Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT……

SUBJECT CARD

Name in Polish: Bezpieczeństwo sieciowe i internetowe
Name in English: Department of Computer Science and Management
Main field of study (if applicable): Informatics
Specialization (if applicable): Security and Reliability of Information Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ003822WL
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	120		60		
Form of crediting	Examination / ~~crediting with grade~~*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	4		2		
including number of ECTS points for practical (P) classes	0		2		
including number of ECTS points for direct teacher-student contact (BK) classes	2,4		1,2		

*delete as not applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge and skills in the field of computer networks.
2. Knowledge and skills in the field of databases and SQL.
3. Windows and Linux administration ability
4. Knowledge on programming languages and platforms, web applications (HTML, XML, C#, JavaScript).

\

SUBJECT OBJECTIVES

C1 The acquisition of knowledge in the field of safety engineering systems, network and Internet security protocol stack TCP / IP and Web Services protocol stack.
C2 Acquisition of knowledge on protecting data integrity, network security using firewalls and IDS and IPS to detect and prevent attacks.
C3 Acquisition of knowledge on mechanisms and tools to increase the safety and security policies and audit system and network security information and business processes.
C4 Acquiring the skills to apply tools, methods, mechanisms and software solutions to of increasing the safety, security audit and intrusion detection system development.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – has knowledge of the concept of security systems and networks, information about the characteristics of safe, familiar classification of attacks on the security of systems and networks.

PEK_W02 – has knowledge of network security and protocol stack TCP / IP, is aware of the attacks on the communication protocols and infrastructure IP, DNS, and directory services, and preventing these attacks, has knowledge of the dangers and realizations DoS and DDoS attacks and the defense mechanisms and systems network from these attacks, has knowledge of intelligent systems, IDS and IPS detection and intrusion prevention systems and the FD.

PEK_W03 – have knowledge about the safety of Wi-Fi and WiMAX, known standards and protocols secure wireless communications.

PEK_W04 – has knowledge of Internet safety information and services as well as security threats and attacks against SQL injection and cross-site scripting, web, email, instant messaging, search engines, Web Services infrastructure, business processes, cloud computing.

PEK_W05 – has knowledge of social engineering attacks, phishing and to prevent these attacks, as well as the security of electronic banking has advanced knowledge about the services and PKI - embodiments of the certification hierarchy, from the Centers for server certification services.

PEK_W06 – has knowledge of information systems security policy and network, and knowledge of safety audit - its different models, methodologies, standards and de facto standards and best practices.

relating to skills:

PEK_U01 – ability to assess the quality and use tools for penetration testing and security scanners systems and networks.

PEK_U02 – ability to demonstrate the attack scenarios and examine and apply methods and tools to detect and prevent attacks and enhance security systems, networks, and web services.

PEK_U03 – ability to use biometric security.

PEK_U04 – ability to perform information security audits with selected methodologies and tools.

relating to social competences:

PEK_K01 – understands the importance of information security, social and business processes, and information systems of national government.

PEK_K02 – has the ability to work in a team on study tasks and implementation of solutions.

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	The safety concept of systems and networks.	2
Lec 2	Features information safe. Classification of attacks.	2
Lec 3	Confidentiality, authentication, authorization, integrity.	2
Lec 4	Basic cryptography, symmetric and asymmetric encryption. PKI, X509 standard.	2
Lec 5	Cryptography systems and networks.	2
Lec 6	Security of TCP / IP protocol stack, and network security.	2
Lec 7	Attacks against the operating system - viruses, worms, hidden communication channels.	2
Lec 8	Attacks aimed at communication and IP, firewall architecture, address translation, and packet filters.	2
Lec 9	Security of network applications and services - Web, email, instant messaging, Web	2

	search engines, Web services infrastructure, defense against XSS and SQL Injection.	
Lec 10	Security of electronic banking.	2
Lec 11	Security directory services. Security in wireless networks.	2
Lec 12	Security of directory services. Security in wireless networks.	2
Lec 13	Security policies and standards.	2
Lec 14	Intrusion detection systems IDS and intrusion prevention systems IPS.	2
Lec 15	Security audit.	2
	Total hours	30
Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	
Form of classes - laboratory		**Number of hours**
Lab 1	Security of protocol stack TCP / IP.	2
Lab 2	DoS attacks and prevention. Password cracking.	2
Lab 3	Penetration testing tools. Security scanners for systems and networks.	2
Lab 4	Sniffing - methods and tools. Detecting and preventing sniffing attacks.	2
Lab 5	IP Spoofing. ARP Spoofing. Man-In-The-Middle attacks and prevention.	2
Lab 6	DNS spoofing and prevention.	2
Lab 7	Detection and protection against malware.	2
Lab 8	XSS attacks and prevention. SQL Injection Attacks and prevention.	2
Lab 9	WEP, WPA, WPA2 – security and attacks against security. Security of wireless network infrastructure.	2
Lab 10	Hardware and software firewall systems.	2
Lab 11	Certification and PKI. Certified mail, news, and business servers and clients, Web services and e-mail. PGP and GPG.	2
Lab 12	Social engineering attacks. Phishing, whaling, scamming. Phishing prevention. Google Hacking.	2
Lab 13	Biometric security.	2
Lab 14	Safety messaging, security of social networking, security infrastructure of systems with a stack of protocols in web services, cloud computing security, business processes security. Simulating an attack in quantum cryptography.	2
Lab 15	Security audit. Audit tools and systems.	2
	Total hours	30
Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		

Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED

N1. Traditional lectures based on multimedia presentations.
N2. A computer lab with Internet access, and virtualization capabilities of workstations and servers.
N3. Research carried out by the students. Participation in the performance of student research and laboratory tasks.
N4. Studying the issues discussed during the lecture. Preparation for the exam.
N5. Consultations for students.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U02, PEK_K02	Ratings for the implementation and documentation of research.
F2	PEK_U01, PEK_U03-PEK_U04	Ratings for the implementation and documentation of laboratory tasks.
C	PEK_W01-PEK_W06	Examination.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] R. Anderson, *Inżynieria zabezpieczeń*, WNT, Warszawa 2005.
[2] B. Schneider, *Kryptografia dla praktyków. Protokoły, algorytmu i programy źródłowe w języku C*, WNT, Warszawa 2002.
[3] E. Cole, R. Krutz, J. Conley, *Bezpieczeństwo sieci. Biblia*, Helion, Gliwice 2005.
[4] J. Pieprzyk, T. Hardjono, J. Seberry, *Teoria bezpieczeństwa systemów komputerowych*, Helion, Gliwice 2005.
[5] A. Lockhart, *125 sposobów na bezpieczeństwo sieci*, Helion, Gliwice 2007.
[6] B. Smith, B. Komar, *MS Windows Security Resorce Kit*, Microsoft Press, 2003.
[7] A. Białas, *Bezpieczeństwo informacji i usług w nowoczesnej firmie*, WNT, Warszawa 2007.
[8] M. Molski, M. Łacheta, *Przewodnik audytora systemów informatycznych*, Helion, Gliwice 2007.
[9] ISACA. *Standardy, wytyczne i procedury audytowania i kontrolowania systemów informatycznych*, 2002.

SECONDARY LITERATURE:

[1] K. Lidermann, *Podręcznik administratora bezpieczeństwa teleinformatycznego*, Helion, Gliwice, 2003.
[2] T. Polaczek, *Audyt bezpieczeństwa informacji w praktyce*, Helion, Gliwice 2006.
[3] S. Garfinkel, G. Stafford, *WWW. Bezpieczeństwo i handel*, Helion, Gliwice 1999.
[4] B. Toxen, *Bezpieczeństwo w Linuxie – Podręcznik administratora*, Helion, Gliwice 2004.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

doc. dr inż. Jacek Gruber, 71 320 33 40; jacek.gruber@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Network and Internet security
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION Security and Reliability of Information Systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W01	C1	Lec1-Lec2	N1, N3-N5
PEK_W02	K2INF_W01-K2INF_W02, K2INF_W04	C1-C2, C4	Lec4,Lec6, Lec9	N1, N3-N5
PEK_W03	K2INF_W02	C2	Lec6-Lec7	N1, N3-N5
PEK_W04	K2INF_W02-K2INF_W05	C2-C3,	Lec5-Lec7	N1, N3-N5
PEK_W05	K2INF_W02-K2INF_W05	C1-C4	Lec1-Lec3, Lec6-Lec7	N1, N3-N5
PEK_W06	K2INF_W03-K2INF_W05	C1-C4	Lec4-Lec5, Lec8-Lec9	N1, N3-N5
PEK_U01 (skills)	K2INF_06, K2INF_U09	C1-C4	Lab1-Lab9	N2-N5
PEK_U02	K2INF_U06-K2INF_U07	C1-C2	Lab1, Lab3, Lab4-Lab5, Lab9	N2-N5
PEK_U03	K2INF_U09	C1-C4	Lab1-Lab9	N2-N5
PEK_U04	K2INF_U06, K2INF_09	C1-C4	Lab1-Lab9	N2-N5
PEK_K01 (competences)			Lec1-Lec9	N5
PEK_K02			Lab1-Lab9	N1-N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY of Computer Science and Management / DEPARTMENT……

SUBJECT CARD

Name in Polish: Diagnostyka systemów informatycznych
Name in English: Department of Computer Science and Management
Main field of study (if applicable): Informatics
Specialization (if applicable): Security and Reliability of Information Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: ~~obligatory~~ / optional / ~~university-wide~~*
Subject code INZ003825WL
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		30		
Number of hours of total student workload (CNPS)	90		60		

Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3		2		
including number of ECTS points for practical (P) classes	0		2		
including number of ECTS points for direct teacher-student contact (BK) classes	1,8		1,2		

*delete as not applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5. Knowledge and skills on Probability and mathematical statistics.
6. Knowledge and skills on Modeling the reliability of systems.

\

SUBJECT OBJECTIVES

C1 The acquisition of knowledge in the area of diagnostic systems, models and strategies diagnosis systems, and the use and applications of the formalism of finite automata and Petri nets for testing and diagnostics systems and software.
C2 Acquisition of knowledge on UML models and graph-theoretic models in diagnosis systems.
C3 Acquisition of knowledge on effectiveness of diagnostic testing, self-diagnosis information systems, mechanisms and protocols of diagnostic, repair and reliability in distributed systems and databases.
C4 Acquisition of knowledge on testing tools, diagnostics, fault location, acquisition of diagnostic knowledge, diagnostic expert systems based on statistics and artificial intelligence - evolutionary methods and neural networks, fuzzy logic as well.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 – have knowledge of computer systems, models and strategies diagnosis systems, and the use and applications of the formalism of finite automata and Petri nets for testing and diagnostics systems and software.
PEK_W02 – has knowledge of the UML models and graph-theoretic models in diagnosis systems.
PEK_W03 – has knowledge of the effectiveness of diagnostic tests, self-diagnosis information systems, mechanisms and protocols of diagnostic, repair and reliability in distributed systems and databases.

relating to skills:
PEK_U01 – can use testing tools, diagnostics, fault location, diagnostics knowledge acquisition, diagnostic expert systems based on statistics and artificial intelligence - evolutionary methods and neural networks and fuzzy logic.

relating to social competences:
PEK_K01 – understands the importance of technical diagnostics and diagnostic systems in the course of a variety of technical and social processes.
PEK_K02 – know how to carry out research work as a team and solve problems.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	The issue of diagnostic systems. Models and strategies of diagnostic systems.	2
Lec 2	Finite automata theory formalisms in the diagnosis. The use of models and formalisms of Petri nets in the diagnostics software.	2
Lec 3	Software testing - the stop conditions. Petri net models in software testing.	2
Lec 4	Diagnostics behavior of UML models of software systems. Graph theory and its applications in diagnostics systems.	2
Lec 5	Graph topology modeling of secure information systems and networks. Trees diagnostic system in the diagnosis of behavioral systems.	2
Lec 6	The theory of Petri net reachability in the diagnosis of software and information systems. The diagnostic tests.	2
Lec 7	The effectiveness of diagnostic tests. Self-diagnosis information systems.	2
Lec 8	Diagnostic, repair and reliability mechanisms in communication protocols, distributed systems and databases. Final test.	1
	Total hours	15
Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	
Form of classes - laboratory		**Number of hours**
Lab 1	Software testing and software diagnosis. Dedicated software. Debugging software environments. Discussion of student research topics, how to study subjects, how to prepare test documentation and presentation. Acquisition of research topics.	2
Lab 2	Detection and fault tolerance during system operation. Redundancy. Dedicated software. Emulators. Testers. Practical exercises on the areas of two student research teams.	2
Lab 3	Diagnostic knowledge acquisition methods. Statistical models. Dedicated software. Practical exercises on the areas of student research teams.	2
Lab 4	Methods for evaluation of credibility. Dedicated software. Practical exercises on	2

	the areas of student research teams.	
Lab 5	Testing and diagnostic equipment of computer hardware infrastructure. Testers. Performance tests. Dedicated software. Practical exercises on the areas of student research teams.	2
Lab 6	Expert systems for technical diagnosis (I). Specialized software. Statistical packages. Practical exercises on the areas of student research teams.	2
Lab 7	Expert systems for technical diagnosis. Specialized software.Practical exercises on the areas of student research teams.	2
Lab 8	Methods of diagnosis process. Specialized software. Statistical packages. Practical exercises on the areas of student research teams.	2
Lab 9	Fault location. Specialized software. Statistical packages. Practical exercises on the areas of student research teams.	2
Lab 10	Evolutionary methods in the design of diagnostic systems. Specialized software. Statistical packages. Practical exercises on the areas of student research teams.	2
Lab 11	Optimizing multimodal optimization. Specialized software. Statistical packages. Practical exercises on the areas of student research teams.	2
Lab 12	Artificial neural networks in the diagnosis of computer systems. Specialized software. Statistical packages. Practical exercises on the areas of student research teams.	2
Lab 13	The use of fuzzy logic in diagnosis systems. Specialized software. Statistical packages. Practical exercises on the areas of student research teams.	2
Lab 14	Methods of obtaining diagnostic knowledge. Specialized software. Statistical packages. Practical exercises on the areas of student research teams.	2
Lab 15	Final test.	2
	Total hours	30

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED

N1. Traditional lectures based on multimedia presentations.
N2. A computer lab with Internet access, and virtualization capabilities of workstations and servers.
N3. Research carried out by the students. Participation in the performance of student research and laboratory tasks.

N4. Studying the issues discussed during the lecture.
N5. Consultations for students.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U06	Rate for the execution and documentation of web applications with enhanced security.
F2	PEK_U01-PEK_U05	Ratings for the implementation and documentation of laboratory tasks.
C	PEK_W01-PEK_W05	Colloquium of the lecture.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] M. Nałęcz (red), *Biocybernetyka i inżynieria biomedyczna 2000*, Tom 6, *Sieci Neuronowe*, W. Duch, J. Korbicz, L. Rutkowski, R. Tadeusiewicz (red. t.), Akademicka Oficyna Wydawnicza EXIT, Warszawa 2000.
[2] F. Grabski, J. Jaźwiński, *Metody bayesowskie w niezawodności i diagnostyce*, WKiŁ, Warszawa 2001.
[3] Sosnowski J., *Testowanie i niezawodność systemów komputerowych*, Akademicka Oficyna Wydawnicza EXIT, Warszawa 2005.
[4] J. Korbicz J., Kościelny J.M., Z. Kowalczuk, Cholewa W. (redaktorzy.), *Diagnostyka procesów. Modele. Metody sztucznej inteligencji. Zastosowania*, WNT, Warszawa 2002.

SECONDARY LITERATURE:

[1] D. Bobrowski, *Modele i metody matematyczne teorii niezawodności w przykładach i zadaniach*, WNT, Warszawa 1985.
[2] M. Maliński, *Weryfikacja hipotez statystycznych wspomagana komputerowo*, Wyd. Politechniki Śląskiej, Gliwice 2004.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

prof. dr hab. inż. Ireneusz Jóźwiak, 71 320 33 40; ireneusz.jozwiak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Diagnostic of information systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION Security and Reliability of Information Systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02-K2INF_W05	C1	Lec1-Lec3	N1, N4-N5
PEK_W02	K2INF_W02-K2INF_W05	C2	Lec4-Lec6	N1, N3-N5
PEK_W03	K2INF_W02-K2INF_W05	C3	Lec7	N1, N3-N5
PEK_U01 (skills)	K2INF_U06-K2INF_U07	C4	Lab1-Lab15	N2-N5
PEK_K01 (competences)	K2INF_W02-K2INF_W05, K2INF_U06-K2INF_U07	C1-C4	Lec1-Lec7, Lab1-Lab15	N1-N5
PEK_K02	K2INF_U06-K2INF_U07	C4	Lab1-Lab15	N1-N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

DEPARTMENT OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish Kryptografia
Name in English Cryptography
Main field of study (if applicable): Informatics
Specialization (if applicable): Security and Reliability of Information Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ003821WL
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	100		70		
Form of crediting	Examination / ~~crediting with grade~~*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	4		3		
including number of ECTS points for practical (P) classes	0		3		

including number of ECTS points for direct teacher-student contact (BK) classes	2		2		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Basic knowledge of calculus, algebra, probability and statistics.
2 Ability to program in a higher level language (Java, C + +, C #, Python).

\

SUBJECT OBJECTIVES

C1 Acquisition of basic knowledge about functioning and construction systems with the symmetric key cryptography.
C2 Acquisition of basic knowledge about functioning and construction systems with the asymmetric key cryptography (public).
C3 Acquisition of basic knowledge about cryptanalysis algorithms and cryptographic systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 - knows the history and the mathematical basis for the operation of cryptographic systems;
PEK_W02 - has knowledge about the functioning of symmetric key algorithms;
PEK_W03 - has knowledge about the functioning of asymmetric key algorithms (public);
PEK_W04 - have a basic understanding of the scope of breaking of cryptographic algorithms.

relating to skills:
PEK_U01 - can implement simple cryptographic algorithms in a high level programming language;
PEK_U02 - can properly select and use cryptographic algorithms available in a library of cryptographic algorithms.

relating to social competences:
PEK_K01 - can work collectively to solve problems.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to the course. Cryptology, cryptography, cryptanalysis - definitions and terminology. History of cryptography and cryptanalysis.	2
Lec 2	Mathematical - selected topics in information theory, number theory and computational complexity.	2
Lec 3	Cryptographic systems - components and properties.	2
Lec 4	Encryption steps - substitutions and transpositions.	2
Lec 5	Polyalphabetic encryption.	2
Lec 6	Block and stream ciphers.	2
Lec 7	Symmetric-key algorithms.	2
Lec 8	Public-key algorithms.	2
Lec 9	Random number generators – keys generation.	2
Lec 10	Generating prime numbers. Hash functions.	2
Lec 11	Digital Signatures. Certificates and Public Key Infrastructure.	2
Lec 12	Cryptographic protocols.	2
Lec 13	Cryptographic systems on elliptic and hyperelliptic curves.	2

Lec 14	Cryptanalysis and cryptanalytic methods - Selected Issues (Part 1)	2
Lec 15	Cryptanalysis and cryptanalytic methods - Selected Issues (Part 2)	2
	Total hours	30

Form of classes - laboratory		**Number of hours**
Lab 1	Organizational issues. Health and Safety Training.	2
Lab 2	Introduction to available educational software in the field of cryptography and cryptanalysis.	2
Lab 3	Mathematical software for cryptographic computations.	2
Lab 4	Implementation of a network application framework for learning of cryptographic techniques and algorithms.	2
Lab 5	Implementation of simple cryptographic algorithms (alg. Caesar, etc.).	2
Lab 6	The implementation of more advanced cryptographic algorithms (alg. Viginere).	2
Lab 7	Techniques for network traffic monitoring to verify the cryptographic security of network communication.	2
Lab 8	Using of cryptographic software libraries - DES and AES.	2
Lab 9	Implementation of the RSA algorithm.	2
Lab 10	Using of cryptographic software libraries - RSA algorithm.	2
Lab 11	Enabling of the RSA algorithm for the network application.	2
Lab 12	Implementation of digital signature in the network application.	2
Lab 13	Using cryptographic certificates.	2
Lab 14	The cryptographic network application tests.	2
Lab 15	Assessment of progress and final grades.	2
	Total hours	30

TEACHING TOOLS USED

N1. Traditional lecture.
N2. Computer laboratories.
N3. Consultations for students.
N4. Own work - preparing for laboratories.
N5. Own work - self-study and exam preparation.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01- PEK_U02 PEK_K01	Assessment for conducting of laboratory tasks or software implementation.
P	PEK_W01 - PEK_W04	Examination.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Stallings W., Kryptografia i bezpieczeństwo sieci komputerowych, Helion, 2012.
[2] Bauer F.L., Sekrety kryptografii. Helion, Gliwice, 2003.
[3] Koblitz N.: Wykład z teorii liczb i kryptografii, WNT, Warszawa, 2006.
[4] Koblitz N.: Algebraiczne aspekty kryptografii, WNT, Warszawa, 2000.
[5] Schneier B.: Kryptografia dla praktyków – Protokoły, algorytmu i programy źródłowe w języku C. WNT, Warszawa, 2002.

SECONDARY LITERATURE:

[1] Kahn D.: Łamacze kodów, WNT, Warszawa, 2004.
[2] Ogiela M.: Systemy utajniania informacji, Uczelniane Wyd. AGH, Kraków, 2003.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Krzysztof Chudzik, Krzysztof.Chudzik@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Network and Internet security
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION Security and Reliability of Information Systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W01	C1, C2	Lec1-Lec3, Lec12-Lec13	N1,3,5
PEK_W02		C1	Lec4-Lec7	N1,3,5
PEK_W03		C2	Lec8-Lec11	N1,3,5
PEK_W04	K2INF_W05	C3	Lec14-Lec15	N1,3,5
PEK_U01 (skills)		C1, C2	Lab4, Lab5, Lab6, Lab9, Lab11, Lab12, Lab13, Lab14	N2,3,4
PEK_U02		C1, C2	Lab2, Lab3, Lab7, Lab8, Lab10	N2,3,4
PEK_K01 (competences)			Lec1-Lec15 Lab1-Lab15	N1,2,3,4,5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY of Computer Science and Management / DEPARTMENT……

SUBJECT CARD

Name in Polish: Kwantowe systemy kryptograficzne
Name in English: Quantum cryptographic systems
Main field of study (if applicable): Informatics
Specialization (if applicable): Security and Reliability of Information Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: ~~obligatory~~ / optional / ~~university-wide~~*
Subject code INZ002643WS
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				30
Number of hours of total student workload (CNPS)	60				60
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					

Number of ECTS points	2				2
including number of ECTS points for practical (P) classes	0				2
including number of ECTS points for direct teacher-student contact (BK) classes	1,2				1,2

*delete as not applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

7. Knowledge and skills on Cryptography.
8. Knowledge and skills on Network and internet security.
9. Knowledge and skills on Probability and mathematical statistics.

\

SUBJECT OBJECTIVES

C1 Acquisition of knowledge in the area of informatics and quantum cryptography.
C2 Acquisition of knowledge on ideas and patterns of action absolutely secure quantum channels.
C3 Acquisition of knowledge on quantum cryptographic key distribution, and swapped and non-swapped QKD protocols, distillation key in QKD, authentication in QKD.
C4 Acquisition of knowledge on modern implementations of quantum cryptography, an overview of the current state of development of technical platforms, research projects and commercial technical platforms.
C5 Acquisition of knowledge on real security of quantum cryptography practical implementation as well as the types of attacks on quantum cryptography schemes.
C6 Acquisition of knowledge on advanced methods for processing of measured data from the system software for the platform cryptographic id3100 Clavis of Id Quantique.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 – has knowledge of the fundamentals of computer science and quantum cryptography.
PEK_W02 – has knowledge of the ideas and patterns of action absolutely secure quantum channels. He knows the basic theorems of quantum - no-cloning, no-deleting, no-broadcasting. He has knowledge of quantum swapping.
PEK_W03 – has knowledge of modern realizations of quantum cryptography, knows the current state of development of technical platforms, research projects and commercial technical platforms for single and entangled photons.
PEK_W04 – have knowledge of advanced methods for measurement data processing software systems and technical platforms quantum cryptography - DARPA SECOQC, UQCC, Tokyo QKD Network, IdQuantique, SwissQuantum, Magiq Technologies, Toshiba.
PEK_W05 – has actual knowledge of the practical implementation of the security of quantum cryptography. He knows the kinds of attacks on quantum cryptography schemes.

relating to skills:
PEK_U01 – has been able to maintain a software system used for cryptographic id3100 Clavis PKI platform of Id Quantique, and can lead acquisition and process measurement data advanced statistical methods and data mining techniques.
PEK_U02 – is able to present the methods and results measurement data processing platform cryptographic PKI be a record of the examination, as well as hold a discussion on these issues

with the audience.

relating to social competences:
PEK_K01 – understand the benefits and risks of quantum cryptography in applications for computer systems maintenance and automation of social and economic processes.
PEK_K02 – know how to carry out research work as a team and solve problems.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Conditional security communication channels based on classical cryptography. The threat of a classical computer. The threat of quantum computing. The essence of quantum information processing. Quantum algorithms Shore and Grover. Practical realization of a quantum computer.	2
Lec 2	Quantum cryptography as fundamentally safe method of transmission of classified information. Unique properties of quantum mechanics in the context of information security. United quantum and nature of quantum measurement. Basic theorems of quantum - no-cloning, no-deleting, no-broadcasting. Quantum swapping.	2
Lec 3	Quantum cryptographic key distribution. Non-swapping QKD protocols. Swapping QKD protocols. Distillation of the QKD key. Authentication.	2
Lec 4	Modern implementations of quantum cryptography. Technology implementation. Single photons. Weak laser pulses. Swapped photons.	2
Lec 5	Review of the current state of development of technical platforms. Research projects. DARPA Quantum Network. The project SECOQC. The project UQCC and Tokyo QKD Network. The project SwissQuantum. Commercial availability of technical platforms IdQuantique, Magiq Technologies, Toshiba.	2
Lec 6	The actual practical implementation of security of quantum cryptography. Types of attacks on quantum cryptography schemes. Denial of Service. Man In The Middle. Weak Measurement. Intercept-resend attack. Photon number splitting. Beam - splitting. Other attacks.	2
Lec 7	QKD - distribution and expansion of the secret cryptographic key. The experimental network connection using the mechanisms of the Wrocław University of QKD under Polish National Laboratory for Quantum Technologies. Experimental setup and installation and software description id3100. Secure Communications using QKD chat demo application.	2
Lec 8	Final test.	1
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		

	Total hours	
Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
Lab 6		
Lab 7		
Lab 8		
Lab 9		
	Total hours	
Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	
Form of classes - seminar		**Number of hours**
Sem 1	The Id Quantique Clavis. Installing the software id3100. Discussion of student research topics, how to study subjects, how to prepare test documentation and presentation. General information of platform cryptographic company Clavis Id Quantique and of software system id3100 on this platform. Acquisition of student research topics.	2
Sem 2	Id Quantique Clavis - Quantum key distribution over a distance of 5 km in the real test environment. The initial phase of the commissioning and testing the platform.	2
Sem 3	Key exchange using the BB84 protocol. Key exchange protocol using SARG04. Start data acquisition process monitoring and diagnostic system.	2
Sem 4	Key exchange protocol using SARG04. Start data acquisition process monitoring and diagnostic system. Measurement data extraction and analysis capabilities and methods of processing.	2
Sem 5	Analysis of the experimental set-id3100 action in the real test environment without connectors and splices. The results for the BB84 protocol. Measurement data extraction and analysis capabilities and methods of processing.	2
Sem 6	Analysis of the experimental set-id3100 action in the real test environment without connectors and splices. Results for SARG04 protocol. Measurement data extraction and analysis capabilities and methods of processing.	2
Sem 7	Analysis of the experimental set-id3100 action in the real test environment with different number of connectors and splices. The results for the BB84 protocol. Measurement data extraction and analysis capabilities and methods of processing.	2
Sem 8	Analysis of the experimental set-id3100 action in the real test environment with different number of connectors and splices. Results for SARG04 protocol.	2

	Measurement data extraction and analysis capabilities and methods of processing.	
Sem 9	Advanced analysis and diagnostics activities set for the BB84 protocol without fiber connectors and splices. Measurement data extraction and analysis capabilities and methods of processing.	2
Sem 10	Advanced analysis and diagnostics activities set for the BB84 protocol with varying amounts of fiber connectors and splices. Measurement data extraction and analysis capabilities and methods of processing.	2
Sem 11	Advanced analysis and diagnostics activities set for the protocol SARG04 without connectors and splices fibers. Measurement data extraction and analysis capabilities and methods of processing.	2
Sem 12	Advanced analysis and diagnostics activities set for the protocol SARG04 with varying amounts of fiber connectors and splices. Measurement data extraction and analysis capabilities and methods of processing.	2
Sem 13	Research Report Kit for BB84 protocol and SARG04.	2
Sem 14	Formulating conclusions from the study for the protocols BB84 and SARG04 for different number of connectors and splices. Discuss the idea of fiber optic repeaters.	2
Sem 15	Summary of the study. Credits.	2
	Total hours	30

TEACHING TOOLS USED

N1. Traditional lectures based on multimedia presentations.
N2. Research carried out by the students. Participation in the performance of student research and laboratory tasks.
N3. Studying the problems of lectures and seminars, and research with access to the platform cryptographic Clavis IdQuantique.
N4. Consultations for students.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01-PEK_U02	Ratings for the execution of studies and presentations and discussion.
F2	PEK_U02	Rating for documentation of studying a subject.
C	PEK_W01-PEK_W05, PEK_K01	Final test.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] W. Jacak (i in.), *Wstęp do Informatyki i Kryptografii Kwantowej*, Oficyna Wydawnicza Politechniki Wrocławskie, Wrocław 2011.
[2] M. Donderowicz, *Modele kwantowych kryptograficznych kanałów komunikacyjnych z realizacjami na platformach badawczych i w zastosowaniach komercyjnych*, praca magisterska, Politechnika Wrocławska, Wrocław 2012.
[3] W. Jacak, *Aspekty bezpieczeństwa informacji w systemach informatyki klasycznej i kwantowej wraz z analizą możliwości wybranych eksperymentalnych realizacji kwantowego przetwarzania informacji*, praca magisterska, Politechnika Wrocławska, Wrocław 2005.
[4] W. Donderowicz, *Modelowanie bezpiecznych kanałów informacyjnych i projekt kwantowej studialnej platformy badawczej dla wybranych zastosowań informatycznych*, praca magisterska, Poliechnika Wrocławska, Wrocław 2005.
[5] M. Jacak, *Informatyczna implementacja protokołów kryptografii kwantowej na systemach splątanych fotonów(system Clavis II) i splątanych fotonów (system EPR S405 Quelle)*, praca magisterska, Politechnika Wrocławska, Wrocław 2012.
[6] J. Jacak, *Porównanie kwantowego i klasycznego sposobu przechowywania, przetwarzania i zabezpieczania informacji (wybrane aspekty)*, Politechnika Wrocławska, Wrocław 2007.
[7] M. Hirvensalo, *Quantum computing*, Springer-Verlag, Berlin 2001.
[8] *Quantum Distribution System id 3100 Clavis2 User Guide*, Id Quantic, 2012.
[9] *MagiQ Technologies Releases 'Open' Quantum Key Distribution for Researchers Exploring Boundaries of Cryptography*, Business Wire, [Online] MagiQ Technologies, Inc., 2003, opracowanie dostępne pod adresem: http://www.businesswire.com/news/home/20031103005452/en/MagiQ-Technologies-Releases-Open-Quantum-Key-Distribution
[10] A. Pellegrini, V. Bertacco, T. Austin, M.A. Nielsen, I.J. Chuang, *Fault-Based Attack on RSA Authentication, Quantum Computation and Quantum Information*, Cambridge, Cambridge University Press, 2000.
[11] Y. Zhao (et al), *Quantum Hacking: Experimental Demonstration of Time-shift Attack Against Practical Quantum-key-distribution Systems*, Phys. Rev. A. 4, Vol. 78, 2008.

SECONDARY LITERATURE:

[1] S. Bellovin, *Security through obscurity. Risks Digest*, Forum on Risks to the Public in Computers and Related Systems, ACM Committee on Computers and Public Policy, P.G. Neumann, moderator, Volume 25, Issue 69, 24 May 2009.
[2] A.S. Tanenbaum, *Computer Networks*, Ed. 2nd, Prentice Hall, 2003.
[3] A.S. Godbole, *Data Communications and Networks*, McGraw-Hill Publishing Co. Ltd., 2007.
[4] C. Adams, S. Lloyd, *Understanding Public Key Infrastructure, II*, Pearson Education Inc., 2003.
[5] L.D. Landau, E.M. Lifshic, *Quantum Mechanics*, PWN, Warsaw 1979.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

doc. dr inż. Jacek Gruber, 71 320 33 40; jacek.gruber@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Network and Internet security
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION Security and Reliability of Information Systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W01, K2INF_W02	C1	Lec1	N1, N3-N4
PEK_W02	K2INF_W01, K2INF_W02	C2	Lec2	N1, N3-N4
PEK_W03	K2INF_W01, K2INF_W02	C3,C4	Lec4-Lec5, Lec7	N1, N3-N4
PEK_W04	K2INF_W01, K2INF_W02	C4	Lec4-Lec5, Lec8	N1, N3-N4
PEK_W05	K2INF_W01, K2INF_W02	C4	Lec6	N1, N3-N4
PEK_U01 (skills)	K2INF_U03	C4,C6	Sem1-Sem14	N2-N4
PEK_U02	K2INF_U06-K2INF_U07	C4,C6	Sem1-Sem15	N2-N4
PEK_K01 (competences)		C1-C6	Lec1-Lec8, Sem1-Sem15	N1-N4
PEK_K02		C1-C6	Sem1-Sem15	N2-N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Metodologia badań naukowych
Name in English Methodology of empirical sciences…….
Main field of study (if applicable): Informatics…….
Specialization (if applicable): ……..
Level and form of studies: 2nd* level, full-time /
Kind of subject: obligatory /
Subject code INZ003763……
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	0	0	0	0
Number of hours of total student workload (CNPS)	90	0	0	0	0
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					

Number of ECTS points	3				
including number of ECTS points for practical (P) classes	0				
including number of ECTS points for direct teacher-student contact (BK) classes	1,8				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Competence in basic algebra
2. Competence in mathematical analysis
3. Differential equations

\

SUBJECT OBJECTIVES

C1 Knowledge on the methodological postulates
C2Competence in mathematical modeling on the base of methodology of empirical sciences
C3Competence in hypothesis testing
C4Competence in creation of homogeneous and invariant in relation to the system of units models

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01Knowledge on methodological postulates
PEK_W02Logical postulates of mathematical models construction (invariance and homogeneity)
PEK_WOO3Logical base of hypothesis testing

…
relating to skills:
PEK_U01Competence in mathematical modeling with accordance to methodological postulates
PEK_U02Competence in hypothesis and empirical models testing
…
relating to social competences:
PEK_K01Competence in the exactness of process description
PEK_K02Competence on ability of studying and reflection on experiment

PROGRAMME CONTENT

Form of classes - lecture		**Number of**
Lec 1Methods of scientific and technical project validation on the base of citation analysis	2	
Lec 2Methodological postulates of determinism, closed system, interconnectedness, simplicity and Popper's condition of falsification	2	
Lec 3Classical theory of measurements and the postulate of uniquenes	2	
Lec 4Dimensionally invariant description of a process, dimensional space	2	
Lec 5Theorem Pi of dimensional analysis and examples of its applications	2	
Lec 6Applications of theorem Pi in: models construction, experiment planning,	2	

identification Lec 7Theory of similarity Lec 8Invariance of models in relation to rotations group, tensors homogeneity Lec 9 Models testing and falsification of hypothesis Lec 10Identification of mathematical models Lec 11Multistage identification, models interpretability Lec 12Description of models construction Lec 13Models testing	2 2 2 2 2 2 2 2	
	Total hours26	Plus 2 colloqiums

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		

…		
	Total hours	

TEACHING TOOLS USED
N1.Literature N2.Examples analysis N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1P-1colloquium evaluation	WO1,WO2	Evaluation of students work
F2P-2colloquium evaluation	UO1,UO2	Evaluation of examples solving
F3		
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J.M. Bochenski The methods of contemporary thought. Harper Torchbooks, NY,1968
[2] W.Kasprzak, B. Lysik, M.Rybaczuk Measurements, Dimensions, Invariant Models and Fractals Spolom Wroclaw Lviv 2004
[3]
[4]

SECONDARY LITERATURE:

[1] K. R. Popper The logic of Scientific Discovery. Hutchinson Publ. Comp. 1959
[2]
[3]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Waclaw Kasprzak waclaw.kasprzak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Methodology of empirical sciences……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_WO1	Methodology basis	K1,K2,K3	N1,N2,P1
PEK_W02	K2INF_WO6	Models testing	K4,K13	P1
…				
…				
PEK_U01 (skills)	K2INF_UO6	Construction of models	K5,K6,K7	N1,N2,P2
PEK_U02	K2INF_UO8	Hyothesis testing	K8,K13	N1,N2,P2
…				
PEK_K01 (competences)	K_2SWD_KO1		K2	N1,N2
PEK_K02	K2_SWD_KO2		K13	N1,N2,P2
…				

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY of Computer Science and Management / DEPARTMENT……

SUBJECT CARD

Name in Polish: Modele niezawodności systemów informatycznych
Name in English: Reliability models of information systems
Main field of study (if applicable): Informatics
Specialization (if applicable): Security and Reliability of Information Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ003823WS
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30				30
Number of hours of total student workload (CNPS)	120				60
Form of crediting	Examination / ~~crediting with grade~~*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					

Number of ECTS points	4				2
including number of ECTS points for practical (P) classes	0				2
including number of ECTS points for direct teacher-student contact (BK) classes	2,4				1,2

*delete as not applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

10. Knowledge and skills in probability and mathematical statistics.

\

SUBJECT OBJECTIVES

C1 Acquisition of knowledge on the basis of reliability of technical systems with particular emphasis on information systems.
C2 Acquisition of knowledge about models and measures of functional reliability of computer systems.
C3 Acquisition of knowledge about the reliable transmission of information.
C4 Acquisition of knowledge about the reliability of the software and its protection against threats.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – is aware of the importance of safety and more reliability of technical systems, known classification of computer crashes and forcing factors, has knowledge of security tools, system faults and security systems.
PEK_W02 – has knowledge of the distributions of the times suitability of computer systems, the reliability structure, repairable and non-repairable systems.
PEK_W03 – has knowledge of the functional configuration, known models and measures of reliability systems and is also known Markov models.
PEK_W04 – has knowledge of models and measures of the reliability of computer systems and system reliability threshold, knows the software reliability models.
PEK_W05 – has knowledge of the software reliability measurement and planning an experiment in reliability.
PEK_W06 – has knowledge of reliability engineering of computer systems, has a knowledge of research in reliability of computer systems.
PEK_W07 – has expertise in assessing the reliability of computer systems in the light of the standards and has knowledge of designing the reliable elements.

relating to skills:

PEK_U01 – is able to study a specific part of issues relating to the reliability of computer systems.
PEK_U02 – is able to present to study some issues relating to the reliability of computer systems, which studied, in the form of presentations and discussions, as well as hold a discussion with the audience made in the area of study.
PEK_U03 – can make documentation of completed study works.

relating to social competences:

PEK_K01 – understands the importance of reliability of computer and information systems in the course of social and economic processes.

PROGRAMME CONTENT

Form of classes - lecture	**Number of**

		hours
Lec 1	The importance of the safety and reliability of the technical systems. Classification of computer failure. Forcing factors.	2
Lec 2	Security tools. Failures, faults, and errors in computer systems. System protection.	2
Lec 3	Distributions of times faultless operation of computer systems.	2
Lec 4	Reliability structure. Recoverable and unrecoverable systems.	2
Lec 5	Functional Configuration. Models and measurements of system reliability.	2
Lec 6	Markov Models.	2
Lec 7	Models and measures of the reliability of computer systems.	2
Lec 8	Reliability of threshold systems.	2
Lec 9	Software reliability models.	2
Lec 10	Measurement of software reliability.	2
Lec 11	Planning an experiment in reliability.	2
Lec 12	Reliability engineering systems.	2
Lec 13	Reliability testing of computer systems.	2
Lec 14	Reliability assessment systems in the light of the standards.	2
Lec 15	Introduction to design reliable systems.	2
	Total hours	30
Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	
Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
..		
	Total hours	
Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
...		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	The importance of the safety and reliability of the technical systems. Discussion of student research topics, how to study subjects, preparing test documentation and presentation. Acquisition of research topics.	2
Sem 2	Classification of computer failure. Forcing factors. Two student presentations of case study research.	2
Sem 3	Security tools. Failures, faults, and errors in computer systems. System protection. Two student presentations of case study research.	2
Sem 4	Distributions of times faultless operation of computer systems. Two student presentations of case study research.	2
Sem 5	Reliability structure. Recoverable and unrecoverable systems. Two student presentations of case study research.	2
Sem 6	Functional Configuration. Models and measurements of system reliability. Two student presentations of case study research.	2
Sem 7	Markov Models. Two student presentations of case study research.	2
Sem 8	Models and measures of the reliability of computer systems. Two student presentations of case study research.	2
Sem 9	Reliability of threshold systems. Two student presentations of case study research.	2
Sem 10	Software reliability models. Two student presentations of case study research.	2
Sem 11	Measurement of software reliability. Two student presentations of case study research.	2
Sem 12	Planning an experiment in reliability. Two student presentations of case study research.	2
Sem 13	Reliability engineering systems. Two student presentations of case study research.	2
Sem 14	Reliability testing of computer systems. Two student presentations of case study research.	2
Sem 15	Reliability assessment systems in the light of the standards. Credits.	2
	Total hours	30

TEACHING TOOLS USED

N1. Traditional lectures based on multimedia presentations.
N2. Traditional seminars based on multimedia presentations.
N3. Research carried out by the students. Participation in the performance of student research tasks.
N4. Studying the issues discussed during the lecture. Preparation for the exam.
N5. Consultations for students.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01-PEK_U02	Ratings for doing work-study, and for the presentation and discussion. Oceny za wykonanie prac studialnych oraz prezentacje i omówienia.
F2	PEK_U03	Rating for documentation of case study research.

		Oceny za dokumentację z przestudiowanej problematyki.
C	PEK_W01-PEK_W05, PEK_K01	Examination.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J. Migdalski (red.), *Inżynieria niezawodności*. Poradnik tom I i II. Wyd. ATR Bydgoszcz i ZETOM, Warszawa 1992.
[2] B. Schneier, *Kryptografia dla praktyków - protokoły, algorytmy i programy źródłowe w języku C*, WNT, Warszawa 1995.
[3] D. Comer, Sieci *komputerowe TCP/IP. Zasady, protokoły i architektura*, WNT, Warszawa 1997.
[4] D. Bobrowski, *Modele i metody matematyczne teorii niezawodności w przykładach i zadaniach*, WNT, Warszawa 1985.
[5] D. *Bobrowski*, *Probabilistyka w zastosowaniach technicznych*, WNT, Warszawa 1986.
[6] I. Koźniewska, M. Włodarczyk, *Modele odnowy, niezawodności i masowej obsługi*, PWN, Warszawa 1978.
[7] A. Grzywak, *Bezpieczeństwo systemów komputerowych i telekomunikacyjnych*, Wydawnictwo SOTEL, Chorzów 1999.
[8] S. Garfinkel, G. Spafford, *Bezpieczeństwo w Unixie i Internecie*, Wydawnictwo RM, Warszawa 1997.

SECONDARY LITERATURE:

[1] S. Maguire, *Niezawodność oprogramowania*. Wyd. Helion, Gliwice 2002.
[2] J. Bernardyn, J. Gruber, *Bezpieczeństwo sieci intranetowych i systemów włączonych do Interenetu*. Raport WZI P.Wr. serii SPR nr 10/99. Politechnika Wrocławska 1999.
[3] I.J. Jóźwiak, *Zastosowanie modelu hazardów proporcjonalnych Weibulla*, Pr. Nauk. CO P.Wr. nr 11, Seria Monografie Nr 3, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1991.
[4] N. Viswanadham, V.V.S. Sarma, G. Singh, *Reliability of Computer and Control Systems*, North-Holland, Amsterdam 1987.
[5] K. Ważyńska-Fiok, J. Jaźwiński, *Niezawodność systemów technicznych*, PWN, Warszawa 1990.
[6] J. Stokłosa, T. Bilski, T. Pankowski, *Bezpieczeństwo danych w systemach informatycznych*, Wyd. Naukowe PWN, Warszawa 2001.
[7] M. Maliński, *Weryfikacja hipotez statystycznych wspomagana komputerowo*, Wyd. Politechniki Śląskiej, Gliwice 2004.
[8] D. Bobrowski, *Modele i metody matematyczne teorii niezawodności w przykładach i zadaniach*, WNT, Warszawa 1985.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

prof. dr hab. inż. Ireneusz Jóźwiak, 71 320 33 40; ireneusz.jozwiak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Network and Internet security
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION Security and Reliability of Information Systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF01-K2INF02	C1-C3	Lec1-Lec2	N1, N3-N5
PEK_W02	K2INF02	C1-C3	Lec3-Lec4	N1, N3-N5
PEK_W03	K2INF01	C1-C3	Lec5-Lec6	N1, N3-N5
PEK_W04	K2INF01-K2INF02	C1-C4	Lec7-Lec9	N1, N3-N5
PEK_W05	K2INF01-K2INF02	C1,C4	Lec10-Lec11	N1, N3-N5
PEK_W06	K2INF01-K2INF02	C1-C3	Lec12-Lec13	N1, N3-N5
PEK_W07	K2INF01-K2INF02	C1-C3	Lec14-Lec15	N1, N3-N5
PEK_U01 (skills)	K K2INF01-K2INF02	C1 C1-C4	Sem1-Sem15	N2-N5
PEK_U02	K2INF01-K2INF02	C1-C4	Sem1-Sem15	N2-N5
PEK_U03		C1-C4	Sem1-Sem15	N2-N5
PEK_K01 (competences)	K2INF01-K2INF02	C1-C4	Lec1-Lec15, Sem1-Sem15	N1-N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: Informatics and Management

SUBJECT CARD

Name in Polish: Modelowanie i analiza biznesowa
Name in English: Modeling and business analysis
Main field of study (if applicable): Informatics
Specialization (if applicable): Computer Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ3760
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	30			
Number of hours of total student workload (CNPS)	60	90			
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points	2	3			
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	1,8			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Practice in object-oriented programming.
2. Basic knowledge of software engineering.

\

SUBJECT OBJECTIVES

C1. Basic knowledge in the area of software system modeling with the stress on business modeling as the initial phase of the software development process.
C2. Basic knowledge in the area of the requirements specification.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEK_W01: Students have basic knowledge on business modeling.
PEK_W02: Students know and understand the role of specification requirements.
PEK_W03: Students have basic knowledge on selected modeling languages.

Relating to skills:
PEK_U01: Students, in cooperation with domain experts, can construct and analyze business models.
PEK_U02: Students can build models of system requirements.

Relating to social competences:
PEK_K01: Students are able to cooperate with representatives of application domain.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Basic notions for software development cycle. Survey of modeling languages – UML and BPMN.	2
Lec 2	Class diagrams – classes, associations, generalizations.	2
Lec 3	Validation and verification.	1
Lec 4	Object Constraint Language.	2
Lec 5	UML activity diagrams.	2
Lec 6	BPMN process diagrams.	2
Lec 7	UML statechart diagrams.	2
Lec 8	System requirements; use case diagrams.	2

	Total hours	15

Form of classes - class		Number of hours
Cl 1	Construction and analysis of simple class diagrams.	2
Cl 2	Construction and analysis of advanced class diagrams.	2
Cl 3	Analysis of textual descriptions of exemplary application domains – structural aspect (1).	2
Cl 4	Analysis of textual descriptions of exemplary application domains – structural aspect (2).	2
Cl 5	Case study – an example of structural modeling.	2
Cl 6	Construction and analysis of OCL constraints imposed on diagrams.	2
Cl 7	Test 1.	2
Cl 8	Analysis of textual descriptions of exemplary application domains – structural and behavior aspect.	2
Cl 9	Analysis of simple BPMN diagrams.	2
Cl 10	Construction of simple BPMN diagrams.	2
Cl 11	Construction and analysis of advanced BPMN diagrams.	2
Cl 12	Construction and analysis of simple state diagrams.	2
Cl 12	Construction and analysis of advanced state diagrams..	2
Cl 13	Construction and analysis of use case diagrams.	2
Cl 14	Test 2.	2
Cl 15	Corrective test.	2
	Total hours	30

TEACHING TOOLS USED

N1. Lecturer's presentation at a blackboard, supported by a multimedia presentation using a laptop and a projector.
N2. Individual search and study of literature and Internet sources.
N3. Access to teaching materials published in the local area network.
N4. Individual consultations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 PEK_U01 PEK_K01	Each student gets 1 point for own solution of a problem from the list of problems for the given class.

<table>
<tr><td>F2</td><td>PEK_W01
PEK_W02
PEK_U01
PEK_U02
PEK_K01</td><td>Each student gets up to 10 points for own solution of problems for the given test (intermediate and final).</td></tr>
<tr><td>F3</td><td>PEK_W01
PEK_W02
PEK_W03
PEK_U01
PEK_U02
PEK_K01</td><td>The final evaluation for the classes is determined on the basis of total marks obtained by the student's activity for exercise (F1) and colloquia (F2). Positive mark is awarded to a student who has obtained at least 4 points for each of the symposia and has won a total of 10 points.
If this condition is met, the number of points P is the basis for evaluation in accordance with the following table:
<table>
<tr><td>P</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table>
Students who get at least a very good grade are exempt from the examination with the same mark as for the classes.</td></tr>
<tr><td colspan="3">C: The final evaluation of the course is determined based on the results of the examination. The examination lasts two hours and consists of a set of tasks, the total number of 20 points. The condition for a positive assessment of the final exam is to get 10 points and a positive final evaluation of the exercise.
The final evaluation of the examination is determined in accordance with the following table:
<table>
<tr><td>Points</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table></td></tr>
</table>

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Rumbaugh J., Jacobson I., Booch G., *The Unified Modeling Language – Reference Manual*. Second edition, Addison-Wesley, 2005.

[2] Weilkiens T., Oestereich B., *UML 2 Certification Guide. Fundamental and Intermediate Exams*, Elsevier 2007.

[3] Maciaszek L. A., *Requirements Analysis and System Design*, Second edition, Pearson, Addison-Wesley, 2005.

[4] Adolph S., Bramble P., *Patterns for Effective Use Cases,* Addison-Wesley, 2003

[5] Gašević D., Djurić D., Devedžić V., *Model Driven Architecture and Ontology Development*, Springer, 2006.

SECONDARY LITERATURE:

[1] Graessle P., Baumann H., Baumann P., *UML 2.0 w akcji. Przewodnik oparty na projektach*, Helion, 2006.

[2] Object Management Group, Unified Modeling Language (available on the website: www.omg.com).

[3] Object Management Group, System Modeling Language SysML (available on the website: www.omg.com).

[4] Object Management Group, Business Process Modeling Notation BPMN (available on the website: www.omg.com).

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Zbigniew Huzar, zbigniew.huzar@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems Modeling and Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION
Computer Engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W02	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W03	K2INF_W03		Lec1-Lec8	N1, N2, N3, N4
PEK_U01 (skills)	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_U02	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_K01 (competences)	K2_SWD_K01	C1, C2	Lec1-Lec15 Cl1-Cl15	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from the table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa I
Name in English MSc Thesis I
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code INZ003818
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				60	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points				2	
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes				0,6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 2rd semester

\

SUBJECT OBJECTIVES

C1 Preparation of students to write a master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology, with special attention of all stages of writing a thesis.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Preparation of students to write a master thesis according the internal	

	requirements of Faculty of Computer Science and Management (Computer Science field of study), Wrocław University of Technology, with special attention of all stages of writing a thesis. Literature studies, selection and learning of systems, tools, methods and algorithms needed for the realization of the chosen subject of thesis. The preparation of an outline of work and schedule of future work. Basic work on the research, design and implementation. Familiarization with the research works carried out at the Institute of Informatics. Final results: the initial solution and / or the prototype of developed system, knowledge about the current state of art in the field of thesis, an outline of future work and timetable for further works documented in English and Polish languages.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED
N1. Literature study - analysis of publications (including websites) related to subject of thesis, including the research works of the Institute of Informatics. N2. Own work, independent research on the tasks defined in the master's thesis N3. Student consultation with the supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessment based on the final results achieved

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[5] Literature related to the scope of realized project selected by student and recommended by the teacher.

[6] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis I
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U03, K2INF_U08	C1	Pr1	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa II
Name in English MSc Thesis II
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005221
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				540	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points				18	
including number of ECTS points for practical (P) classes				18	
including number of ECTS points for direct teacher-student contact (BK) classes				6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 4th semester

\

SUBJECT OBJECTIVES

C1 Preparation of master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish language, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes – project		**Number of hours**
Proj 1	Subject is the main component of the process of realization the master thesis and involves the preparation by the student his master thesis. Master thesis is done under the direction of his supervisor, with whom student defines its scope, goals, tasks and timetable for implementation.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED

N1. Preparation of master thesis N2. The text of the master thesis N3. Thesis review prepared by the supervisor N4. Students consultation with supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of master thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessed is the final text of the diploma thesis. The assessment is carried out in the form of a review done by the promoter. The condition to pass the course is delivering the final text of master thesis before the defined deadline. The second review, which does not, however the condition for pass the course is done by the reviewer appointed by the Faculty Dean. Reviews are made according to the standard format. The student is admitted to the defense (final exam) if both reviews are positive

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[7] Literature related to the scope of realized project selected by student and recommended by the teacher.

[8] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis II
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K1INF_U03, K2INF_U08	C1	Proj1	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Seminarium dyplomowe
Name in English Diploma seminar
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005220
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					90
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points					2
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes					1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge, skills and competences acquired at Informatics field at second level of study until 3th semester

\

SUBJECT OBJECTIVES

C1 Preparing students to write a master thesis according the internal requirements in Informatics field at Faculty of Computer Science and Management, Wrocław University of Technology,

C2 Providing students with basic skills related to preparation and presentation of scientific texts, beginning from the choice of topic, selection of tasks to be performed, use of literature to interpretation of the results.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He is able to acquire information from literature, databases and other sources, also in English or other language used for communication in Informatics field, is able to integrate the information obtained, interpret them, make critical evaluation and also draw conclusions and formulate and justify opinions related to prepared master thesis.

PEK_U02 He can communicate using a variety of techniques in his professional environment and in other environments, also in English or other foreign language used for communication in Informatics field and also to present the results of his master thesis

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
	Total hours	

Form of classes - seminar	**Number of hours**

Sem 1	Familiarization with the principles of master thesis realization at Informatics field. Rules related to student presentations. Determining the schedule of student presentations.	2
Sem 2	Review of basic skills related to preparation and presentation of scientific texts by students, beginning from the choice of topic, selection of tasks to be performed, use of literature and also how to write thesis and how obtained results should be interpret.	2
Sem 3 – Sem15	During semester each student has 2 presentations. The first presentation is related to the general view of the thesis topic, its placement in the literature and in the Informatics field. The student should present the primary aim of thesis, the state of art related to thesis topic, the concept of solution, the initial structure of thesis and timetable for further work. The purpose of the second presentation is preparation to defense and demonstrate presentation skills in English. The second presentation consists of two parts, namely, discussion of the results of the work in English and a short presentation in Polish devoted to the results of the thesis.	26
	Total hours	30

TEACHING TOOLS USED

N1. Multimedia presentations
N2. Examples of scientific papers and reports from the field of computer science.
N3. E-Learning System used to publish teaching materials and announcements, also used for collection and evaluation of student work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01 PEK_U02	Evaluation of the presentation of the work at the seminar and prepared documentation from the presentation. The evaluation shall be subject to the fulfillment of the requirements for the presentation, including its substantive scope, structure and organization of presentation, techniques of conversation, a form of presentation, compactness of presentation and conclusions reached. Participation in the discussions after presentation is also evaluated. In addition, the seminar leader is able to control the cooperation between supervisors and graduate students.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[9] Literature related to the scope of realized project selected by student and recommended by the teacher.

[10] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. inż. Leszek Borzemski, prof. PWr, leszek.borzemski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Diploma seminar
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
AND SPECIALIZATION **every specjalization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3
PEK_U02	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT…

SUBJECT CARD

Name in Polish Systemy informacyjne
Name in English Information systems
Main field of study (if applicable): Informatics
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code INZ3762
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				30
Number of hours of total student workload (CNPS)	60				60
Form of crediting	crediting with grade	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	crediting with grade
For group of courses mark (X) final course					
Number of ECTS points	2				2
including number of ECTS points for practical (P) classes	0				0
including number of ECTS points for direct teacher-student contact (BK) classes	1,2				1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic mathematical knowledge for 1st level of studies.

2. Informatics knowledge background.
3. Algorithms knowledge background.

\

SUBJECT OBJECTIVES

C1 Acquiring knowledge about functions and significance of information systems in contemporary organizations
C2 Acquainting with the functions and development of information systems in information society
C3 Acquainting with the different methods of information retrieval by surfing the Web
C4 Recognizing the problems of passing of contemporary organizations to Internet space
C5 Obtainment of skills to analyze the literature from information systems area and to synthesize the contents from different sources
C6 Application of the obtained knowledge to presentation the problems from information systems area by means of using adequate tools

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Familiarity with basic models of information systems
PEK_W02 Basic knowledge about Web information systems
PEK_W03 Familiarity with common multimedia technologies
PEK_W04 Understanding of the measures of information retrieval efficiency

relating to skills:
PEK_U01 Student can to build information query for different types of information needs
PEK_U02 Can to determine basic features of information system for given organization
PEK_U03Student be able to evaluate the precision of retrieved information
PEK_U04 Can to present basic features of given information system

relating to social competences:
PEK_K01 Can individually to use literature of the subject and to select useful information
PEK_K02 Student is convinced above positive role of information systems in stimulation of the civilization development

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	History of information systems development. Information processing. Theoretical basis of information systems.	2
Lec 2	Main information systems' models. Automation of information flow in organization.	2
Lec 3	Information retrieval on Internet – fundamentals.	2
Lec 4	Web information systems.	2
Lec 5	Multimedia. Importance of multimedia technologies in information systems development.	2
Lec 6	How societies embrace information technology. Digital libraries.	2
Lec 7	Efficiency of information systems. Case study of chosen information system.	2
Lec 8	Test	1
	Total hours	15

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Introductory seminar.	2
Sem 2	Information systems – definitions, types, features, examples.	2
Sem 3	Information retrieval fundamentals – models, dictionaries, indexes.	2
Sem 4	Evaluation of information systems' efficiency.	2
Sem 5	Analytical retrieval of information.	2
Sem 6	Information retrieval on Internet.	2
Sem 7	ERP class systems.	2
Sem 8	Mobile information systems.	2
Sem 9	Multimedia information systems.	2
Sem 10	Information systems for teleworking.	2
Sem 11	How societies embrace information technology.	2
Sem 12	CRM systems.	2
Sem 13	Knowledge management systems.	2
Sem 14	Information society: e-business, e-administration, e-commerce, e-health	2

Sem 15	Seminar summation and credit.	2
	Total hours	30

TEACHING TOOLS USED

N1. Computerized presentation at the lectures.
N2. Presentation with visualization and using Internet resources during the seminar.
N3. Consultations.
N4. Students' homework with using software packages.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 PEK_U04 PEK_K02	Grade of presentation (quality of slides, oral presentation, relevance, duration), presence and activity.
F2	PEK_K01	Report's grade
P-seminar	PEK_U02	Grade result from F1 and F2
P-lecture	PEK_W01-PEKW04 PEK_U03	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Manning C. D., Raghavan P., Schutze H.: *Introduction to Information Retrieval*, Cambridge University Press, New York, 2009, dostępne także bezpłatnie: www.cambridge.org

[2] Kłopotek M. A.: *Inteligentne wyszukiwarki internetowe* , Akademicka Oficyna Wydawnicza EXIT, Warszawa, 2001.

[3] Wrycza S. (red.): *Informatyka ekonomiczna. Podręcznik akademicki*, PWE, Warszawa, 2010.

[4] Cortada J. W. : How Societies Embrace Information Technology, WILEY-IEEE, NY, 2009.

[5] Baeza-Yates R., Ribeiro-Neto B.: *Modern Information Retrieval*, ACM Press, Adison-Wesley, New York, 1999.

SECONDARY LITERATURE:

[1] Zgrzywa A., Choroś K., Siemiński A.(Eds.): *Multimedia and Internet Systems: Theory and Practice,* Spriger Verlag, Berlin, 2013.

[2] Nguyen N.T., Zgrzywa A., Czyżewski A.(Eds.): *Advances in Multimedia and Network Information System Technology,* Spriger Verlag, Berlin, 2010.

[3] Zawiła-Niedźwiecki J. : *Informatyka gospodarcza*, Wyd. C. H. Beck, 2010.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Aleksander Zgrzywa, Aleksander.Zgrzywa@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INFW03, K2INF_W06	C1	Lec1, Lec 6 Sem 2,Sem 14	N1-4
PEK_W02	K2INF_W04, K2INF_W06	C3,C4	Lec 3, Lec 4 Sem 6,Sem 7, Sem 11	N1-4
PEK_W03	K2INF_W02, K2INF_W06	C2	Lec 5, Lec 6 Sem 13,Sem 14	N1-4
PEK_W04	K2INF_W03	C3	Lec 3, Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U01	K2INF_U01, K2INF_U08	C3	Lec 3,Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U02	K2INF_U05, K2INF_U08	C4	Lec 2,Lec 7 Sem 7,Sem 8,Sem 12,Sem 13	N1-4
PEK_U03	K2INF_U05, K2INF_U08	C3	Lec 2, Lec 5 Sem 3, Sem 5, Se6,Se9	N1-4
PEK_U04	K2INF_U02, K2INF_U03	C5, C6	Lec 5, Lec 6 Sem 3, Sem 5, Sem 6, Sem 9, Sem 10	N1-4

PEK_K01	K2INF_K01, K2INF_U02	C5	Lec 5, Lec 6 Sem 9, Sem 10	N1-4
PEK_K02	K2INF_K02	C1	Lec 1, Lec 6 Sem 2, Sem 14	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8/ DEPARTMENT……

SUBJECT CARD

Name in Polish: Systemy wspomagania decyzji
Name in English: Decision Support Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Decision Support Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / university-wide*
Subject code: INZ003761
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	15		15	
Number of hours of total student workload (CNPS)	60	30		60	
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / ~~crediting with grade~~*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2	1		2	
including number of ECTS points for practical (P) classes				2	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	0,6		1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None.

\

SUBJECT OBJECTIVES

C1 Getting to know foundations of designing computer science decision support systems using general systemic methods which make it possible to apply unified approaches for analysis and decision making for decision support systems of different nature.
C2 Acquisition of skills to represent in the form of mathematical formulas of decision making plants treated as input-output plants.
C3 Acquisition of skills to analyze of decision making plants treated as input-output plants.
C4 Getting acquainted with methods and algorithms of multi-stage decision making.
C5 Acquisition of skills to apply dynamic programming method.
C6 Getting to know metods and algorithms of multi-criteria decision making.
C7 Acquisition of skills to use AHP method.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Student knows foundations of designing of decision support systems for any kind of plants.
PEK_W02 Student knows foundations of analysis and decision making for input-output plants with logic knowledge representation.
PEK_W03 Student knows selected method of multi-stage and multi-criteria decision making.
relating to skills:
PEK_U01 Student is able to elaborate a mathematical model for an input-output decision making plant in discrete state space as well as with logic knowledge representation.
PEK_U02 Student can solve analysis and decision making tasks for elementary plants with logic knowledge representation.
PEK_U03 Student is able to solve multi-stage decision making problem using Bellman's Principle and dynamic programming.
PEK_U04 Student can use AHP algorithm for the solution od multi-criteria decision making problem
relating to social competences:
PEK_K01 Student can take advantage of professional literature by oneself and can perform the critical analysis of information mined.
PEK_K02 Student can think creatively.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Decision support systems – definitions, structures, problems.	1
Lec 2	Application of discrete state equations and logic expressions for representation of decision making plants.	2
Lec 3	Analysis of decision making plants, in particular logic-algebraic method.	2
Lec 4	Decision making – definition, typology, logic-algebraic plant.	2
Lec 5	Bellman's Principle and multi-stage decision making.	3
Lec 6	Multi-criteria decision making, Pareto sets, AHP method.	3
Lec 7	Examples of computer decision support systems.	2
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Solution of numerical exercises concerning difference equations.	1
Cl 2	Solution of numerical exercises concerning differential equations as well as propositional calculus.	2

Cl 3	Solution of numerical exercises concerning mathematical representations of input-output plants.	2
Cl 4	Solution of numerical exercises concerning analysis using logic-algebraic method.	2
Cl 5	Solution of numerical exercises concerning decision making using logic-algebraic method.	2
Cl 6	Solution of numerical exercises concerning dynamic programming.	2
Cl 7	Solution of numerical exercises concerning AHP method.	2
Cl 8	Final test.	2
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Collecting of indispensable information about selected plant being the decision making plant.	2
Proj 2	Determination of mathematical model of selected decision making plant and decision making problem formulation.	2
Proj 3	Analysis of decision making plant using its mathematical model.	2
Proj 4	Choice of decision making method for further usage as well as elaboration of decision making algorithm.	3
Proj 5	Implementation and alalysis of decision making algorithm.	4
Proj 6	Elaboration of conclusions and written report of the project performed.	2
	Total hours	15

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1 Lecture – traditional method. N2 Classes – traditional method. N3 Consultation. N4 Individual discussion with student. N5 Short test (10 mins.). N6 Self-contained work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Short tests during the classes.
F2	PEK_K01– PEK_K02	Individual discussion with student during the project.
P (Classes)	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Test.
P (Project)	PEK_U01–PEK_U04; PEK_K01–PEK_K02	Evaluation of written report of the project.
P (Lecture)	PEK_W01–PEK_W03; PEK_K02	Exam.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[11] [1] Józefczyk J., Wybrane problemy podejmowania decyzji w kompleksach operacji, Oficyna Wydawnicza PWr, Wrocław 2001.

[12] Bubnicki Z., Podstawy informatycznych systemów zarządzania, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1993.

[13] Roy B., Wielokryterialne podejmowanie decyzji, WNT, Warszawa 1990.

SECONDARY LITERATURE:

[1] Techniki informacyjne w badaniach systemowych, P. Kulczycki, O. Hryniewicz, J. Kacprzyk (red.), WNT, Warszawa 2007.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Jerzy Józefczyk, Jerzy.Jozefczyk@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Decision Support systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Decision Support systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1	Lec1, Lec 2, Lec 7, Cl1, Cl 2, Pr1	N1, N3, N6
PEK_W02	K2INF_W02	C1	Lec3, Lec4	N1, N3, N6
PEK_W03	K2INF_W02	C4, C6	Lec5, Lec6	N1, N3, N6
PEK_U01 (skills)	K2INF_U05; K2INF_U06	C2	Lec2, Cl 3, Proj2	N2–N6
PEK_U02	K2INF_U05; K2INF_U06	C3	Cl 4, Cl 5, Proj3, Pro4	N2–N6
PEK_U03	K2INF_U05; K2INF_U06	C5	Cl 6, Proj4	N2–N6
PEK_U04	K2INF_U05; K2INF_U06	C7	Cl 7, Proj4	N2–N6
PEK_K01 (competences)	K2INF_K01	C1, C4, C6	Lec1– Lec7, Proj1, Proj4	N2–N6
PEK_K02	K2INF_K01	C1–C7	Proj1–Proj6	N2–N6

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: Teoria i inżynieria ruchu teleinformatycznego

Name in English: Theory and engineering of teletraffic

Main field of study (if applicable): Computer science

Specialization (if applicable): Teleinformatics

Level and form of studies: 2nd level, full-time

Kind of subject: obligatory

Subject code INZ3759

Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload	30			90	

(CNPS)					
Form of crediting	Crediting with grade			Crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	1			3	
including number of ECTS points for practical (P) classes				3	
including number of ECTS points for direct teacher-student contact (BK) classes	0,6			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Has a basic knowledge of ICT systems and computer communication networks (K1INF_W11).
2. Knows the basic methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_W16)
3. Can use the right tools to build a simple model of the process (the object), to formulate specific task analysis and decision making (K1INF_U15)
4. Can effectively use the methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_U16)
5. It has the ability to self-education, including in order to improve the professional competence (K1INF_U05)
6. Understands the need and knows the possibility of lifelong learning and to improve their professional and social competences (K1INF_K01)

SUBJECT OBJECTIVES

C1. Ordered, underpinned by theoretical knowledge of methods and techniques for transmitting signals using different modulation techniques, methods and techniques of information transmission, methods of organization and management of data communications traffic in the tasks of design and analysis of communication systems, methods of delivering service quality of ICT systems, analysis of quantitative and qualitative requirements and methods for sizing of distributed IT systems.

C2. Skills about the differences and benefits of the use of analog and digital data transmission techniques, the differences and benefits of the use of wired and wireless signal transmission techniques, developing the concept of using wired and wireless technologies in the basic applications of ICT systems, defining the qualitative and quantitative requirements of the user information and communication systems range of data, designing ICT solutions needed to achieve the qualitative and quantitative requirements of the user, using standards and solutions available on the market, estimating the cost of preparing and maintaining ICT solutions needed to achieve the qualitative and quantitative requirements, designing modernization of IT solutions needed to achieve the qualitative and quantitative requirements, identifying differences and similarities between solutions in a variety of applications (e-health, e-government and e-learning, in real-time systems, etc.).

C3. Skills for the design and analysis of complex, distributed ICT systems providing network services for distributed computer communication systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

K2INF_W02: Has a structured, theoretically founded essential knowledge of business modeling and requirements specification systems.

K2INF_W03: Has a structured, theoretically founded essential knowledge in the delivery of information distributed systems

K2INF_W06: Achieves results in the category of knowledge for specialty data communications

relating to skills:

K2INF_U05: Can - in formulating and solving engineering tasks - integrate knowledge of the fields of science and scientific disciplines relevant to the study being studied and applied a systemic approach, taking into account the non-technical aspects

K2INF_U06: Can solve the modeling, analysis and decision making for different types of objects

K2INF_U08: Achieves results and skills in areas of data exchange and computer communications systems

relating to social competences:

K2INF_K01: Can think and act in a creative and enterprising

K2INF_K02: Has aware of the social role of technical graduating, especially understands the need for the formulation and communication to the public, especially through the mass media, information and opinion on the achievements of technology and other aspects of engineering, shall endeavor to provide such information and opinions in a widely understood the reasons for the different points of view

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Classification of ICT systems from different points of view. Quality of Experience (QoE) and Quality of Service (QoS) in ICT systems with elastic and streaming traffic.	2
Lec 2	Introduction to queuing. Open and close networks of queues.	2
Lec 3	Queuing models of circuit-switched and packet-switched computer communication systems. Burke's theorem and Kleinrock approximation.	2
Lec 4	Access control, flow control and routing tasks formulation and solution in distributed environments.	2
Lec 5	Requirements analysis	1
Lec 6	Models (Poisson, Markov modulated, self-similarity, etc) of teletraffic and its application in traffic engineering tasks.	2
Lec 7	QoS delivery concepts: best effort, integrated services and differentiated services	2
Lec 8	New concepts of systems and networks - NXGN (Next Generation Networks) i NWGN (New Generation Network). Summary.	2
	Total hours	15

PROGRAMME CONTENT

Form of classes - project		Number of hours
Proj 1	Formulation design task based on the analysis of the literature, documentation, etc.	2
Proj 2	Justification for the choice task and purpose of the task design - an analysis of the expected benefits of the project task.	2
Proj 3	Quantitative requirements analysis for the communication system under design	2
Proj 4	Qualitative requirements analysis for the communication system under design	2
Proj 5	Analysis of state of the art on how to solve the task design	2
Proj 6	Analysis and selection of the task design methodology	2
Proj 7	Tools (methods, algorithms, procedures, software and hardware) analysis and selection required for the implementation of the project task	2
Proj 8	Implementation of prototype of modules solve the task	2
Proj 9	Prototype testing and evaluation	2
Proj 10	Modification of solutions using prototype test results	2
Proj 11	Integration of modules distinguished at the stages of requirements analysis and prototyping	2
Proj 12	Verification and testing of an integrated solution design task	2
Proj 13	Analysis of the possibility of extending the project tasks	2
Proj 14	Preparation of the presentation and documentation of the design task	2
Proj 15	Presentation of the results of the design task	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture supported by whole class multimedia presentations based on literature and open access and commercial sources.
N2. Student's own works – solving experiments and tasks in laboratory as well as homework.
N3. Student's own works – literature and open access sources studies.
N5. Collective works in laboratory
N5. Student's own works – preparation of presentations and technical documentations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05	Observation and verification of student activity. Solving the sample jobs.

	K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	
F1 – F15 (project)	K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and assessment of student autonomy.
P (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	Colloquium (course credit) in the evaluation of forming F1 (lecture)
P (project)	K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Total weighted ratings F1 - F15 (project) and the assessment for the presentation of the final results of the project.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[14] A.S. Tanenbaum, „Computer networks", Prentice Hall; 1996
[15] G. Pujolle, D. Seret, D. Dromard, E. Horlait, „Integrated Digital Communication Networks", J. Wiley & Sons
[16] B. Russell, „The art of computer networks", Prentice Hall; 2009
[17] V.S. Bagad, I.A. Dhotre, „Computer networks", Technical Publications, 2009.
[18] M. Roden, „Analog and digital communication systems", Prentice Hall
[19] http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

SECONDARY LITERATURE:

[1] S. Haykin, „Telecommunication systems", Prentice Hall, 1999.
[2] MIT Free Open Course Materials (http://ocw.mit.edu/index.htm)
[3] CCNA Exploration Network Fundamentals, Cisco Academy, PWN, 2008

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Adam Grzech, adam.grzech@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Theory and engineering of teletraffic

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer science

AND SPECIALIZATION
Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1, C2, C3	Lec 1 – Lec 8	N1, N4
PEK_W02	K2INF_W03	C1	Lec 1 – Lec 8	N1,N2, N4
PEK_W03	K2INF_W06	C1	Lec 1 – Lec 8	N1, N4
PEK_U01 (skills)	K2INF_U05	C1, C2, C3	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_U02	K2INF_U06	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_U03	K2INF_U08	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_K01 (competences)	K2INF_K01	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_K02	K2INF_K02	C1, C2	Lec 1 – Lec 8	N1, N2, N3, N4, N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY of Computer Science and Management / DEPARTMENT……

SUBJECT CARD

Name in Polish: Testowanie i niezawodność systemów komputerowych
Name in English: Testing and reliability of computer systems
Main field of study (if applicable): Informatics
Specialization (if applicable): Security and Reliability of Information Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ002644WS
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				30
Number of hours of total student workload (CNPS)	60				60

Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2				2
including number of ECTS points for practical (P) classes	0				2
including number of ECTS points for direct teacher-student contact (BK) classes	1,2				1,2

*delete as not applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

11. Knowledge and skills of models reliability of computer systems.
12. Knowledge and skills of Building secure applications.
13. Knowledge and skills in Probability and mathematical statistics.

\

SUBJECT OBJECTIVES

C1 Acquisition of knowledge on selected problems on Reliability and software testing methodologies for industrial applications.
C2 The acquisition of knowledge on language management automatic source code instrumentation for testing embedded software integration.
C3 Acquisition of knowledge on the test Web applications, software testing, software testing support in a distributed environment.
C4 The acquisition of knowledge in the application of fuzzy logic in testing and reliability, security management of an industrial venture, reliability object on the basis of parametric and catastrophic injuries.
C5 Acquisition of knowledge about modern methodologies, models, formalisms, algorithms and for testing and research and increase the reliability of computer systems, software, and computer control systems and automation.
C6 Acquisition of knowledge on testing tools, and research and increase the reliability of computer systems, software, and computer control systems and automation.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 – has knowledge of selected problems of reliability and software testing methodologies for industrial applications.
PEK_W02 – has knowledge of the management of automated source code instrumentation for testing embedded software integration.
PEK_W03 – have knowledge of the test sites, software testing, software testing support in a distributed environment.
PEK_W04 – has expertise in the field of application of fuzzy logic applications in testing and reliability, security management of an industrial venture, to study and improve the reliability of an object based on information about parametric and catastrophic injuries.
PEK_W05 – has knowledge on contemporary methodologies, models, formalisms, algorithms and for testing and research and increase the reliability of computer systems, software, and computer control systems and automation.

relating to skills:
PEK_U01 – can be selected and applied methodologies, models, formalisms, algorithms and tools for testing and research and increase the reliability of systems, software and systems.
PEK_U02 – is able to present the methods and results of measurement data on various methodologies, models, formalisms, algorithms and tools for testing and research and increase the reliability of systems, software and systems.

relating to social competences:
PEK_K01 – understand the benefits and risks of testing and increase the reliability of the applications for operating systems and automation of social and economic processes.
PEK_K02 – know how to carry out research work as a team and solve problems.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Selected problems of reliability.	2
Lec 2	Methods of testing software for industrial applications.	2
Lec 3	Language management automatic source code instrumentation for testing embedded software integration.	2
Lec 4	Functional testing tools web sites.	2
Lec 5	Software testing. Support the integration of software testing tools in a distributed environment.	2
Lec 6	The use of fuzzy logic in testing and reliability.	2
Lec 7	Issues of safety management of an industrial venture. Reliability assessment of object based on information about parametric and catastrophic injuries.	2
Lec 8	Final test.	1
	Total hours	15
Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	
Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
Lab 6		
Lab 7		
Lab 8		
Lab 9		

	Total hours	
Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	
Form of classes - seminar		**Number of hours**
Sem 1	Security testing of social networking - sample testing tools. Discussion of student research topics, how to study subjects, preparing test documentation and presentation. Acquisition of student research topics.	2
Sem 2	Web Usage Mining. Presentation of results of studies student.	2
Sem 3	Testing the physical data models. Practical exercises in two student research. Presentation of results of student research.	2
Sem 4	Forecasting using data mining methods. Presentation of results of student research.	2
Sem 5	Application of data mining methods in the detection and analysis of failures of equipment and machinery. Presentation of results of student research.	2
Sem 6	Application modules Cucaber, Rcpec and Test: Unit testing applications in Ruby. Presentation of results of student research.	2
Sem 7	Statistical models and metrics in the context of testing and prediction of software defects. Presentation of results of student research.	2
Sem 8	The use of evolutionary algorithms in the process of applying for reliability. Presentation of results of student research.	2
Sem 9	Advanced data analysis and knowledge discovery. Applications for testing and reliability. Presentation of results of student research.	2
Sem 10	Reducing the dimension sample size for the synthesis of the statistical system fault detection. Presentation of results of student research.	2
Sem 11	Creating and using data mining model with the provisions of STATISTICA Data Miner. Example - fraud detection. Presentation of results of student research.	2
Sem 12	Reducing the dimension of the problem situation using factor analysis. Presentation of results of student research.	2
Sem 13	High availability - HCMP. Presentation of results of student research.	2
Sem 14	Detection of double damages. The equivalence of binary classifiers. Presentation of results of student research.	2
Sem 15	Summary of the study. Credits.	2
	Total hours	30
TEACHING TOOLS USED		
N1. Traditional lectures based on multimedia presentations. N2. Research carried out by the students. Participation in the performance of student research and		

laboratory tasks.
N3. Studying the issues discussed during the lecture and the student research.
N4. Consultations for students.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01-PEK_U02	Ratings for the implementation and documentation of research.
F2	PEK_U02	Ratings for the implementation and documentation of laboratory tasks.
C	PEK_W01-PEK_W05, PEK_K01	Final test.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Problemy współczesnej nauki. Teoria i zastosowania, Seria: Automatyka i Robotyka, Edytor serii: Leonard Bolc (ed.), Akademicka Oficyna Wydawnicza EXIT, Warszawa 2009.
[2] Z. Huzar, Z. Mazur (red.), *Inżynieria oprogramowania – od teorii do praktyki*, WKiŁ, Warszawa, 2008.
[3] Z. Kowalczuk (red.), *Systemy wykrywające, analizujące i tolerujące usterki*, Automatyka i informatyka. Technologie Informacyjne, Automatyka, Diagnostyka, PWNT, Gdańsk 2009.
[4] S. Kozielski (red.) i in., *Architektura, metody formalne i zaawansowana analiza danych*, Bazy danych. Rozwój metod i technologii, WKiŁ, Warszawa 2008.
[5] S. Kozielski (red.) i in., *Bezpieczeństwo. Wybrane technologie i zastosowania*, Bazy danych, WKiŁ, Warszawa 2008.
F. Grabski, J. Jaźwiński, *Metody bayesowskie w niezawodności i diagnostyce*, WKiŁ, Warszawa 2001.

SECONDARY LITERATURE:

[1] D. Bobrowski, *Modele i metody matematyczne teorii niezawodności w przykładach i zadaniach*, WNT, Warszawa 1985.
[2] M. Maliński, *Weryfikacja hipotez statystycznych wspomagana komputerowo*, Wyd. Politechniki Śląskiej, Gliwice 2004.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

doc. dr inż. Jacek Gruber, 71 320 33 40; jacek.gruber@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Network and Internet security
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION Security and Reliability of Information Systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W01, K2INF_W02	C1,C5	Lec1-Lec2	N1,N3-N4
PEK_W02	K2INF_W01, K2INF_W02	C2,C5	Lec3	N1,N3-N4
PEK_W03	K2INF_W01, K2INF_W02	C3,C5	Lec4-Lec5	N1,N3-N4
PEK_W04	K2INF_W01, K2INF_W02	C4,C5	Lec6-Lec7	N1,N3-N4
PEK_W05	K2INF_W01, K2INF_W02	C5	Sem1-Sem15	N1,N3-N4
PEK_U01 (skills)	K2INF_U03	C5-C6	Sem1-Sem15	N2-N4
PEK_U02		C5-C6	Sem1-Sem15	N2-N4
PEK_K01 (competences)		C1-C6	Lec1-Lec7, Sem1-Sem15	N1-N4
PEK_K02		C1-C6	Sem1-Sem15	N2-N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY of Computer Science and Management / DEPARTMENT……

SUBJECT CARD

Name in Polish: Wytwarzanie bezpiecznych aplikacji
Name in English: Programming secure applications
Main field of study (if applicable): Informatics
Specialization (if applicable): Security and Reliability of Information Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: ~~obligatory~~ / optional / ~~university-wide~~*
Subject code INZ003824WL
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		30		
Number of hours of total student workload (CNPS)	90		60		
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3		2		

including number of ECTS points for practical (P) classes	0		2		
including number of ECTS points for direct teacher-student contact (BK) classes	1,8		1,2		

*delete as not applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

14. Knowledge and skills on programming in at least two languages from C #, Java, PHP, HTML / XML in JavaScript, Python.
15. Knowledge on application development on one of the PHP, JSP, ASP, or a single platform from XAMP / WAMP, J2EE, MS Visual Studio, any CMS or any framework to create web applications and software systems.
16. Windows and Linux administration ability.
17. Knowledge and skills in the area of databases and SQL.

\

SUBJECT OBJECTIVES

C1 Acquisition of knowledge about how to create secure code programs and applications in different programming languages and on different platforms of software development.
C2 Acquisition of knowledge of the development of mechanisms for securing data in databases and programming secure applications and web services.
C3 Acquisition of knowledge of the mechanisms of strengthening security software programs, applications and services.
C4 Acquisition of advanced knowledge about the mechanisms, libraries and components of a cryptographic system programming software platforms and web applications development and information systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 – has knowledge of the production of secure code and secure applications in the Java programming language, C #, on platforms JSP and ASP.NET and C / C + +.
PEK_W02 – no knowledge of programming and production of secure applications on different platforms and in different environments and languages free software - including PHP, Python, Joomla!, Drupal, WAMP, XAMP and different manufacturing environments CMS.
PEK_W03 – has knowledge of a threat of web applications and systems of the mechanisms of development.
PEK_W04 – knows the security mechanisms and the development of technology platforms J2EE/SE, PHP, ASP.NET, AJAX, WAMP environments and XAMP, and Python, Joomla!, Drupal CMS design.
PEK_W05 – knows security mechanisms in web servers and in DBMS systems.

relating to skills:
PEK_U01 – can produce secure code programs in different programming languages.
PEK_U02 – can make use of the mechanisms of generation of secure web applications and systems on the platform JSP. He can remove and test the security vulnerability.
PEK_U03 – can make use of the mechanisms of generation of secure web applications and systems platforms ASP.NET. He can remove and test the security vulnerability.
PEK_U04 – can make use of the mechanisms of generation of secure web applications and systems software platforms and manufacturing ox CMS - PHP, Joomla!, Python, Drupal. He can remove and test the security vulnerability.

PEK_U05 – can create secure the availability of information systems and services.
PEK_U06 – able to implement a web application or a small system with enhanced security in a language of choice in selected technology and the selected developer platform.

relating to social competences:
PEK_K01 – understands the importance of security of information systems and Internet services for the processes of economic, social and security of the state and society.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Introduction to produce secure code. Create secure applications in C / C + +. Create secure applications in C #. Safety components for the Java platform.	2
Lec 2	Programming of secure applications using PHP and CMS Joomla!. Security threats in database management systems.	2
Lec 3	Programming web applications with security against attacks generate, download and execute malicious code. Countering threats derived from the mechanisms of development - security structures indicative and memory leaks - software and systems failures.	2
Lec 4	Programming applications to support a stack overflow attacks when performing code - malicious code execution and denial of service.	2
Lec 5	Security mechanisms for development platforms. Cryptographic systems programming technology of JSP, PHP, and CMS platforms.	2
Lec 6	Programming security systems on the ASP.NET and AJAX platforms. Secure access to data - programming secure applications and services for web servers and databases.	2
Lec 7	Securing the operability of services and systems by filtering network traffic load balancing, clustering mechanisms and to ensure quality of service QoS. Final test.	2
Lec 8	Summary of the lecture. Credits.	1
	Total hours	15
Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	
Form of classes - laboratory		**Number of hours**
Lab 1	The rules for creating secure code - study of practical examples. Discussion of student research topics, how to study subjects, preparing test documentation and presentation. Acquisition of research topics.	2
Lab 2	Programming secure applications in C / C + + - practical examples. Practical exercises in two student research.	2

Lab 3	Safety programs for the Java platform - study examples. Practical exercises in two student research.	2
Lab 4	Application Development in C # - removing vulnerabilities, security testing. Practical exercises in two student research.	2
Lab 5	Programming of secure applications using PHP and CMS Joomla!. The use of safe, well-tested components, Joomla! and PHP scripts. Security mechanisms for access to databases MySQL and PostgreSQL. Practical exercises in two student research.	2
Lab 6	Security threats and security mechanisms in database management systems, MySQL, PostgreSQL and MS SQL Server. Examples of practical application development with protection of access to databases on different platforms developers. Practical exercises in two student research.	2
Lab 7	Programming Web applications with security against attacks generate, download and execute malicious code. Practical examples of secure Web applications - creating or commissioning and testing. Practical exercises for student research.	2
Lab 8	Mechanisms for secure access to data - programming secure applications and services, and mechanisms for web servers and networking - practical examples of developer platforms ASP.NET / Visual Studio, JSP/J2EE, PHP, CMS Joomla!, server platforms IIS, Apache Tomcat, Apache. Practical exercises in two student research.	2
Lab 9	Countering threats derived from the mechanisms of development - security structures indicative and memory leaks - software and systems failures. Practical examples of programs in C / C + +, C #, Java, PHP. Practical exercises for student research.	2
Lab 10	Applications resistant to attack a stack overflow when performing code - malicious code execution and denial of service. Practical examples of non-susceptible programs in C / C + +, C #, Java, PHP. Practical exercises for student research.	2
Lab 11	Security mechanisms for development platforms. Detailed analysis of the Visual Studio platform, J2EE, CMS Joomla. Practical exercises for student research.	2
Lab 12	Programming cryptographic systems. Programming the small-scale symmetric cryptography, asymmetric, and hash functions for encryption and signatures. Practical exercises for student research.	2
Lab 13	Security software mechanisms of technology platforms. NET and AJAX. Advanced mechanisms and code examples. Practical exercises for student research.	2
Lab 14	Security software mechanisms of technology platforms J2EE, PHP, CMS Joomla. Examples of creating safe sites, portals and business systems and information. Analysis of examples of secure business systems architectures using Web services protocol stack with specialized secure access to network services. Practical exercises for student research.	2
Lab 15	Practical solutions secure access to services and information systems by filtering network traffic load balancing, clustering mechanisms and to ensure quality of service (QoS) based on dedicated servers. Analysis and testing of the sample solution. Practical exercises for student research. Credits.	2
	Total hours	30

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		

Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED

N1. Traditional lectures based on multimedia presentations.
N2. A computer lab with Internet access, and virtualization capabilities of workstations and servers.
N3. Research carried out by the students. Participation in the performance of student research and laboratory tasks.
N4. Studying the issues discussed during the lecture.
N5. Consultations for students.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U06	Rate for the execution and documentation of web applications with enhanced security.
F2	PEK_U01-PEK_U05	Ratings for the implementation and documentation of laboratory tasks.
C	PEK_W01-PEK_W06	Final test for the lecture.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] L. Powers, M. Snell, *Microsoft Visual Studio 2008. Księga eksperta*, Helion, Gliwice, 2009.
[2] E. Jendrock, I. Evans, D. Gollapudi, K. Haase, Ch. Srivathsa, *Java EE 6. Przewodnik. Wydanie IV*, Helion, Gliwice, 2012.
[3] H. Schildt, *Java. Kompendium programisty. Wydanie VIII*, Helion, Gliwice, 2012.
[4] J. Ross, *Bezpieczne programowanie. Aplikacje hakeroodporne*, Helion, Gliwice, 2009.
[5] L. Ullman, *E-commerce. Genialnie proste tworzenie serwisów w PHP i MySQL*, Helion, Gliwice, 2011.
[6] B. Hoffman, B. Sullivan, *Bezpieczeństwo aplikacji tworzonych w technologii Ajax*, Helion, Gliwice, 2009.
[7] T. Canavan, *Joomla! Zabezpieczanie witryn*, Helion, Gliwice, 2010.
[8] D. Overton, *Small Business Server 2008 PL. Instalacja, migracja i konfiguracja*, Helion, Gliwice, 2010.

SECONDARY LITERATURE:

[1] C. Shiflett, *PHP. Bezpieczne programowanie*, Helion, Gliwice, 2006.
[2] C.S. Horstmann, G. Cornell, *Java. Techniki zaawansowane. Wydanie VIII*, Helion, Gliwice, 2009.
[3] M. Hall, L. Brown, Y. haikin, *Core Java Servlets i JavaServer Pages. Tom II. Wydanie II*, Helion, Gliwice, 2009.
[4] J. Viega, M. Messier, *C i C++. Bezpieczne programowanie, Receptury*, Helion, Gliwice, 2005.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

doc. dr inż. Jacek Gruber, 71 320 33 40; jacek.gruber@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Network and Internet security
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION Security and Reliability of Information Systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02-K2INF_W05	C1, C4	Lec1	N1, N3-N5
PEK_W02	K2INF_W02-K2INF_W05	C1-C4	Lec2	N1, N3-N5
PEK_W03	K2INF_W02-K2INF_W05	C1-C4	Lec3-Lec4, Lec7	N1, N3-N5
PEK_W04	K2INF_W02-K2INF_W05	C2-C4	Lec5	N1, N3-N5
PEK_W05	K2INF_W02-K2INF_W05	C1-C4	Lec6	N1, N3-N5
PEK_U01 (skills)	K2INF_W07	C1, C4	Lab2	N2-N5
PEK_U02	K2INF_U06-K2INF_U07	C2-C4	Lab3, Lab8-La14	N2-N5
PEK_U03	K2INF_U09	C2-C4	Lab3, Lab8-La14	N2-N5
PEK_U04	K2INF_U09	C1-C4	Lab5-Lab6	N2-N5
PEK_U05	K2INF_U09	C2-C4	Lab5-Lab14	N2-N5
PEK_U06	K2INF_U09	C1-C4	Lab1-Lab15	N2-N5
PEK_K01 (competences)	K2INF_W02-K2INF_W05	C2-C4	Lec1-Lec8	N1-N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Zaawansowane metody i techniki analizy danych
Name in English Advanced Methods and Techniques of Data Analysis
Main field of study (if applicable): computer science
Specialization (if applicable): …….
Level and form of studies: 2nd* level, full-time
Kind of subject: obligatory
Subject code INZ003758
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	crediting with grade*		crediting with grade*		
For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P)	0		4		

classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of mathematics and mathematical statistics

\

SUBJECT OBJECTIVES

C1 Introduce the methods and techniques of the statistical data analysis to students
C2 Gather knowledge for Knowledge Discovery (Data Mining)
C3 Applying the gathered knowledge to drawing conclusions based on data analysis

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has a basic knowledge of Knowledge Discovery (Data Mining)
PEK_W02 student has a basic knowledge of statistical data analysis
PEK_W03 student is able to present differences between parametric and non-parametric tests

relating to skills:
PEK_U01 student is able to choose a proper statistical test
PEK_U02 student is able to draw conclusion from data analysis
PEK_U03 student is able to select a proper data mining method

relating to social competences:
PEK_K01 student is able to search and reuse the primary and secondary literature listed below and is able to gather the proper knowledge
PEK_K02 student understands the need for systematic and individual work in order to cover the scope of the course

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction to knowledge discovery	2
Lec 2	Classification and Data Clustering	2
Lec 3	Clustering Algorithms	2
Lec 4	Discovering association rules	2
Lec 5	Statistics - basic notions	2
Lec 6	The selected problems of estimation theory	2
Lec 7	Introduction to verification of statistical hypothesis	2
Lec 8	Parametric tests for one population	2
Lec 9	Non-parametric tests for one population	2
Lec 10	Parametric tests for two populations	2
Lec 11	Non-parametric tests for two populations	2
Lec 12	Parametric tests for more than 2 populations	2
Lec 13	Non-parametric tests for more than 2 population	2

Lec 14	Correlation and regression methods	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Introduction to WEKA	2
Lab 2	Knowledge discovery in WEKA	8
Lab 3	Introduction to MATLAB	2
Lab 4	Statistical data analysis in MATLAB	8
Lab 5	Introduction to R	2
Lab 6	Statistical data analysis in R	8
	Total hours	30

Form of classes - project		**Number of**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Traditional lecture N2. Labs N3. One-to-one consultancy during stuff hours N4. Student self-study

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P -laboratory	PEK_U01-PEK_U03, PEK_K01-PEK_K02	Evaluation of the prepared tasks during labs, oral test
P-lecture	PEK_W01-PEK_W03 PEK_K01-PEK_K02	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[20] M. Sobczyk: Statystyka, Wydawnictwo Naukowe PWN, 2007

[21] W.Krysicki, J.Bartos, W. Dyczka, K. Królikowska, M. Wasilewski: Statystyka, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, cz. 2 Statystyka matematyczna, Wydawnictwo Naukowe PWN, 2007

[22] Marek Walesiak, Eugeniusz Gatnar (Red. nauk.) :Statystyczna analiza danych z wykorzystaniem programu R, Wydawnictwo Naukowe PWN, 2009

[23] M. Korzyński: Metodyka eksperymentu Planowanie realizacja i statystyczne opracowanie wyników eksperymentów technologicznych, Wydawnictwo Naukowo-Techniczne 2006

[24] Nong Ye, : The Handbook of Data Mining, Lawrence Erlbaum Associates, Publishers, 2003

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Prof. dr hab. inż Ngoc Thanh Nguyen, Ngoc-Thanh.Nguyen@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Advanced Methods and Techniques of Data Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY computer science
AND SPECIALIZATION **……**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C2	Lec1-4 Lab1-2	N1-4
PEK_W02	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_W03	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_U01	K2INF_U01, K2INF_W06, K2INF_W08	C1	Lec5-14 Lab3-6	N1-4
PEK_U02	K2INF_U01, K2INF_W06, K2INF_W08	C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_U03	K2INF_U01, K2INF_W06, K2INF_W08	C2	Lec1-4 Lab1-2	N1-4
PEK_K01		C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_K02		C1, C2, C3	Lec1-14 Lab1-6	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY of Computer Science and Management / DEPARTMENT……

SUBJECT CARD

Name in Polish: Zaawansowane systemy bezpieczeństwa informatycznego
Name in English: Advanced information security systems

Main field of study (if applicable): Informatics
Specialization (if applicable): Security and Reliability of Information Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university wide~~*
Subject code INZ003826WL
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	90		90		
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3		3		
including number of ECTS points for practical (P) classes	0		3		
including number of ECTS points for direct teacher-student contact (BK) classes	1,8		1,8		

*delete as not applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

18. Knowledge and skills in the field on Network and Internet security.
19. Knowledge and skills in the field on Reliability models of information systems.
20. Basic knowledge on Mathematical statistics.

\

SUBJECT OBJECTIVES

C1 The acquisition of knowledge in the field of advanced safety engineering systems.
C2 Acquisition of knowledge on advanced methods and mechanisms for information security infrastructure, business processes and the security of cloud computing.
C3 Acquisition of knowledge on systems of prevention, detection systems IDS, prevention systems IPS, and fraud systems FD.
C4 Acquisition of basic knowledge on quantum cryptographic systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – has an expanded knowledge on the concept of security systems and networks, complex mechanisms of confidentiality, authentication, authorization, integrity of information in business processes and information, and complex IT infrastructures.

PEK_W02 – has extended knowledge about the shortcomings of classical cryptography, PKI classical defects.

PEK_W03 – has knowledge of advanced methods and mechanisms for information security infrastructure, business processes and the security of cloud computing.

PEK_W04 – has an advanced knowledge of the dangers of the system of operating systems, communication protocols and has a basic knowledge of quantum cryptographic systems.

PEK_W05 – has knowledge of the systems of prevention and detection IDS and IPS systems and the fraud detection systems FD.

PEK_W06 – is aware of the dangers of distributed dictionaries, databases and repositories of knowledge about keys and passwords in cryptographic systems, is knowledgeable about preventing data loss and restore the system after a crash as well as norms and standards de facto safety audits.

relating to skills:

PEK_U01 – is able to assess and evaluate the quality and use monitoring tools in the workplace, use the advanced mechanisms and security solutions for wireless networks.

PEK_U02 – can use and manage the security mechanisms of the system servers, network and internet, carry out their audit, use the advanced security features of social networking sites and instant messaging, use tools to test the security of web services.

PEK_U03 – is able to use tools and tests to detect defects in software, banking fraud detection system to detect network traffic that indicates the use of the TOR network, preventing risks of advanced social engineering.

PEK_U04 – is able to apply the methods and tools for risk assessment, use a basic infrastructure of quantum cryptography, PKI server build, build systems and firewall environment, tune and use the application security mechanisms.

relating to social competences:

PEK_K01 – understands the importance of security of information systems and Internet in the course of social and economic processes.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	The safety concept of systems and networks.	2
Lec 2	Features information safe. The classification of threats and vulnerabilities.	2
Lec 3	Confidentiality, authentication, authorization, integrity.	2
Lec 4	Classical cryptography and cryptanalysis - symmetric and asymmetric algorithms and functions shortcuts.	2
Lec 5	Generic weakness of classical cryptography.	2
Lec 6	PKI, the X509 standard - advantages and disadvantages of generic.	2
Lec 7	Fundamentals of quantum cryptography. Quantum cryptographic systems.	2
Lec 8	The attacks on the operating system. The vulnerabilities.	
Lec 9	Attacks on communication and communication protocols. Smart firewalls and network filters.	2

Lec 10	Security WWW applications security. Web Services, e-mail, and instant messaging security. Databases security. Cloud computing security.	2
Lec 11	Architecture and protocols for security of business applications based on Web Services.	2
Lec 12	Intelligent security and security management. Intelligent detection systems and intrusion prevention systems IDS and IPS. Fraud detection systems and violations of systems and business applications.	2
Lec 13	Distributed dictionaries, databases and repositories of keys and passwords in cryptographic systems.	2
Lec 14	Data loss prevention and disaster recovery systems.	2
Lec 15	Distributed systems auditing, attacks and enhance security. Standards of safety audits. Final test.	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	GIODO – General Inspector for Personal Data Protection. Monitoring in the workplace. Applications TotalView, SurfControl, CyberPatrol, SurfWatch, and the law legitimacy.	2
Lab 2	Database Security under the control of different DBMS servers.	2
Lab 3	Wi-Fi and WiMAX networks security. Standard 802.16. Advanced mechanisms and solutions Wi-Fi and WiMAX. Suppliers and WiMAX routers. The use of remote authentication server - RADIUS.	2
Lab 4	Enterprise network security using security mechanisms on the Microsoft Windows Server platform. Monitoring and audit server web services.	2
Lab 5	Social media and the law. Security mechanisms of social networks Facebook and Google+. Safety messaging. Tuning and testing of safety.	2
Lab 6	Functional testing tools websites - Sahi, Webdriver, Selenium RC.	2
Lab 7	Prediction of software defects - models and metrics, testing.	2
Lab 8	Application of data mining system for detecting fraud in the banking and business applications.	2
Lab 9	Information security in a distributed network TOR and crypto-currency Bitcoin.	2
Lab 10	Attacks on security of networks, systems and portals using advanced social engineering.	2
Lab 11	Methods and tools for risk assessment - OCTAVE, Cramm, MARION, MEHARI.	2
Lab 12	Quantum cryptography - fundamentally secure infrastructure for generating and delivering cryptographic keys.	2
Lab 13	PKI - suppliers in Poland. PKI - server certificates.	2

Lab 14	Secure firewall. Review and configure Forefront TMG 2010 environment.	2
Lab 15	Security in Ruby on Rails - an example of secure web applications. Credits.	2
	Total hours	30

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED

N1. Traditional lectures based on multimedia presentations.
N2. A computer lab with Internet access, and virtualization capabilities of workstations and servers.
N3. Research carried out by the students. Participation in the performance of student research and laboratory tasks.
N4. Studying the issues discussed during the lecture. Preparation for the final test.
N5. Consultations for students.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01-PEK_U04, PEK_K01	Ratings for the implementation and documentation of research.
F2	PEK_U01-PEK_U04, PEK_K01	Ratings for the implementation and documentation of laboratory tasks.
C	PEK_W01-PEK_W06	Final test of the lecture.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] S. Weerawarana, F. Curbera, F. Leymann, T. Storey, D.F. Ferguson, *Web Services Platform Architecture: SOAP, WSDL, WS-Policy, WS-Addressing, WS-BPEL, WS-Reliable Messaging, and More*, Prentice Hall, 2005.
[2] Z. Fryźlewicz, D. Nikończuk, Windows Azure. *Wprowadzenie do programowania w chmurze*, Helion, Gliwice 2012.
[3] A. Mateos, J. Rosenberg, *Chmura obliczeniowa. Rozwiązania dla biznesu*, Helion, Gliwice 2012.
[4] D. Biesiada, T. Kopacz, A. Żarski, P. Cichocki, B. Zass, M. Żyliński, *Windows Azure. Platforma Cloud Computing dla programistów*, APN Promise, Gliwice, Warszawa 2010.
[5] W. Jacak (i in.), *Wstęp do Informatyki i Kryptografii Kwantowej*, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2011.

SECONDARY LITERATURE:

[1] G. Bahadur, J. Inasi, Alex de Carvalho, *Securing the Clicks Network Security in the Age of Social Media*, McGraw-Hill Companies, 2011.
[2] M. Harwood, M. Goncalves, M. Pemble, *Security Strategies in Web Applications and Social Networking*, *Security Strategies in Web Applications and Social Networking*, Jones & Bartlett Learning, 2011.
[3] T. Holz, *Virtual Honeypots: From Botnet Tracking to Intrusion Detection*, Addison-Wesley Professional, 2007.
[4] M. Maliński, *Weryfikacja hipotez statystycznych wspomagana komputerowo*, Wyd. Politechniki Śląskiej, Gliwice 2004.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

doc. dr inż. Jacek Gruber, 71 320 33 40; jacek.gruber@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Network and Internet security
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION Security and Reliability of Information Systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W01-K2INF_W02	C1-C2	Lec4	N1, N3-N5
PEK_W02	K2INF_W01	C1-C2	Lec1-Lec2	N1, N3-N5
PEK_W03	K2INF_W01-K2INF_W02	C1-C2	Lec4-Lec5	N1, N3-N5
PEK_W04	K2INF_W01-K2INF_W02	C1,C4	Lec3	N1, N3-N5
PEK_W05	K2INF_W01-K2INF_W02	C1-C2	Lec6	N1, N3-N5
PEK_W06	K2INF_W01-K2INF_W02	C1,C3	Lec7-Lec15	N1, N3-N5
PEK_U01 (skills)	K2INF_W01-K2INF_W02, PEK_K01	C1-C2	Lab1	N2-N5
PEK_U02		C1-C3	Lab2	N2-N5
PEK_U03	K2INF_W02	C1-C2	Lab3-Lab5	N2-N5
PEK_U04	K2INF_W01-K2INF_W02	C1,C2	Lab6-Lab15	N2-N5
PEK_K01 (competences)	K2INF_W01-K2INF_W02	C1-C4	Lec1-Lec15, Lab1-Lab15	N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

DEPARTMENT OF COMPUTER SCIENCE AND MANAGEMENT
SUBJECT CARD

Name in Polish: Zarządzanie Bezpieczeństwem Systemów Informatycznych
Name in English Information Systems Security Management
Main field of study (if applicable): Informatics
Specialization (if applicable): Security and Reliability of Information Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide~~*
Subject code INZ003829WS
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				15
Number of hours of total student workload (CNPS)	60				60
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*

For group of courses mark (X) final course					
Number of ECTS points	2				2
including number of ECTS points for practical (P) classes	0				2
including number of ECTS points for direct teacher-student contact (BK) classes	1,2				1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of contemporary operating systems architectures.

\

SUBJECT OBJECTIVES

C1 Acquisition of knowledge about information security in contemporary enterprises
C2 Acquisition of knowledge about legal aspects of data protection and security.
C3 Acquisition of knowledge about real-world information protection mechanisms and techniques.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 knows basic threats to information stored in information systems
PEK_W02 knows the basic acts and standards concerning information protection and security
PEK_W03 has basic knowledge of information security design and management and is able to enumerate information security technologies and to describe their applications
relating to skills:
PEK_U01 can use publicly available national standards
PEK_U02 can identify associations of standards issues with real life issues
PEK_U03 can identify information security threats, suggest protection solutions and evaluate quality of used protection mechanisms
relating to social competences:
PEK_K01is able to acknowledge new information and share it as well as discuss it with other students

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Information security threats	1
Lec 2	Acts regarding information security in Poland. Classification of information.	2
Lec 3	Non-technical protection mechanisms	2
Lec 4	Physical security	2
Lec 5	Hardware protection mechanisms	2
Lec 6	Security models. Risk analysis	2
Lec 7	Security policies. Threats management. System recovery.	2
Lec 8	Evaluation of information security. Audit.	2
	Total hours	15

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Introduction. Choose of subject.	1
Sem 2-8	Presentation and discussion of information security acts and standards (local and international)	14
	Total hours	15

TEACHING TOOLS USED
N1. Lecture. N2. Seminar. N3. Individual consueling for students.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement

F1	Lec1-Lec9	Lecture assessment.
F2	Se2-Se8	Evaluation of student presentation and discussion
P=F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Anderson R.: Inżynieria zabezpieczeń. WNT, Warszawa, 2005.
[2] Białas A. Bezpieczeństwo informacji i usług w nowoczesnej instytucji i firmie. WNT, Warszawa, 2009.
[3] Lidermann K.: Bezpieczeństwo informacyjne. PWN, Warszawa, 2012.

SECONDARY LITERATURE:

[1]Białas A. (red).: Podstawy bezpieczeństwa systemów teleinformatycznych. Wyd. Prac. Komp. J. Skalmierskiego, Gliwice, 2002.
[2]Lidermann K.: Podręcznik administratora bezpieczeństwa teleinformatycznego. Helion, Gliwice, 2003.
[3]Pipkin D.: Bezpieczeństwo informacji, WNT, Warszawa, 2002.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Krzysztof Chudzik, krzysztof.chudzik@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems Security Management
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION Security and Reliability of Information Systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W06_S2BI N_W01	C1	Wy1, Wy4÷Wy6	N1, N3
PEK_W02	K2INF_W06_S2BI N_W03	C2	Wy2	N1, N3
PEK_W03	K2INF_W06_S2BI N_W04	C2	Wy7÷Wy9	N1, N3
PEK_U01÷ PEK_U03	K2INF_W06_S2BI N_W01, , K2INF_W06_S2BI N_W03, , K2INF_W06_S2BI N_W04,	C1÷ C3	Se1÷Se8	N2,N3
PEK_K01		C1÷ C3	Se1÷Se8	N2

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: Informatics and Management

SUBJECT CARD

Name in Polish: Architektura i technologie usług webowych
Name in English: Architecture and Technologies of Web Services
Main field of study (if applicable): Informatics
Specialization (if applicable): Software Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code: INZ003765
Group of courses ~~YES~~/ NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes	0		4		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

3. Practice in object-oriented programming in C# or Java
4. Practice in web application programming.

\

SUBJECT OBJECTIVES

C1. Basic knowledge in the area of models and protocols forming the SOA technology base.
C2. Service-oriented applications development on .NET platform.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01: Students have basic knowledge on the role and the operation of all components of the SOA model and protocols to support this paradigm.

PEK_W02: Students have basic knowledge of the solutions available on .NET platform associated with the development, hosting and security issues of Web services and service-oriented applications.

relating to skills:

PEK_U01: Student can implement a web application in .NET environment; is able to deploy a web application to the production server..

PEK_U02: Student can implement simple and complex clients of Web services in the .NET environment NET and WCF 4 platform.

PEK_U03: Student can implement web services with a variety of communication, reliability and safety mechanisms in the .NET environment NET and WCF 4 platform.

PEK_U04: Student obtains information from various sources on the service-oriented application development and problem solving.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	An introduction to the course and the principles of assessment	2
Lec 2	An overview of technologies supporting SOA	2
Lec 3	Web services development in Visual Studio environment and WCF 4 platform	2
Lec 4	Case study I: Creating a web service client	2
Lec 5	XML technologies	2
Lec 6	Processing of XML documents on .NET platform	2
Lec 7	SOAP basics	2
Lec 8	Test 1	2
Lec 9	WSDL Basics	2
Lec 10	UDDI basics	2
Lec 11	Web services coordination; web services transactions	2
Lec 12	Security fundamentals for web services	2
Lec 13	BPEL basics	2
Lec 14	Case study II: designing and hosting of the secure web services	2
Lec 15	Test 2	
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
..		
	Total hours	

Form of classes - laboratory	**Number of**

		hours
Lab 1	Presentation of the scope and principles of assessment. Creating accounts on the production server.	2
Lab 2	Configuring of the Visual Studio. Developing a demo web application in the local environment – task #1.	2
Lab 3	Deploying demo web application to the production server; identification of the protocols used in client-server web application using utility tools – task #2	2
Lab 4	Case study I: developing web service client application on WCF 4 platform – task #3	2
Lab 5	Development of the user interface and deployment of a modified web service client application on the production server; identification of the protocols used in client-server web application using utility tools – task #4	2
Lab 6	Case study II: developing web service client application exchanging SOAP messages with structures – task #5	2
Lab 7	Development of the user interface and deployment of a modified case study II on the production server – task #6	2
Lab 8	Case study III: developing web service application – task #7	2
Lab 9	Extending functionality of the case study III; hosting web service on the production server – task #8	2
Lab 10	Development of the web client application for case study III – task #9	2
Lab 11	Case study IV, part I: designing an application with the secure web services – task #10	2
Lab 12	Case study IV, part II: designing an application with the secure web services – task #11	2
Lab 13	Case study IV, part III: designing an application with the secure web services – task #12	2
Lab 14	Case study IV, part IV: designing an application with the secure web services – task #13	2
Lab 15	The questionnaire on the course, grading	2
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED

N1.	Lecture supported by multimedia presentations.
N2.	An integrated development environment supporting the web services and service-oriented applications designing.
N3.	Utility tools (communication protocol analyzer)

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01	Rating the solution of the task #1 on a scale 0 - 1 or traditional
F2	PEK_U01	Rating the solution of the task #2 on a scale 0 - 1 or traditional
F3	PEK_U02	Rating the solution of the task #3 on a scale 0 - 1 or traditional
F4	PEK_U02	Rating the solution of the task #4 on a scale 0 - 1 or traditional
F5	PEK_U02	Rating the solution of the task #5 on a scale 0 - 1 or traditional
F6	PEK_U02	Rating the solution of the task #6 on a scale 0 - 1 or traditional
F7	PEK_U03	Rating the solution of the task #7 on a scale 0 - 1 or traditional
F8	PEK_U03	Rating the solution of the task #8 on a scale 0 - 1 or traditional
F9	PEK_U02, PEK_U03	Rating the solution of the task #9 on a scale 0 - 1 or traditional
F10	PEK_U03, PEK_U04	Rating the solution of the task #10 on a scale 0 - 1 or traditional
F11	PEK_U03, PEK_U04	Rating the solution of the task #11 on a scale 0 - 1 or traditional
F12	PEK_U03, PEK_U04	Rating the solution of the task #12 on a scale 0 - 1 or traditional
F13	PEK_U02	Rating the solution of the task #13 on a scale 0 - 1 or traditional
C1 (grading lab) - Rate is calculated as the arithmetic average of the ratings F1 ... F13 (the traditional scale) or in accordance with the formula: < 8 → ndst 8-9 p. → dst 10 p. → dst+ 11 p. → db 12 p. → db+ 13 p. → bdb > 13 p. → cel (optional task)		
C2 (grading lecture) - The arithmetic average of the two tests - written, including open-ended questions, testing the		

knowledge and skills of the course. The test is given a positive evaluation, if the student scores at least 50% of the maximum number of points. After that the assessment is raised by 0.5 points at 5%. (note: C1 must be positive)

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[25] Z. Fryźlewicz, A. Salamon, Podstawy architektury i technologii usług XML sieci Web, Wydawnictwo Naukowe PWN SA, Warszawa 2008.

[26] T. Erl, Service-Oriented Archirecture. Concepts, Technology, and Design. Prentice Hall 2005

[27] M. Grabek, WCF od podstaw. Komunikacja sieciowa nowej generacji, Helion 2012.

SECONDARY LITERATURE:

[4] J. Löwy, Programowanie usług WCF, Helion 2012.

[5] P. Cibraro, K. Claeys, F. Cozzolino, J. Grabner, Professional WCF 4. Windows Communication Foundation with .NET 4, Wiley Publishing, Inc. 2010.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr inż. Zbigniew Fryźlewicz, zbigniew.fryzlewicz@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Architecture and Technologies of Web Services
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **Software Engineering**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06	C1	Lec1, Lec 2, Lec 4, Lec 7, Lec 9, … Lec 13	N1, N2
PEK_W02	K2INF_W06	C2	Lec 3, Lec 5, Lec 6, Lec 14	N1, N2
PEK_U01 (skills)	K2INF_U07	C1	Lab 1, Lab 2, Lab 3	N2, N3
PEK_U02	K2INF_U07	C1	Lab 4, Lab 5, Lab 6, Lab 7, Lab 10, Lab 14	N2, N3
PEK_U03	K2INF_U07	C1, C2	Lab 8, Lab 9, Lab 10, Lab 11, Lab 12, Lab13	N2, N3
PEK_U04	K2INF_U07, K2INF_U08	C1, C2	Lab 11, Lab 12, Lab 13, Lab 14	N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Metodologia badań naukowych
Name in English Methodology of empirical sciences…….
Main field of study (if applicable): Informatics…….
Specialization (if applicable): ……..
Level and form of studies: 2nd* level, full-time /
Kind of subject: obligatory /
Subject code INZ003763……
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	0	0	0	0
Number of hours of total student workload (CNPS)	90	0	0	0	0
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points	3				
including number of ECTS points for practical (P) classes	0				
including number of ECTS points for direct teacher-student contact (BK) classes	1,8				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Competence in basic algebra
2. Competence in mathematical analysis
3. Differential equations

\

SUBJECT OBJECTIVES

C1 Knowledge on the methodological postulates
C2Competence in mathematical modeling on the base of methodology of empirical sciences
C3Competence in hypothesis testing
C4Competence in creation of homogeneous and invariant in relation to the system of units models

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01Knowledge on methodological postulates
PEK_W02Logical postulates of mathematical models construction (invariance and homogeneity)
PEK_WOO3Logical base of hypothesis testing

…
relating to skills:
PEK_U01Competence in mathematical modeling with accordance to methodological postulates
PEK_U02Competence in hypothesis and empirical models testing
…
relating to social competences:
PEK_K01Competence in the exactness of process description
PEK_K02Competence on ability of studying and reflection on experiment

PROGRAMME CONTENT

Form of classes - lecture		**Number of**
Lec 1Methods of scientific and technical project validation on the base of citation analysis	2	
Lec 2Methodological postulates of determinism, closed system, interconnectedness, simplicity and Popper's condition of falsification	2	
Lec 3Classical theory of measurements and the postulate of uniquenes	2	
Lec 4Dimensionally invariant description of a process, dimensional space	2	
Lec 5Theorem Pi of dimensional analysis and examples of its applications	2	

Lec 6Applications of theorem Pi in: models construction, experiment planning, identification Lec 7Theory of similarity Lec 8Invariance of models in relation to rotations group, tensors homogeneity Lec 9 Models testing and falsification of hypothesis Lec 10Identification of mathematical models Lec 11Multistage identification, models interpretability Lec 12Description of models construction Lec 13Models testing	2 2 2 2 2 2 2 2 2	
	Total hours26	Plus 2 colloqiums

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
...		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
...		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		

…		
	Total hours	

TEACHING TOOLS USED
N1.Literature N2.Examples analysis N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1P-1colloquium evaluation	WO1,WO2	Evaluation of students work
F2P-2colloquium evaluation	UO1,UO2	Evaluation of examples solving
F3		
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J.M. Bochenski The methods of contemporary thought. Harper Torchbooks, NY,1968
[2] W.Kasprzak, B. Lysik, M.Rybaczuk Measurements, Dimensions, Invariant Models and Fractals Spolom Wroclaw Lviv 2004
[3]
[4]

SECONDARY LITERATURE:

[1] K. R. Popper The logic of Scientific Discovery. Hutchinson Publ. Comp. 1959
[2]
[3]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Waclaw Kasprzak waclaw.kasprzak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Methodology of empirical sciences……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_WO1	Methodology basis	K1,K2,K3	N1,N2,P1
PEK_W02	K2INF_WO6	Models testing	K4,K13	P1
…				
…				
PEK_U01 (skills)	K2INF_UO6	Construction of models	K5,K6,K7	N1,N2,P2
PEK_U02	K2INF_UO8	Hyothesis testing	K8,K13	N1,N2,P2
…				
PEK_K01 (competences)	K_2SWD_KO1		K2	N1,N2
PEK_K02	K2_SWD_KO2		K13	N1,N2,P2
…				

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY of Computer Science and Management / DEPARTMENT……

SUBJECT CARD

Name in Polish: Modelowanie i implementacja danych biznesowych
Name in English: Modeling and implementation of business data
Main field of study (if applicable): Informatics
Specialization (if applicable): Software Engineering
Level and form of studies: ~~1st~~/ 2nd* level, ~~full-time / part-time*~~
Kind of subject: ~~obligatory~~ / optional / ~~university-wide~~*
Subject code: INZ003776
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		30		
Number of hours of total student workload (CNPS)	60		60		
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points	2		2		
including number of ECTS points for practical (P) classes			2		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		1,2		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of object-oriented modeling with particular emphasis on business modeling.
2. Basic knowledge of the requirements specification.
3. Basic knowledge of databases and data modeling
4. Basic knowledge of SQL

\

SUBJECT OBJECTIVES

C1. Acquisition the ability of modeling of business data
C2. Acquiring the ability to assess data quality
C3. Acquiring the ability to define and process data stored in databases and data warehouses.
C4. Acquisition of skills data reporting and analysis

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Student gained essential knowledge in the field of advanced data analysis methods

relating to skills:
PEK_U01 Student knows how to solve the task modeling, analysis and decision making for different types of objects

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	The analysis of business data, the analytical data models, data modeling	2
Lec 2	Analysis of the data sources, data preparation for extraction	2
Lec 3	Quality of the data - evaluation and standardization of data , regular expressions, building patterns	2
Lec 4	Analytical processing of data using SQL	2
Lec 5	Analytical processing of data using MDX	2
Lec 6	Fundamentals of business reporting, designing and using of KPIs	2
Lec 7	Methods of graphical representation and analysis of data	2
Lec 8	Test	1
	Total hours	15
Form of classes - class		**Number of**

		hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1	Analysis of business data , data modeling (prob. 1)	2
Lab 2	Analysis of data from different sources (in various formats) - identification and specification problems (prob. 2)	2
Lab 3	Defining data quality metrics: statistical measures, technical (prob. 3)	2
Lab 4	Analysis of patterns, frequency, extreme values, completeness and integrity of data, data redundancy (prob. 4)	2
Lab 5	Creating your own quality metrics, measures of assessing the similarity of data, standardization of data (prob. 5)	2
Lab 6	CTE expressions - constructing complex queries (prob. 6)	2
Lab 7	Using PIVOT clause, GROUPING SETS, CUBE, ROLLUP and other SQL clauses in analytical processing (prob. 7)	2
Lab 8	Creating analytical models of data (prob. 8)	2
Lab 9	Building data marts based on real-world (prob. 9)	2
Lab 10	The development of a process extracting data taking into account the quality criteria (prob. 10)	2
Lab 11	Processing data using MDX (prob. 11)	2
Lab 12	Create reports using spreadsheets. Graphical presentation of data (prob. 12)	2
Lab 13	Data analysis and forecasting using spreadsheets (prob. 13)	2
Lab 14	Data analysis and forecasting using spreadsheets cd (prob. 13)	2
Lab 15	Test	2
	Total hours	30

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Informative lecture with elements of problem, supported by multimedia presentations and examples of solutions N2. Database management systems. N3. BI systems. N4. Spreadsheets N5. E-learning system used for the publication of teaching materials and equipment, collection and assessment of student work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 – prob. 1.	PEK_U01	Rating the solution of the prob. 1 on a scale 0 - 1 or traditional way
F2 – prob. 2.	PEK_U01	Rating the solution of the prob. 2 on a scale 0 - 1 or traditional way
F3 – prob. 3.	PEK_U01	Rating the solution of the prob. 3 on a scale 0 - 1 or traditional way
F4 – prob. 4.	PEK_U01	Rating the solution of the prob. 4 on a scale 0 - 1 or traditional way
F5 – prob. 5.	PEK_U01	Rating the solution of the prob. 5 on a scale 0 - 1 or traditional way
F6 – prob. 6.	PEK_U01	Rating the solution of the prob. 6 on a scale 0 - 1 or traditional way
F7 – prob. 7.	PEK_U01	Rating the solution of the prob. 7 on a scale 0 - 1 or traditional way
F8 – prob. 8.	PEK_U01	Rating the solution of the prob. 8 on a scale 0 - 1 or traditional way
F9 – prob. 9.	PEK_U01	Rating the solution of the prob. 9 on a scale 0 - 1 or traditional way
F10 – prob. 10.	PEK_U01	Rating the solution of the prob. 10 on a scale 0 - 1 or traditional way
F11 – prob. 11.	PEK_U01	Rating the solution of the prob. 11 on a scale 0 - 1 or traditional way
F12 – prob. 12.	PEK_U01	Rating the solution of the prob. 12 on a scale 0 - 1 or traditional way
F13 – prob. 13.	PEK_U01	Rating the solution of the prob. 13 on a scale 0 - 1 or traditional way
C1 - final evaluation of the laboratory	PEK_U01	Grade is calculated as the arithmetic average of the ratings F1 ... F13 (the traditional scale) or in accordance to the formula: $p. < 8{,}0 \rightarrow$ ndst $8{,}0 \leq p. < 9{,}5 \rightarrow$ dst $9{,}5 \leq p. < 11 \rightarrow$ dst+ $11 \leq p. < 12 \rightarrow$ db $12 \leq p. < 13 \rightarrow$ db+ $13 \leq p. \leq 14 \rightarrow$ bdb

		14 < p. → excelent (secondary task)
C2 - final evaluation of the course	PEK_W01	Test - evaluation of the knowledge and skills of the course. On the positive assessment, the student must solve at least three of the five tasks and to answer to two of the five questions. The assessment can be improved by solving additional task or the correct answer to the question from the problem domain (by 0.5)
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[28] Mendrala D., Szeliga M., Microsoft SQL Server : modelowanie i eksploracja danych, Helion, 2012

[29] Winston W. L., Microsoft Excel 2010 Analiza i modelowanie danych biznesowych, APN PROMISE, 2011

[30] Ben-Gan I., Microsoft SQL Server 2008, T-SQL Fundamentals, Microsoft Press, 2009

[31] Celko J., SQL Zaawansowane techniki programowania, PWN, 2008.

SECONDARY LITERATURE:

[1] The materials prepared by the instructor of the course based on documentation MS SQL, Oracle, SAS.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr inż. Lech Tuzinkiewicz, Lech.Tuzinkiewicz@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Modeling and implementation of business data
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **Software Engineering**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W05	C1, C2, C4	Lec 1 - Lec 7	N1, N5
PEK_U01 (skills)	K2INF_U06	C1, C2, C3, C4	Lab 1-Lab 15	N1, N2, N3, N4, N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish *Modele i Metryki Jakości w Inżynierii Oprogramowania*
Name in English *Models and Metrics in Software Quality Engineering*
Main field of study (if applicable): Computer Science
Specialization (if applicable): ……..
Level and form of studies: ~~1st~~/ 2nd* level, ~~full-time~~ / part-time*
Kind of subject: obligatory / ~~optional / university-wide~~*
Subject code INZ3766
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	15
Number of hours of total student workload (CNPS)	60			150	30
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2			5	1
including number of ECTS points for practical (P) classes	0			5	0
including number of ECTS points for direct teacher-student contact	1			2	1

(BK) classes					

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Is able to use bug and issue trackers as well as version control system.
2. Is able to use programming language (Java).
3. Knows basics of statistics.

\

SUBJECT OBJECTIVES

C1 To familiarize students with the selected software metrics and measurement tools and the way to formulate useful software metrics.

C2 To familiarize students with the selected methods and tools to build and evaluate prediction models in software engineering, possibilities of improvement and comparison with the existing models.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Has a basic knowledge which allows to name sample software metrics and measurement tools as well as to explain how to formulate useful software metrics. Wymienia przykładowe metryki oprogramowania i narzędzia do ich gromadzenia oraz wyjaśnia sposób konstruowania użytecznych metryk.

PEK_W02 Has a basic knowledge which allows to name sample methods, tools or languages to build, empirically evaluate and compare prediction models in software engineering. Wymienia przykładowe metody, narzędzia czy języki do budowy, empirycznej ewaluacji i porównywania modeli predykcji w inżynierii oprogramowania.

PEK_W03 Has a basic knowledge which allows to name sample results of empirical studies in software engineering, especially those which are known as laws and hypotheses in software engineering.

…

relating to skills:

PEK_U01 Is able to find in literature basic software metrics, measurement tools and methods to build prediction models in software engineering

PEK_U02 Is able to build prediction models, plan and perform their empirical evaluation using proper tools, to interpret obtained results and to draw appropriate conclusions.

PEK_U03 Is able to develop new, creatively modify and/or integrate existing metrics, measurement tools or prediction model building methods within software engineering domain.

PEK_U04 Is able to propose research hypothesis concerning experimental comparison of existing and new solutions within the area of prediction models in software engineering and to prepare and conduct comparative study providing data necessary to test the proposed research hypothesis, results interpretation and coming to conclusions.

PEK_U05 Is able to prepare a preliminary technical report in English including results of the conducted research.

…
relating to social competences:
PEK_K01 Is able to take creative steps in order to carry out tasks required during the course.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Introduction to the course. Basic definitions	2
Lec 2	Metric validation criteria, Goal-Question-Metric (GQM), metrics usability.	2
Lec 3	Metrics and measurement tools in software engineering. Introduction to prediction models.	2
Lec 4	Prediction models in software engineering.	2
Lec 5	Introduction to selected platform to build and to evaluate prediction models.	2
Lec 6	Comparison of prediction models. Empirical studies in software engineering	2
Lec 7	Laws and hypotheses in software engineering. Defect detection methods.	2
Lec 8	Summary and retrospection	1
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes – laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes – project		Number of hours
Proj 1	Introduction, passing criteria.	2
Proj 2	Software metrics and prediction models in software engineering – a preliminary review of application areas and selection of a research topic.	2
Proj 3	A preliminary state of the art within a chosen research topic.	2
Proj 4	A technical report presenting state of the art within a chosen research topic, possible attractive/innovative character of an undertaken research topic (e.g. preliminary proposals of novel software metrics, measurement or data integration tools, and/or methods to build prediction models and and research infrastructure) [0…15 pkt] (Pr1-Pr4) .	2
Proj 5	Research infrastructure building	2
Proj 6	Research infrastructure further building	2
Proj 7	Updated proposal of possibly novel solutions in order to obtain better prediction models in software engineering. An attempts to build and preliminary evaluate prediction models.	2
Proj 8	Improving novel solutions and research infrastructure as well as preliminary attempts to build and empirically evaluate prediction models – part 1	2
Proj 9	Improving novel solutions and research infrastructure as well as preliminary attempts to build and empirically evaluate prediction models – part 2	2
Proj 10	Improving novel solutions and research infrastructure as well as preliminary attempts to build and empirically evaluate prediction models – part 3	2
Proj 11	Experimental comparison of the proposed and existing solutions – a preliminary technical report	2
Proj 12	Replication package preparation	2
Proj 13	Taking into account threats to validity of the conducted research and technical report correction.	2
Proj 14	Final technical report (publication draft) and research infrastructure	2
Proj 15	Summary and retrospection, and grading.	2
	Total hours	30

Form of classes - seminar		Number of hours
Sem 1	Introduction, passing criteria, schedule and selection of topics.	1
Sem 2	Topic 1 is selected by students from the pool including, for example, the following ones: 1) Software metrics and measurement tools 2) Software metrics and models in software quality assessment. 3) Prediction models in software engineering (software defect prediction, top crashes, effort and cost prediction) 4) Tools and environments to build and evaluate prediction models.	2

	5) Methods to build prediction models. 6) Methods to evaluate prediction models. 7) Ensemble learning approaches in prediction models. 8) New trends in building and evaluation of prediction models.	
Sem 3	Topic 2 is selected from the aforementioned pool of topics	2
Sem 4	Topic 3 is selected from the aforementioned pool of topics	2
Sem 5	Topic 4 is selected from the aforementioned pool of topics	2
Sem 6	Topic 5 is selected from the aforementioned pool of topics	2
Sem 7	Topic 6 is selected from the aforementioned pool of topics	2
Sem 8	Topic 7 is selected from the aforementioned pool of topics	2
	Total hours	15

TEACHING TOOLS USED
N1. Lecture N2. The course web page with references to literature and course related stuff (e.g. sample data sets). N3. Software to build, evaluate and compare prediction models and to collect software metrics. N4. Internet and software infrastructure (e.g. versioning repository SVN or Git). N5. Software to prepare presentations and technical reports (Latex, TeXnicCenter, PowerPoint/Beamer)

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01	Evaluation of technical report draft v.1, in particular originality and innovative character of a preliminary research proposal (e.g. new metrics, tools, prediction models, and application areas), thoroughness of literature review (state of the art) and maturity of a research infrastructure [0…15 pkt] (Pr1-Pr4) .
F2	PEK_U02, PEK_U03	Evaluation of technical report draft v.1, in particular originality, innovative character and progress of a research project and maturity of a research infrastructure [0…15 pkt] (Pr5-Pr7).
F3	PEK_U02…	Evaluation of technical report draft v.3, in particular originality, innovative character and progress of a research project (e.g. empirical evaluation of a

	PEK_U04	proposed solution and comparison with the existing ones) and maturity of a research infrastructure [0…20 pkt] (Pr8-Pr11).
F4	PEK_U02 … PEK_U04	Evaluation with regard to maturity, originality, and publication value of the final technical report (publication draft) including usually description of the novel solultions (metrics, tools, prediction models), their empirical evaluation and comparison with existing solutions, research infrastructure, discussion of threats to validity of the conducted research [0…50 pkt] (Pr12-Pr15).
P1 – project	PEK_U01 … PEK_U04	P1 is obtained on a basis of the points from F1…F4 in the following way (mark – points): • 5.5 – 91…100 pkt and F4=50 pkt • 5.0 – 91…100 pkt • 4.5 – 81…90 pkt • 4.0 – 71…80 pkt • 3.5 – 61…70 pkt • 3.0 – 50…60 pkt • 2.0 <50 pkt
P2 – lecture	PEK_W01 … PEK_W03	Exam – a written test to evaluate knowledge covered in lectures. A positive mark is given if student get at least 50% of the points possible to achieve.
P3 – seminar	PEK_U01, PEK_U02	P3 is based on how well a presentation has been conducted (e.g. clearly defined goals of presentation or benefits for the listeners, communication, presentation content, level of details, examples, timing, presentation flow - order of topics, capturing audience / listeners involvement). Given mark may be changed due to active and creative discussion during seminars or (after an agreement with a lecturer) a detailed report or tutorial on a given topic.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[32] Marco D'Ambros, Michele Lanza, Romain Robbes: Evaluating defect prediction approaches: a benchmark and an extensive comparison. Empirical Software Engineering 17(4-5): 531-577 (2012) http://dx.doi.org/10.1007/s10664-011-9173-9

[33] Marco D'Ambros, Michele Lanza, Romain Robbes: An extensive comparison of bug prediction approaches. MSR 2010: 31-41 http://dx.doi.org/10.1109/MSR.2010.5463279 http://www.old.inf.usi.ch/phd/dambros/publications/msr10.pdf

[34] Nachiappan Nagappan, Andreas Zeller, Thomas Zimmermann, Kim Herzig, Brendan Murphy: Change Bursts as Defect Predictors. ISSRE 2010:309-318 http://dx.doi.org/10.1109/ISSRE.2010.25 http://www.st.cs.uni-saarland.de/publications/files/nagappan-issre-2010.pdf

[35] Marian Jureczko, Lech Madeyski, Predykcja defektów na podstawie metryk oprogramowania – identyfikacja klas projektów, w: Inżynieria Oprogramowania w Procesach Integracji Systemów Informatycznych, Wydawnictwo Komunikacji i Łączności, 2010.

http://madeyski.e-informatyka.pl/download/JureczkoMadeyski10e.pdf

[36] Marian Jureczko, Lech Madeyski, Towards identifying software project clusters with regard to defect prediction, ACM International Conference Proceeding Series, Proceedings of the 6th International Conference on Predictor Models in Software Engineering (PROMISE'2010), ACM Digital Library, 2010.
http://madeyski.e-informatyka.pl/download/JureczkoMadeyski10f.pdf
http://dx.doi.org/10.1145/1868328.1868342

[37] Marian Jureczko, Lech Madeyski, A review of process metrics in defect prediction studies, Methods of Applied Computer Science (Metody Informatyki Stosowanej), Volume 30, Issue 5, 2011, Pages 133-145, 2011 (ISSN 1898-5297)
http://madeyski.e-informatyka.pl/download/Madeyski11.pdf

[38] Marian Jureczko, Metody zarządzania zapewnianiem jakości oprogramowania wykorzystujące modele predykcji defektów, 2012.
http://staff.iiar.pwr.wroc.pl/marian.jureczko/rozprawa.pdf

[39] W.N. Venables, D. M. Smith and the R Core Team, An Introduction to R.
http://cran.r-project.org/doc/manuals/R-intro.pdf (dostarczany z domyślną instalacją)

[40] W.J. Oven, The R Guide http://cran.r-project.org/doc/contrib/Owen-TheRGuide.pdf

[41] D. G. Rossiter, Introduction to the R Project for Statistical Computing for use at ITC http://cran.r-project.org/doc/contrib/Rossiter-RIntro-ITC.pdf

SECONDARY LITERATURE:

[6] Books related to R
http://www.r-project.org/doc/bib/R-books.html

[7] Quick-R: Books and Tutorials
http://www.statmethods.net/about/books.html

[8] KNIME Quickstart Guide http://tech.knime.org/files/KNIME_quickstart.pdf

[9] KNIME Introduction to the workbench http://tech.knime.org/workbench

[10] KNIME Developer Guide http://tech.knime.org/developer-guide

[11] KNIME JavaDoc API http://tech.knime.org/javadoc-api

[12] KNIME Example implementation http://tech.knime.org/developer/example

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Lech Madeyski

Lech.Madeyski /at/ pwr.wroc.pl http://madeyski.e-informatyka.pl/

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Models and Metrics in Software Quality Engineering
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION
Software Engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2IO_W03	C1	Lec1-3	N1, N2
PEK_W02	K2INF_W06_S2IO_W03	C2	Lec 3-6,8	N1, N2
PEK_W03	K2INF_W06_S2IO_W03	C3	Lec 6-8	N1, N2
…				
PEK_U01 (skills)	K2INF_U01	C1, C2	Proj1-4, Sem1-8	N1, N2, N5
PEK_U02	K2INF_U08_S2IO_U05	C2	Proj7-10	N3, N4, N5
PEK_U03	K2INF_U08_S2IO_U06	C1, C2	Proj5-10	N3, N4, N5
PEK_U04	K2INF_U08_S2IO_U08	C1, C2	Proj11-15	N3, N4, N5
PEK_U05	K2INF_U03	C1, C2	Proj2-14	N5
PEK_K01 (competences)	K2INF_06	C1, C2	Proj1-8	N2-N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: Informatics and Management

SUBJECT CARD

Name in Polish: Modelowanie i analiza biznesowa
Name in English: Modeling and business analysis
Main field of study (if applicable): Informatics
Specialization (if applicable): Computer Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ3760
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	30			

Number of hours of total student workload (CNPS)	60	90			
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2	3			
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	1,8			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5. Practice in object-oriented programming.
6. Basic knowledge of software engineering.

\

SUBJECT OBJECTIVES

C1. Basic knowledge in the area of software system modeling with the stress on business modeling as the initial phase of the software development process.
C2. Basic knowledge in the area of the requirements specification.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEK_W01: Students have basic knowledge on business modeling.
PEK_W02: Students know and understand the role of specification requirements.
PEK_W03: Students have basic knowledge on selected modeling languages.

Relating to skills:
PEK_U01: Students, in cooperation with domain experts, can construct and analyze business models.
PEK_U02: Students can build models of system requirements.

Relating to social competences:
PEK_K01: Students are able to cooperate with representatives of application domain.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Basic notions for software development cycle. Survey of modeling languages – UML and BPMN.	2
Lec 2	Class diagrams – classes, associations, generalizations.	2

Lec 3	Validation and verification.	1
Lec 4	Object Constraint Language.	2
Lec 5	UML activity diagrams.	2
Lec 6	BPMN process diagrams.	2
Lec 7	UML statechart diagrams.	2
Lec 8	System requirements; use case diagrams.	2
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Construction and analysis of simple class diagrams.	2
Cl 2	Construction and analysis of advanced class diagrams.	2
Cl 3	Analysis of textual descriptions of exemplary application domains – structural aspect (1).	2
Cl 4	Analysis of textual descriptions of exemplary application domains – structural aspect (2).	2
Cl 5	Case study – an example of structural modeling.	2
Cl 6	Construction and analysis of OCL constraints imposed on diagrams.	2
Cl 7	Test 1.	2
Cl 8	Analysis of textual descriptions of exemplary application domains – structural and behavior aspect.	2
Cl 9	Analysis of simple BPMN diagrams.	2
Cl 10	Construction of simple BPMN diagrams.	2
Cl 11	Construction and analysis of advanced BPMN diagrams.	2
Cl 12	Construction and analysis of simple state diagrams.	2
Cl 12	Construction and analysis of advanced state diagrams..	2
Cl 13	Construction and analysis of use case diagrams.	2
Cl 14	Test 2.	2
Cl 15	Corrective test.	2
	Total hours	30

TEACHING TOOLS USED

N1. Lecturer's presentation at a blackboard, supported by a multimedia presentation using a laptop and a projector.
N2. Individual search and study of literature and Internet sources.
N3. Access to teaching materials published in the local area network.
N4. Individual consultations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P –	Educational effect number	Way of evaluating educational effect achievement

<table>
<tr><td>concluding (at semester end)</td><td></td><td></td></tr>
<tr><td>F1</td><td>PEK_W01
PEK_U01
PEK_K01</td><td>Each student gets 1 point for own solution of a problem from the list of problems for the given class.</td></tr>
<tr><td>F2</td><td>PEK_W01
PEK_W02
PEK_U01
PEK_U02
PEK_K01</td><td>Each student gets up to 10 points for own solution of problems for the given test (intermediate and final).</td></tr>
<tr><td>F3</td><td>PEK_W01
PEK_W02
PEK_W03
PEK_U01
PEK_U02
PEK_K01</td><td>The final evaluation for the classes is determined on the basis of total marks obtained by the student's activity for exercise (F1) and colloquia (F2). Positive mark is awarded to a student who has obtained at least 4 points for each of the symposia and has won a total of 10 points.
If this condition is met, the number of points P is the basis for evaluation in accordance with the following table:
<table>
<tr><td>P</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table>
Students who get at least a very good grade are exempt from the examination with the same mark as for the classes.</td></tr>
<tr><td colspan="3">C: The final evaluation of the course is determined based on the results of the examination. The examination lasts two hours and consists of a set of tasks, the total number of 20 points. The condition for a positive assessment of the final exam is to get 10 points and a positive final evaluation of the exercise.
The final evaluation of the examination is determined in accordance with the following table:
<table>
<tr><td>Points</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table></td></tr>
</table>

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[6] Rumbaugh J., Jacobson I., Booch G., *The Unified Modeling Language – Reference Manual*. Second edition, Addison-Wesley, 2005.

[7] Weilkiens T., Oestereich B., *UML 2 Certification Guide. Fundamental and Intermediate Exams*, Elsevier 2007.

[8] Maciaszek L. A., *Requirements Analysis and System Design*, Second edition, Pearson, Addison-Wesley, 2005.

[9] Adolph S., Bramble P., *Patterns for Effective Use Cases,* Addison-Wesley, 2003

[10] Gašević D., Djurić D., Devedžić V., *Model Driven Architecture and Ontology Development*, Springer, 2006.

SECONDARY LITERATURE:

[42] Graessle P., Baumann H., Baumann P., *UML 2.0 w akcji. Przewodnik oparty na projektach*, Helion, 2006.

[43] Object Management Group, Unified Modeling Language (available on the website: www.omg.com).

[44] Object Management Group, System Modeling Language SysML (available on the website: www.omg.com).
[45] Object Management Group, Business Process Modeling Notation BPMN (available on the website: www.omg.com).

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Zbigniew Huzar, zbigniew.huzar@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems Modeling and Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION
Computer Engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W02	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W03	K2INF_W03		Lec1-Lec8	N1, N2, N3, N4
PEK_U01 (skills)	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_U02	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_K01 (competences)	K2_SWD_K01	C1, C2	Lec1-Lec15 Cl1-Cl15	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from the table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa I
Name in English MSc Thesis I
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code INZ003818
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				60	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points				2	
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes				0,6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 2rd semester

\

SUBJECT OBJECTIVES

C1 Preparation of students to write a master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology, with special attention of all stages of writing a thesis.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Preparation of students to write a master thesis according the internal	

	requirements of Faculty of Computer Science and Management (Computer Science field of study), Wrocław University of Technology, with special attention of all stages of writing a thesis. Literature studies, selection and learning of systems, tools, methods and algorithms needed for the realization of the chosen subject of thesis. The preparation of an outline of work and schedule of future work. Basic work on the research, design and implementation. Familiarization with the research works carried out at the Institute of Informatics. Final results: the initial solution and / or the prototype of developed system, knowledge about the current state of art in the field of thesis, an outline of future work and timetable for further works documented in English and Polish languages.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED
N1. Literature study - analysis of publications (including websites) related to subject of thesis, including the research works of the Institute of Informatics. N2. Own work, independent research on the tasks defined in the master's thesis N3. Student consultation with the supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessment based on the final results achieved

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[46] Literature related to the scope of realized project selected by student and recommended by the teacher.

[47] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis I
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U03, K2INF_U08	C1	Pr1	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa II
Name in English MSc Thesis II
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005221
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				540	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points				18	
including number of ECTS points for practical (P) classes				18	
including number of ECTS points for direct teacher-student contact (BK) classes				6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 4th semester

\

SUBJECT OBJECTIVES

C1 Preparation of master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish language, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes – project		**Number of hours**
Proj 1	Subject is the main component of the process of realization the master thesis and involves the preparation by the student his master thesis. Master thesis is done under the direction of his supervisor, with whom student defines its scope, goals, tasks and timetable for implementation.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED

N1. Preparation of master thesis N2. The text of the master thesis N3. Thesis review prepared by the supervisor N4. Students consultation with supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of master thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessed is the final text of the diploma thesis. The assessment is carried out in the form of a review done by the promoter. The condition to pass the course is delivering the final text of master thesis before the defined deadline. The second review, which does not, however the condition for pass the course is done by the reviewer appointed by the Faculty Dean. Reviews are made according to the standard format. The student is admitted to the defense (final exam) if both reviews are positive

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[48] Literature related to the scope of realized project selected by student and recommended by the teacher.

[49] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis II
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K1INF_U03, K2INF_U08	C1	Proj1	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: Informatics and Management

SUBJECT CARD

Name in Polish: Programowanie na platformie Windows Azure
Name in English: Programming on Windows Azure Platform
Main field of study (if applicable): Informatics
Specialization (if applicable): Software Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: ~~obligatory~~ / optional / ~~university-wide~~*
Subject code: INZ003815
Group of courses YES / ~~NO~~*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		30		
Number of hours of total student workload (CNPS)	60		60		
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course	X				
Number of ECTS points	2		2		
including number of ECTS points for practical (P) classes	0		2		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		1,2		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

7. Practice in object-oriented programming in C#
8. Practice in web application programming

\

SUBJECT OBJECTIVES

C1. Basic knowledge in the area of different models of cloud computing, services, good programming practices and deploying applications to Windows Azure cloud; evaluation of cloud computing in terms of business.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01: Students have basic knowledge on the different models of cloud computing and their services.

PEK_W02: Students could list and describe a variety of mechanisms available in the Windows Azure cloud to access and storage of data, distribution of computing power, data and application security, performance and integration bus.

relating to skills:

PEK_U01: Student is able to implement the Windows Azure cloud applications using a variety of data storage services.

PEK_U02: Student is able to implement on the Windows Azure platform autoscaling applications based on application scalability patterns.

PEK_U03: Student is able to implement cloud applications using advanced communication mechanisms.

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	An introduction to the course and the principles of assessment	2
Lec 2	Windows Azure architecture	2
Lec 3	Windows Azure Compute service model	1
Lec 4	Windows Azure Blob storage service	1
Lec 5	Windows Azure Queue storage service	1
Lec 6	Windows Azure Tables storage service	1
Lec 7	Windows Azure Connect	1
Lec 8	Windows Azure Access Control Service	1
Lec 9	Windows Azure AppFabric ServiceBus	2
Lec 10	SQL Azure	2
Lec 11	Test	1
	Total hours	15

	Form of classes - class	**Number of hours**
Cl 1		
Cl 2		
Cl 3		

..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1	Presentation of the scope and principles of assessment; Visual Studio 2012 basics	2
Lab 2	Azure Compute emulator ; creating an application using Azure Compute service (case study I) – task #1	2
Lab 3	Windows Azure Compute service; publishing and running of case study I – task #2.	2
Lab 4	Windows Azure Compute service; developing, publishing, running and monitoring of case study II – task#3	2
Lab 5	Windows Azure Storage part I, Blobs – task #4	2
Lab 6	Windows Azure Storage part II, Queues – task #5	2
Lab 7	Windows Azure Storage part III, Tables – task #6	2
Lab 8	Windows Azure Storage and Compute service, case study III – task #7	2
Lab 9	Windows Azure Storage and Compute service; publishing, running and monitoring of case study III – task #8	2
Lab 10	VM Role and Windows Azure Connect – task #9	2
Lab 11	AppFabric: Access Control Service – task #10	2
Lab 12	AppFabric Service Bus – task #11	2
Lab 13	Developing an application using SQL Azure service – task #12	2
Lab 14	Publishing, running and monitoring an application using SQL Azure service – task #13	2
Lab 15	Evaluation of the labs; ratings	2
	Total hours	30

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED	
N1.	Lecture supported by multimedia presentations.
N2.	An integrated development environment supporting application development for Windows Azure platform.
N3.	Utility tools

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U02	Rating the solution of the task #1 on a scale 0 - 1 or traditional
F2	PEK_U02	Rating the solution of the task #2 on a scale 0 - 1 or traditional
F3	PEK_U01	Rating the solution of the task #3 on a scale 0 - 1 or traditional
F4	PEK_U01	Rating the solution of the task #4 on a scale 0 - 1 or traditional
F5	PEK_U01, PEK_U03	Rating the solution of the task #5 on a scale 0 - 1 or traditional
F6	PEK_U01, PEK_U02, PEK_U03	Rating the solution of the task #6 on a scale 0 - 1 or traditional
F7	PEK_U01, PEK_U02, PEK_U03	Rating the solution of the task #7 on a scale 0 - 1 or traditional
F8	PEK_U01, PEK_U02, PEK_U03	Rating the solution of the task #7 on a scale 0 - 1 or traditional
F9	PEK_U01, PEK_U02, PEK_U03	Rating the solution of the task #7 on a scale 0 - 1 or traditional
F10	PEK_U01, PEK_U02, PEK_U03	Rating the solution of the task #7 on a scale 0 - 1 or traditional
F11	PEK_U01, PEK_U02, PEK_U03	Rating the solution of the task #7 on a scale 0 - 1 or traditional
F12	PEK_U01, PEK_U02, PEK_U03	Rating the solution of the task #7 on a scale 0 - 1 or traditional
F13	PEK_U01, PEK_U02, PEK_U03	Rating the solution of the task #7 on a scale 0 - 1 or traditional

C1 (grading lab) - Rate is calculated as the arithmetic average of the ratings F1 ... F13 (the traditional scale) or in accordance with the formula:

$p. < 8 \rightarrow$ ndst
$8 \leq p. < 9 \rightarrow$ dst
$9 \leq p. < 10 \rightarrow$ dst+
$10 \leq p. < 11 \rightarrow$ db
$11 \leq p. < 12 \rightarrow$ db+
$12 \leq p. \leq 13 \rightarrow$ bdb
$14 < p. \rightarrow$ cel (optional task)

C2 (grading lecture) -
One test - written, including open-ended questions, testing the knowledge and skills of the course. The test is given a positive evaluation, if the student scores at least 50% of the maximum number of points. After that the assessment is raised by 0.5 points at 5%.
(note: C1 must be positive)

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[50] Z. Fryźlewicz, D. Nikończuk. Windows Azure. Wprowadzenie do programowania w chmurze. Helion 2012.
[51] T. Redkar, T. Guidici. Windows Azure Platform, 2nd Edition, Apress 2011.
[52] D. Biesiada, P. Cichocki i inni. Windows Azure. Platforma Cloud Computing dla programistów, APN Promise, Warszawa 2010.

SECONDARY LITERATURE:

[13] https://www.windowsazure.com/, Centrum tematyczne firmy Microsoft.
[14] J. Rosenberg, A. Mateos. Chmura obliczeniowa. Rozwiązania dla biznesu. Helion 2011
[15] A. T. Velte, T. J. Velte, R. Elsenpeter. Cloud Computing. A Practial Approach. McGrow-Hill 2010.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr inż. Zbigniew Fryźlewicz, zbigniew.fryzlewicz@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Programming on Windows Azure Platform
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **Software Engineering**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2IO_W04	C1	Lec1, Lec2	N1, N2
PEK_W02	K2INF_W06_S2IO_W05	C2	Lec 3, …Lec 10	N1, N2, N3
PEK_U01(skills) PEK_U02 PEK_U03	K2INF_U08_S2IO_U07, K2INF_U08_S2IO_U09	C1	Lab1, … Lab 8	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT……

SUBJECT CARD

Name in Polish *Projektowanie Systemów Informatycznych*
Name in English *Software System Design*
Main field of study (if applicable): *Computer Science*
Specialization (if applicable): *Software Engineering*
Level and form of studies: ~~1st/~~ 2nd* level, full-time ~~/ part-time~~*
Kind of subject: obligatory~~/ optional / university-wide~~*
Subject code INZ003767
Group of courses ~~YES /~~ NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload (CNPS)	60			120	
Form of crediting	Examination / ~~crediting with grade~~*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2			4	
including number of ECTS points for practical (P) classes	0			4	
including number of ECTS points for direct	1,2			2,4	

teacher-student contact (BK) classes					

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Know basic notations and diagrams used in object-oriented modeling.
2. Is able to build a distributed application (at least client-server) in a selected programming language.

\

SUBJECT OBJECTIVES

C1 To present role of modeling and code generation in software development.
C2 To familiarize students with a design process of complex software systems, and the system implementation according to the project.
C3 To present approaches to quality assessment of software projects, and practical quality assessment of different artifacts build during software development.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 A student names and describes models used at different sta ges of software development and explains their connection to source code.
PEK_W02 A student classifies non-functional requirements and names tactics of their achievement.
PEK_W03 A student distinguishes architectural perspectives and views; describes selected architectural and design patterns.
PEK_W04 A student lists factor influencing the quality of software artifacts; knows basic steps of selected method used for architecture quality assessment.
relating to skills:
PEK_U01 A student designs an architecture of software system taking into account non-functional requirements
PEK_U02 A student assesses a quality of artifacts build during software development
PEK_U03 A student proposes improvements connected to source code generation
PEK_U04 A student implements, consistently to project, a part of software system, and verifies its quality
PEK_U05 A student analyses the possibility of application of new technologies or tools to software system implementation
PEK_U06 A student solves complex engineering problems that can appear during installation, configuration, programming, testing, component integration

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction. Definition of basic terms.	2
Lec 2	MDA and DSL	2
Lec 3	Business modeling and requirement specification – basic input to architecture definition	2
Lec 4	System architecture design – perspectives and views	2
Lec 5	Architectural mechanisms and patterns.	2
Lec 6	System architecture design – influence of non-functional requirements on software system architecture. Methods of architecture assessment.	2
Lec 7	SOA. SoaML.	2
Lec 8	Summary.	1

	Total hours	15
Form of classes - project		**Number of hours**
Proj 1	Organizational activities.	2
Proj 2	Business modeling and requirement specification – part I	2
Proj 3	Business modeling and requirement specification – part II	2
Proj 4	Assessment of req. specification	2
Proj 5	Definition of software system architecture – part I	2
Proj 6	Definition of software system architecture – part II	2
Proj 7	Assessment of software architecture	2
Proj 8	Definition of DSL – idea	2
Proj 9	DSL implementation – part I	2
Proj 10	DSL usage. Assessment of generated source coverage	2
Proj 11	Software system implementation (fragment) – part I	2
Proj 12	Software system implementation (fragment) – part II	2
Proj 13	Software system implementation (fragment) – part III	2
Proj 14	Software system verification	2
Proj 15	Project transition to final evaluation	2
	Total hours	30

TEACHING TOOLS USED

N1. Informative lecture with elements of problem solving, supported by multimedia presentations.
N2.Examples of project documentation, prepared in accordance with document templates.
N3. Software for modeling, implementation and testing of software.
N4. E-learning system used for the publication of teaching materials, and announcements, as well as for collection and assessment of student works.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 – business modeling and req. specification	PEK_U01	Project documentation will be checked according to consistency, completeness, and adequacy to a modeled domain. Student's assessment will be checked according to its acuteness, and accuracy. Traditional scale.
F2 – architecture definition and assessment	PEK_U01, PEK_U02	System architecture will be checked according to consistency, completeness, addressing non-functional requirements. Student's assessment will be checked according to its acuteness and accuracy. Traditional scale.
F3 – domain language	PEK_U01, PEK_U03	Implementation of DSL will be checked according to its correctness, and the degree of source code coverage. Traditional scale.

F4 – implementation and tests	PEK_U04, PEK_U05	Implementation of a software system will be checked according to its consistency to the design, and the test coverage level. Traditional scale.
P1 – final grade (theoretical part)	PEK_W01, …, PEK_W04	Exam - written test checking students' knowledge. The test is given a positive evaluation, if the student scores at least 50% of the maximum number of points.
P2 – final grade (practical part)	PEK_U01, …, PEK_U06	Final grade calculated on the base of the following formula: 0,2 * F1 + 0,2 * F2 + 0,3 * F3 + 0,3 * F4

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] L. Bass, P. Clements, R. Kazman, Architektura oprogramowania w praktyce. Wydanie II, Helion 2011.

[2] P. Clements, R. Kazman, M. Klein, Architektura oprogramowania. Metody oceny oraz analiza przypadków, Helion 2003.

SECONDARY LITERATURE:

[16] F. Buschmann, K. Henney, D. C. Schmidt, Pattern-oriented software architecture: On patterns and pattern languages, John Wiley and Sons, 2007

[17] I. Dubielewicz, B. Hnatkowska, Z. Huzar, L. Tuzinkiewicz. Metodyka QUAD, Sterowane jakością wytwarzanie aplikacji bazodanowych, Oficyna Wydawnicza PWR, 2010

[18] Materials delivered by lecturer.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr inż. Bogumiła Hnatkowska, Bogumila.Hnatkowska@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Software System Development
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Computer Science
AND SPECIALIZATION Software Engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W03, K2INF_W06_S2IO_W01	C1	Wy1 – Wy5, Wy8	N1, N4
PEK_W02	K2INF_W03, K2INF_W06_S2IO_W01	C2	Wy6	N1, N4
PEK_W03	K2INF_W06_S2IO_W01	C2	Wy4, Wy5, Wy7, Wy8	N1, N4
PEK_W04	K2INF_W06_S2IO_W01	C3	Wy3, Wy6	N1, N4
PEK_U01	K2INF_U08_S2IO_U02	C2, C3	Pr5, Pr6	N2, N3, N4
PEK_U02	K2INF_U08_S2IO_U01	C3	Pr4, Pr7, Pr14	N3, N4
PEK_U03	K2INF_U08_S2IO_U02, K2INF_U08_S2IO_U10	C1	Pr8, Pr9, Pr10	N3, N4
PEK_U04	K2INF_U08_S2IO_U01, K2INF_U08_S2IO_U02	C2	Pr11, Pr12, Pr13	N3
PEK_U05	K2INF_U08_S2IO_U09	C2	Pr11, Pr12	N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8/ DEPARTMENT……

SUBJECT CARD

Name in Polish Projektowanie usług IT w organizacji
Name in English Design of IT services in organization
Main field of study (if applicable): Informatics
Specialization (if applicable): Software engineering
Level and form of studies: 1st/ 2nd* level, full-time / ~~part-time*~~
Kind of subject: ~~obligatory~~ / optional / ~~university-wide*~~
Subject code INZ003816
Group of courses YES / ~~NO*~~

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		15		15
Number of hours of total student workload (CNPS)	30		30		30
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course	X				
Number of ECTS points	1		2		1
including number of ECTS points for practical	0		2		0

(P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	0.6		1,2		0,6

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basics of organisation and venture management including business process modeling

\

SUBJECT OBJECTIVES

C1 Transfer of knowledge necessary for fulfilment of an active role in creating an organisation in which ICT services should function, in addition providing such services outside, including services used in internal business processes

C2 Learning about good practices in field of ITIL (Information Technology Infrastructure Library) allowing for modelling processes in an commercial company (for example computer and programming ventures) also non-commercial ones (for example government agencies), independent when it comes to its size, organisation type or acquired ICT tools

C3 Getting accustomed to defined role and responsibilities in ICT departments, organisation support processes (ITIL: Service Support) and planning and services control (ITIL: Service Delivery)

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – has necessary knowledge for fulfilling an active role in shaping of and organisation in which ICT services should function

PEK_W02 – has knowledge about good practices in ITIL area

PEK_W03 – has knowledge about defined roles and responsibilities in ICT departments

relating to skills:

PEK_U01 – can use good ITIL practices in real life situations

PEK_U02 – can discern in roles and responsibilities of ICT departments in organisation

relating to social competences:

PEK_K01 – has expertise necessary for preparing and giving a speech on topic of designing ICT services in organisation

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to managing ICT services, evolution and expectations	0,5
Lec 2	ICT project – specificity. Methodologies and usefulness	1
Lec 3	Position of services management in ICT field and project management based on PRINCE2	1
Lec 4	Service-based ICT organisational model. What is ITIL?	1
Lec 5	Strategy of ICT services management	1
Lec 6	Service desk (central contact point with users)	0,5
Lec 7	Incydent Management	0,5
Lec 8	Problem Management	0,5
Lec 9	Change Management	0,5
Lec 10	Release Management	0,5

Lec 11	Configuration Management	0,5
Lec 12	CMDB structure and ITIL process support tools	0,5
Lec 13	Capacity Management	1
Lec 14	IT Service Continuity Management	1
Lec 15	Availability Management	1
Lec 16	Service Level Management	1
Lec 17	Financial Management for IT Services	1
Lec 18	Rules and range of knowledge necessary for “ITIL Foundation” certification	1
Lec 19	Colloquium	1
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Organization group and choice of topics and the environment	2
Lab 2	Requirement Analysis Call Centre and Service desk	3
Lab 3	Preparation SLA	2
Lab 4	Implementation simple function Call Centre and Service desk	4
Lab 5	Reports services	2
Lab 6	Discussion of the results	2
	Total hours	15

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1	Strategy of ICT services management – case SLA	2
Sem 2	Procedure and process of change Management	2
Sem 3	Choices cases of SLA	4

Sem 4	Call Centre and Service desk –tools and reguirement	2
Sem 5	Principe PRINCE 2 and ITIL	3
Sem 6	Financial Management for IT Services	2
	Total hours	15

TEACHING TOOLS USED
N1. N2. N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_W01	Colloquium
P	PEK_W02	Colloquium
P	PEK_W03	Colloquium
P	PEK_U01	Passing laboratory lessons
P	PEK_U02	Passing laboratory lessons
P	PEK_K01	Conducting a seminar

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Westland J., Project Management Lifecycle, Kogan Page, 2006

[2] Grieves M.: Product Lifecycle Management – Driving the Next Generation of Lean Thinking. MC Graw-Hill, New York, 2006.

[3] Frączkowski K., Zarządzanie projektem informatycznym. Projekty w środowisku wirtualnym. Czynniki sukcesu i niepowodzeń projektów, Oficyna Wydawnicza Politechniki Wrocławskiej, 2003

SECONDARY LITERATURE:

[1] Project Management Institute, PMBOK Guide Fourth Edition – Kompendium wiedzy o zarządzaniu projektami, MT&DC, 2009

[2] http://www.ploug.org.pl/konf_05/materialy/pdf/07.pdf

[3] http://itsm.itlife.pl/content/view/10091/132/

[4] Robert M., Micah M., Agile – Programowanie zwinne, Helion, 2008

[5] Frączkowski K.,: Mapping activities and competence in ICT projects. W: Project management essential reality for business and government. [21st IPMA World Congress Cracow 2007], Cracow, Poland, 18-20 June 2007 / Eds Jerzy A. Kisielnicki, Stanisław Sroka. Kraków : "Akapit", 2007. s. 61-68,

[6] Frączkowski K., Wpływ globalizacji rynku IT na procesy zarządzania i wytwarzania systemów informatycznych. W: Nowoczesne technologie informacyjne w zarządzaniu. Red. nauk. E. Niedzielska, H. Dudycz, M. Dyczkowski. Wrocław : Wydaw. AE, 2005.

[7] PN-EN ISO 9001:2001: Systemy Zarządzania Jakością. Wymagania. Polski Komitet Normalizacyjny, Warszawa 2001

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Kazimierz Frączkowski Ph D. mail : kazimierz.fraczkowski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Design of IT services in organization
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION Software engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W06	C1	Lec1, Lec2, Lec	
PEK_W02	K2INF_W06	C1	Lec4,Lec5	
PEK_W03	K2INF_W06	C1	Lec6-Lec18	
PEK_U01	K2INF_U03 K2INF _U06	C2,C3		
PEK_U02	K2INF_U03 K2INF _U06	C2,C3		
PEK_K01	K2SWD_K02	C2,C3		

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish *Przygotowanie publikacji z Wykorzystaniem LaTeX'a*
Name in English *Preparing publications using LaTeX*
Main field of study (if applicable): Computer Science
Specialization (if applicable): …….
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: ~~obligatory~~ / optional~~ / university wide~~*
Subject code INZ3817
Group of courses YES / ~~NO~~*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		15		15
Number of hours of total student workload (CNPS)	30		60		30
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course			X		
Number of ECTS points	1		2		1

including number of ECTS points for practical (P) classes	0		2		0
including number of ECTS points for direct teacher-student contact (BK) classes	1		1		1

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

4. Is able to read research papers in English.

\

SUBJECT OBJECTIVES

C1 To familiarize students with selected, methodology-oriented techniques or hints to prepare research papers.

C2 To familiarize students with selected, tool-oriented techniques or hints to prepare research papers.

C3 To familiarize students with selected research papers in software engineering (or closely related areas) which could be seen as a research synthesis model to follow (e.g. systematic literature review, meta-analysis).

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Has a basic knowledge which allows to name and describe selected useful tools to prepare research papers.

PEK_W02 Has a basic knowledge which allows to name and describe methodological hints and features of sample research papers in software engineering, or closely related areas, which could be seen as a research synthesis model to follow.

…

relating to skills:

PEK_U01 Is able to collect, assess, integrate and interpret information from research literature, data bases of research papers and other properly selected sources in English.

PEK_U02 Is able to collaborate on research synthesis paper in English.

PEK_U03 Is able to prepare a multimedia presentation in English focused on selected tools, packages or methods to prepare research papers.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction to the course.	1
Lec 2	Tools to prepare publications (LaTeX). Searching for research papers.	2
Lec 3	Systematic Literature Review	2

Lec 4-7	Preparing research papers. Test (Lec7)	8
Lec 8	Retrospection and test	2
	Total hours	15

Form of classes – laboratory		Number of hours
Lab1	Introduction, passing criteria.	1
Lab2	Software infrastructure to work on systematic literature review	2
Lab3	Searching for literature	2
Lab4	Preparing a research paper 1	2
Lab5	Preparing a research paper 2	2
Lab6	Preparing a research paper 3	2
Lab7	Preparing a research paper 4	2
Lab8	Evaluation of final drafts of research papers	2
	Total hours	15

Form of classes - seminar		Number of hours
Sem 1	Introduction, passing criteria, schedule and selection of topics.	1
Sem 2	Topic 1 is selected by students from the pool including, for example, the following ones: 1) LaTeX and text editors, 2) Systematic Literature Review, 3) Mapping Study, 4) BibTeX 5) LaTeX packages useful to prepare research papers (tables, images, animations) 6) Preparing research papers to research journals and conferences as well as confefrence posters in LaTeX. 7) Multimedia presentations in LaTeX.	2
Sem 3	Topic 2 is selected from the aforementioned pool of topics	2
Sem 4	Topic 3 is selected from the aforementioned pool of topics	2
Sem 5	Topic 4 is selected from the aforementioned pool of topics	2
Sem 6	Topic 5 is selected from the aforementioned pool of topics	2
Sem 7	Topic 6 is selected from the aforementioned pool of topics	2

Sem 8	Topic 7 is selected from the aforementioned pool of topics	2
	Total hours	15

TEACHING TOOLS USED
N1. Lecture N2. The course web page with references to literature and course related stuff. N3. Software to prepare research papers, reports and presentations (e.g. Latex, TeXnicCenter, Beamer). N4. Internet and server-side software infrastructure (e.g. versioning repository SVN or Git). N5. Search engines and research papers data bases

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01	Assessment of ability to use tools to prepare research papers and server infrastructure to collaborate on a paper as well as ability to findresearch papers on a selected topic in proper data bases and Internet [0…20 pkt] (Pr2-Pr3) .
F2	PEK_U01, PEK_U 02	Assessment on a basis of work progress [0…40 pkt] (Pr4-Pr7).
F3	PEK_U01, PEK_U 02	Assessment on a basis of the final research paper draft (its research and publication value) [40 pkt] (Pr8).
P1 – lab	PEK_U01	P1 is obtained on a basis of the points from F1…F3 in the following way (mark – points): • 5.5 – 91…100 pkt and F2>=35 pkt • 5.0 – 81…100 pkt • 4.5 – 71…80 pkt • 4.0 – 61…70 pkt • 3.5 – 51…60 pkt • 3.0 – 41…50 pkt • 2.0 <=50 pkt
P2 – lecture	PEK_W01 … PEK_W03	A written test to evaluate assimilation of knowledge covered in lectures. A positive mark is given if student obtains at least 50% of the points possible to achieve.
P3 – seminar	PEK_U01, PEK_U02	P3 is based on how well a presentation has been conducted (e.g. clearly defined goals of presentation or benefits for the listeners,

		communication, presentation content, level of details, examples, timing, presentation flow - order of topics, capturing audience / listeners involvement). Given mark may be changed due to active discussions and creative contributions during seminars or (after an agreement with a lecturer) a detailed report or tutorial on a given topic.
P – final	PEK_W01…03, PEK_U01…02	P is based on the following equation: P=(P2+2*P1+P3)/4 if and only if P1 is positive. Otherwise P=2.0.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[4] Leslie Lamport, LATEX : system opracowywania dokumentów : podręcznik i przewodnik użytkownika, 2004

[5] Antoni Diller, LATEX wiersz po wierszu: zasady i techniki przetwarzania dokumentów, 2001.

[6] Michel Goossens, The LaTeX companion, 1999.

[7] Helmut Kopka, A guide to Latex : document preparation for beginners and advanced user, 1999

[8] Madhukar Pai et al., Systematic reviews and meta-analyses: An illustrated, step-by-step guide http://www.teachepi.org/documents/courses/sr&ma/Pai_NMJI_2004_Systematic_reviews_illustrated_guide.pdf

[9] Barbara Kitchenham et al, Guidelines for performing Systematic Literature Reviews in Software Engineering v2.3 (2007) http://www.dur.ac.uk/ebse/resources/guidelines/Systematic-reviews-5-8.pdf

[10] Rick W. Wright et al., How to Write a Systematic Review http://www.externarelationer.adm.gu.se/digitalAssets/1273/1273271_How_to_write_a_systemaic.pdf

[11] Adrian Wallwork, English for writing research papers, 2011.

[12] Margaret Cargill, Writing scientific research articles : strategy and steps, 2010.

[13] Hilary Glassman-Deal, Science research writing : for non-native speakers of english, 2010.

[14] Michael Jay Katz, From research to manuscript : a guide to scientific writing, 2009.

[15] Publikacje (w tym systematyczne przeglądy literatury) dostępne na stronie przedmiotu. Linki ze strony http://madeyski.e-informatyka.pl/

SECONDARY LITERATURE:

[8] Kitchenham, Barbara; Pearl Brereton, O.; Budgen, David; Turner, Mark; Bailey, John; Linkman, Stephen, Systematic literature reviews in software engineering – A systematic literature review, Information and Software Technology Volume: 51, Issue: 1, January, 2009, pp. 7-15 http://dx.doi.org/10.1016/j.infsof.2008.09.009

[9] Tore Dybå, Torgeir Dingsøyr: Empirical studies of agile software development: A systematic review. Information & Software Technology 50(9-10): 833-859 (2008) http://dx.doi.org/10.1016/j.infsof.2008.01.006

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Lech Madeyski

Lech.Madeyski /at/ pwr.wroc.pl http://madeyski.e-informatyka.pl/

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Preparing publications using LaTeX
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION
Software Engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2IO_W05	C2	Lec1-2	N1, N2
PEK_W02	K2INF_W06_S2IO_W05	C1, C3	Lec3-8	N1, N2
PEK_U01 (skills)	K2INF_U01	C3	Lab2-Lab8	N3, N4, N5
PEK_U02	K2INF_U03	C1-C3	Lab2-Lab8	N3, N4, N5
PEK_U03	K2INF_U08_S2IO_U03	C2	Sem2-Sem8	N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Seminarium dyplomowe
Name in English Diploma seminar
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005220
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					90
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					

Number of ECTS points					2
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes					1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge, skills and competences acquired at Informatics field at second level of study until 3th semester

\

SUBJECT OBJECTIVES

C1 Preparing students to write a master thesis according the internal requirements in Informatics field at Faculty of Computer Science and Management, Wrocław University of Technology,
C2 Providing students with basic skills related to preparation and presentation of scientific texts, beginning from the choice of topic, selection of tasks to be performed, use of literature to interpretation of the results.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
…
relating to skills:
PEK_U01 He is able to acquire information from literature, databases and other sources, also in English or other language used for communication in Informatics field, is able to integrate the information obtained, interpret them, make critical evaluation and also draw conclusions and formulate and justify opinions related to prepared master thesis.
PEK_U02 He can communicate using a variety of techniques in his professional environment and in other environments, also in English or other foreign language used for communication in Informatics field and also to present the results of his master thesis
relating to social competences:
…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		

Lab 2		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Familiarization with the principles of master thesis realization at Informatics field. Rules related to student presentations. Determining the schedule of student presentations.	2
Sem 2	Review of basic skills related to preparation and presentation of scientific texts by students, beginning from the choice of topic, selection of tasks to be performed, use of literature and also how to write thesis and how obtained results should be interpret.	2
Sem 3 – Sem15	During semester each student has 2 presentations. The first presentation is related to the general view of the thesis topic, its placement in the literature and in the Informatics field. The student should present the primary aim of thesis, the state of art related to thesis topic, the concept of solution, the initial structure of thesis and timetable for further work. The purpose of the second presentation is preparation to defense and demonstrate presentation skills in English. The second presentation consists of two parts, namely, discussion of the results of the work in English and a short presentation in Polish devoted to the results of the thesis.	26
	Total hours	30

TEACHING TOOLS USED

N1. Multimedia presentations
N2. Examples of scientific papers and reports from the field of computer science.
N3. E-Learning System used to publish teaching materials and announcements, also used for collection and evaluation of student work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01 PEK_U02	Evaluation of the presentation of the work at the seminar and prepared documentation from the presentation. The evaluation shall be subject to the fulfillment of the requirements for the presentation, including its substantive scope, structure and organization of presentation, techniques of conversation, a form of presentation, compactness of presentation and conclusions reached. Participation in the discussions after presentation is also evaluated. In addition, the seminar leader is able to control the cooperation between supervisors and graduate students.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[16] Literature related to the scope of realized project selected by student and recommended by the teacher.

[17] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. inż. Leszek Borzemski, prof. PWr, leszek.borzemski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Diploma seminar
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
AND SPECIALIZATION **every specjalization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3
PEK_U02	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT…

SUBJECT CARD

Name in Polish Systemy informacyjne
Name in English Information systems
Main field of study (if applicable): Informatics
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code INZ3762
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				30
Number of hours of total student workload (CNPS)	60				60
Form of crediting	crediting with grade	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	crediting with grade
For group of courses mark (X) final course					
Number of ECTS points	2				2
including number of ECTS points for practical (P) classes	0				0
including number of ECTS points for direct teacher-student contact (BK) classes	1,2				1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic mathematical knowledge for 1st level of studies.

2. Informatics knowledge background.
3. Algorithms knowledge background.

\

SUBJECT OBJECTIVES

C1 Acquiring knowledge about functions and significance of information systems in contemporary organizations
C2 Acquainting with the functions and development of information systems in information society
C3 Acquainting with the different methods of information retrieval by surfing the Web
C4 Recognizing the problems of passing of contemporary organizations to Internet space
C5 Obtainment of skills to analyze the literature from information systems area and to synthesize the contents from different sources
C6 Application of the obtained knowledge to presentation the problems from information systems area by means of using adequate tools

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Familiarity with basic models of information systems
PEK_W02 Basic knowledge about Web information systems
PEK_W03 Familiarity with common multimedia technologies
PEK_W04 Understanding of the measures of information retrieval efficiency

relating to skills:
PEK_U01 Student can to build information query for different types of information needs
PEK_U02 Can to determine basic features of information system for given organization
PEK_U03Student be able to evaluate the precision of retrieved information
PEK_U04 Can to present basic features of given information system

relating to social competences:
PEK_K01 Can individually to use literature of the subject and to select useful information
PEK_K02 Student is convinced above positive role of information systems in stimulation of the civilization development

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	History of information systems development. Information processing. Theoretical basis of information systems.	2
Lec 2	Main information systems' models. Automation of information flow in organization.	2
Lec 3	Information retrieval on Internet – fundamentals.	2
Lec 4	Web information systems.	2
Lec 5	Multimedia. Importance of multimedia technologies in information systems development.	2
Lec 6	How societies embrace information technology. Digital libraries.	2
Lec 7	Efficiency of information systems. Case study of chosen information system.	2
Lec 8	Test	1
	Total hours	15

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Introductory seminar.	2
Sem 2	Information systems – definitions, types, features, examples.	2
Sem 3	Information retrieval fundamentals – models, dictionaries, indexes.	2
Sem 4	Evaluation of information systems' efficiency.	2
Sem 5	Analytical retrieval of information.	2
Sem 6	Information retrieval on Internet.	2
Sem 7	ERP class systems.	2
Sem 8	Mobile information systems.	2
Sem 9	Multimedia information systems.	2
Sem 10	Information systems for teleworking.	2
Sem 11	How societies embrace information technology.	2
Sem 12	CRM systems.	2
Sem 13	Knowledge management systems.	2
Sem 14	Information society: e-business, e-administration, e-commerce, e-health	2

Sem 15	Seminar summation and credit.	2
	Total hours	30

TEACHING TOOLS USED

N1. Computerized presentation at the lectures.
N2. Presentation with visualization and using Internet resources during the seminar.
N3. Consultations.
N4. Students' homework with using software packages.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 PEK_U04 PEK_K02	Grade of presentation (quality of slides, oral presentation, relevance, duration), presence and activity.
F2	PEK_K01	Report's grade
P-seminar	PEK_U02	Grade result from F1 and F2
P-lecture	PEK_W01-PEKW04 PEK_U03	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Manning C. D., Raghavan P., Schutze H.: *Introduction to Information Retrieval*, Cambridge University Press, New York, 2009, dostępne także bezpłatnie: www.cambridge.org

[2] Kłopotek M. A.: *Inteligentne wyszukiwarki internetowe* , Akademicka Oficyna Wydawnicza EXIT, Warszawa, 2001.

[3] Wrycza S. (red.): *Informatyka ekonomiczna. Podręcznik akademicki*, PWE, Warszawa, 2010.

[4] Cortada J. W. : How Societies Embrace Information Technology, WILEY-IEEE, NY, 2009.

[5] Baeza-Yates R., Ribeiro-Neto B.: *Modern Information Retrieval*, ACM Press, Adison-Wesley, New York, 1999.

SECONDARY LITERATURE:

[1] Zgrzywa A., Choroś K., Siemiński A.(Eds.): *Multimedia and Internet Systems: Theory and Practice,* Spriger Verlag, Berlin, 2013.

[2] Nguyen N.T., Zgrzywa A., Czyżewski A.(Eds.): *Advances in Multimedia and Network Information System Technology,* Spriger Verlag, Berlin, 2010.

[3] Zawiła-Niedźwiecki J. : *Informatyka gospodarcza*, Wyd. C. H. Beck, 2010.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Aleksander Zgrzywa, Aleksander.Zgrzywa@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INFW03, K2INF_W06	C1	Lec1, Lec 6 Sem 2,Sem 14	N1-4
PEK_W02	K2INF_W04, K2INF_W06	C3,C4	Lec 3, Lec 4 Sem 6,Sem 7, Sem 11	N1-4
PEK_W03	K2INF_W02, K2INF_W06	C2	Lec 5, Lec 6 Sem 13,Sem 14	N1-4
PEK_W04	K2INF_W03	C3	Lec 3, Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U01	K2INF_U01, K2INF_U08	C3	Lec 3,Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U02	K2INF_U05, K2INF_U08	C4	Lec 2,Lec 7 Sem 7,Sem 8,Sem 12,Sem 13	N1-4
PEK_U03	K2INF_U05, K2INF_U08	C3	Lec 2, Lec 5 Sem 3, Sem 5, Se6,Se9	N1-4
PEK_U04	K2INF_U02, K2INF_U03	C5, C6	Lec 5, Lec 6 Sem 3, Sem 5, Sem 6, Sem 9, Sem 10	N1-4

PEK_K01	K2INF_K01, K2INF_U02	C5	Lec 5, Lec 6 Sem 9, Sem 10	N1-4
PEK_K02	K2INF_K02	C1	Lec 1, Lec 6 Sem 2, Sem 14	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: Systemy wspomagania decyzji
Name in English: Decision Support Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Decision Support Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / university-wide*
Subject code: INZ003761
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	15		15	
Number of hours of total student workload (CNPS)	60	30		60	
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / ~~crediting with grade~~*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2	1		2	
including number of ECTS points for practical (P) classes				2	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	0,6		1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None.

\

SUBJECT OBJECTIVES

C1 Getting to know foundations of designing computer science decision support systems using general systemic methods which make it possible to apply unified approaches for analysis and decision making for decision support systems of different nature.
C2 Acquisition of skills to represent in the form of mathematical formulas of decision making plants treated as input-output plants.
C3 Acquisition of skills to analyze of decision making plants treated as input-output plants.
C4 Getting acquainted with methods and algorithms of multi-stage decision making.
C5 Acquisition of skills to apply dynamic programming method.
C6 Getting to know metods and algorithms of multi-criteria decision making.
C7 Acquisition of skills to use AHP method.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Student knows foundations of designing of decision support systems for any kind of plants.
PEK_W02 Student knows foundations of analysis and decision making for input-output plants with logic knowledge representation.
PEK_W03 Student knows selected method of multi-stage and multi-criteria decision making.
relating to skills:
PEK_U01 Student is able to elaborate a mathematical model for an input-output decision making plant in discrete state space as well as with logic knowledge representation.
PEK_U02 Student can solve analysis and decision making tasks for elementary plants with logic knowledge representation.
PEK_U03 Student is able to solve multi-stage decision making problem using Bellman's Principle and dynamic programming.
PEK_U04 Student can use AHP algorithm for the solution od multi-criteria decision making problem
relating to social competences:
PEK_K01 Student can take advantage of professional literature by oneself and can perform the critical analysis of information mined.
PEK_K02 Student can think creatively.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Decision support systems – definitions, structures, problems.	1
Lec 2	Application of discrete state equations and logic expressions for representation of decision making plants.	2
Lec 3	Analysis of decision making plants, in particular logic-algebraic method.	2
Lec 4	Decision making – definition, typology, logic-algebraic plant.	2
Lec 5	Bellman's Principle and multi-stage decision making.	3
Lec 6	Multi-criteria decision making, Pareto sets, AHP method.	3
Lec 7	Examples of computer decision support systems.	2
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Solution of numerical exercises concerning difference equations.	1
Cl 2	Solution of numerical exercises concerning differential equations as well as propositional calculus.	2

Cl 3	Solution of numerical exercises concerning mathematical representations of input-output plants.	2
Cl 4	Solution of numerical exercises concerning analysis using logic-algebraic method.	2
Cl 5	Solution of numerical exercises concerning decision making using logic-algebraic method.	2
Cl 6	Solution of numerical exercises concerning dynamic programming.	2
Cl 7	Solution of numerical exercises concerning AHP method.	2
Cl 8	Final test.	2
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Collecting of indispensable information about selected plant being the decision making plant.	2
Proj 2	Determination of mathematical model of selected decision making plant and decision making problem formulation.	2
Proj 3	Analysis of decision making plant using its mathematical model.	2
Proj 4	Choice of decision making method for further usage as well as elaboration of decision making algorithm.	3
Proj 5	Implementation and alalysis of decision making algorithm.	4
Proj 6	Elaboration of conclusions and written report of the project performed.	2
	Total hours	15

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1 Lecture – traditional method. N2 Classes – traditional method. N3 Consultation. N4 Individual discussion with student. N5 Short test (10 mins.). N6 Self-contained work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Short tests during the classes.
F2	PEK_K01– PEK_K02	Individual discussion with student during the project.
P (Classes)	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Test.
P (Project)	PEK_U01–PEK_U04; PEK_K01–PEK_K02	Evaluation of written report of the project.
P (Lecture)	PEK_W01–PEK_W03; PEK_K02	Exam.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[18] [1] Józefczyk J., Wybrane problemy podejmowania decyzji w kompleksach operacji, Oficyna Wydawnicza PWr, Wrocław 2001.

[19] Bubnicki Z., Podstawy informatycznych systemów zarządzania, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1993.

[20] Roy B., Wielokryterialne podejmowanie decyzji, WNT, Warszawa 1990.

SECONDARY LITERATURE:

[1] Techniki informacyjne w badaniach systemowych, P. Kulczycki, O. Hryniewicz, J. Kacprzyk (red.), WNT, Warszawa 2007.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Jerzy Józefczyk, Jerzy.Jozefczyk@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Decision Support systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Decision Support systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1	Lec1, Lec 2, Lec 7, Cl1, Cl 2, Pr1	N1, N3, N6
PEK_W02	K2INF_W02	C1	Lec3, Lec4	N1, N3, N6
PEK_W03	K2INF_W02	C4, C6	Lec5, Lec6	N1, N3, N6
PEK_U01 (skills)	K2INF_U05; K2INF_U06	C2	Lec2, Cl 3, Proj2	N2–N6
PEK_U02	K2INF_U05; K2INF_U06	C3	Cl 4, Cl 5, Proj3, Pro4	N2–N6
PEK_U03	K2INF_U05; K2INF_U06	C5	Cl 6, Proj4	N2–N6
PEK_U04	K2INF_U05; K2INF_U06	C7	Cl 7, Proj4	N2–N6
PEK_K01 (competences)	K2INF_K01	C1, C4, C6	Lec1– Lec7, Proj1, Proj4	N2–N6
PEK_K02	K2INF_K01	C1–C7	Proj1–Proj6	N2–N6

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: W-8

SUBJECT CARD

Name in Polish: Teoretyczne podstawy przetwarzania rozproszonego
Name in English: Theoretical Foundations of Distributed Processes
Main field of study (if applicable): Informatics
Specialization (if applicable): Software Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: ~~obligatory~~ / optional / ~~university-wide~~*
Subject code: INZ003813
Group of courses YES / ~~NO~~*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	15			
Number of hours of total student workload (CNPS)	60	60			
Form of crediting	~~Examination~~ / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course	X				

Number of ECTS points	2	2			
including number of ECTS points for practical (P) classes	0	0			
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	1,2			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

9. The ability to write distributed applications in a high-level programming language is recommended (but not required).

\

SUBJECT OBJECTIVES

C1 To learn standard models of distributed systems (process algebras).
C2 To learn selected tools for the specification and verification of distributed systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Students enumerate and explain basic operations of process algebras.
PEK_W02 Students build algebraic specifications of simple concurrent and distributed systems on different levels of abstraction.
PEK_W03 Students write properties of reactive systems in an appropriate logic.
PEK_W04 Students enumerate and describe methods of process verification.

relating to skills:
PEK_U01: Student makes use of software tools to specify and verify distributed processes.
PEK_U02: Student is able to make use of the literature on the subject and critically analyse the information obtained.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction to lambda calculus as a model of sequential computations.	2
Lec 2	Expressive power of lambda calculus.	2
Lec 3	Lambda calculus with simple types.	2
Lec 4	Abstract data types.	2
Lec 5	Algebra of sequential processes.	2
Lec 6	Algebra of communicating processes.	2
Lec 7	Recursion. Condidional and the choice quantifier for data.	2
Lec 8	Abstraction. Hiding internal behaviour.	2
Lec 9	Modelling of system behaviour with mCRL2 toolset.	2
Lec 10	Specification, implementation and verification of processes.	2
Lec 11	Model checking. Hennessy-Milner logic.	2

Lec 12	The modal mu-calculus.	2
Lec 13	The modal mu-calculus, cont.	2
Lec 14	Written test.	2
Lec 15	Overview of other formalisms.	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1	Administrative class. Grading policy. Installation instructions for the used toolset.	1
Cl 2	Type free lambda calculus.	2
Cl 3	Lambda calculus with simple types.	2
Cl 4	Abstract data types. Algebra of sequential processes.	2
Cl 5	Algebra of communicating processes. Recursion. Condidional and the choice quantifier for data.	2
Cl 6	Abstraction. Hiding internal behaviour. Modelling of system behaviour with mCRL2 toolset.	2
Cl 7	Specification, implementation and verification of processes. Hennessy-Milner logic.	2
Cl 8	The modal mu-calculus.	2
	Total hours	15

TEACHING TOOLS USED

N1. Lecture supported by multimedia presentations.
N2. E-learning system used to publish teaching materials and messages.
N3. A toolset to specify and verify concurrent and distributed processes.
N4. Using Internet resources.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 PEK_W02 PEK_W03 PEK_W04 PEK_U01 PEK_U02	Grading homework exercises solved at classes and declared as solved.
F2	PEK_W01 PEK_W02 PEK_W03 PEK_W04	Written test at lecture.

P The overall grade of the course is (C+2L)/2 rounded off. C is the grade for classes, and L is the grade for written test (lecture).

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[21] Groot J.F, Mousavi M.R. Modelling and Analysis of Communicating Systems, 2013 – available in the Internet.
[22] Handouts provided by the teacher.

SECONDARY LITERATURE:

[10] Barendregt H.P., The Lambda Calculus. Its Syntax and Semantics, Elsevier, Amsterdam 1984.
[11] Baeten J.C.M., Basten T., Reniers M.A., Process Algebra: Equational Theories of Communicating Processes, Cambridge University Press, 2010.
[12] Fokkink W.J., Introduction to Process Algebra (2nd ed.), Springer-Verlag, 2007.
[13] Fokkink W.J., Modelling Distibuted Systems (2nd ed.), Springer-Verlag, 2011.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Zdzisław Spławski, zdzislaw.splawski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Theoretical Foundations of Distributed Processes
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **Software Engineering**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2IO_W05	C1	Lec1 – Lec8	N1, N2, N4
PEK_W02	K2INF_W06_S2IO_W05	C1	Lec1 – Lec10	N1 – N4
PEK_W03	K2INF_W06_S2IO_W05	C1	Lec11 – Lec13	N1 – N4
PEK_W04	K2INF_W06_S2IO_W05	C1	Lec10 – Lec13	N1, N2, N4
PEK_U01 (skills)	K2INF_U06	C1, C2	Cl2 – Cl8	N1 – N4
PEK_U02	K2INF_U01	C1, C2	Cl4 – Cl8	N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: Teoria i inżynieria ruchu teleinformatycznego

Name in English: Theory and engineering of teletraffic

Main field of study (if applicable): Computer science

Specialization (if applicable): Teleinformatics

Level and form of studies: 2nd level, full-time

Kind of subject: obligatory

Subject code INZ3759

Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload	30			90	

(CNPS)					
Form of crediting	Crediting with grade			Crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	1			3	
including number of ECTS points for practical (P) classes				3	
including number of ECTS points for direct teacher-student contact (BK) classes	0,6			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

7. Has a basic knowledge of ICT systems and computer communication networks (K1INF_W11).
8. Knows the basic methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_W16)
9. Can use the right tools to build a simple model of the process (the object), to formulate specific task analysis and decision making (K1INF_U15)
10. Can effectively use the methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_U16)
11. It has the ability to self-education, including in order to improve the professional competence (K1INF_U05)
12. Understands the need and knows the possibility of lifelong learning and to improve their professional and social competences (K1INF_K01)

SUBJECT OBJECTIVES

C1. Ordered, underpinned by theoretical knowledge of methods and techniques for transmitting signals using different modulation techniques, methods and techniques of information transmission, methods of organization and management of data communications traffic in the tasks of design and analysis of communication systems, methods of delivering service quality of ICT systems, analysis of quantitative and qualitative requirements and methods for sizing of distributed IT systems.

C2. Skills about the differences and benefits of the use of analog and digital data transmission techniques, the differences and benefits of the use of wired and wireless signal transmission techniques, developing the concept of using wired and wireless technologies in the basic applications of ICT systems, defining the qualitative and quantitative requirements of the user information and communication systems range of data, designing ICT solutions needed to achieve the qualitative and quantitative requirements of the user, using standards and solutions available on the market, estimating the cost of preparing and maintaining ICT solutions needed to achieve the qualitative and quantitative requirements, designing modernization of IT solutions needed to achieve the qualitative and quantitative requirements, identifying differences and similarities between solutions in a variety of applications (e-health, e-government and e-learning, in real-time systems, etc.).

C3. Skills for the design and analysis of complex, distributed ICT systems providing network services for distributed computer communication systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

K2INF_W02: Has a structured, theoretically founded essential knowledge of business modeling and requirements specification systems.

K2INF_W03: Has a structured, theoretically founded essential knowledge in the delivery of information distributed systems

K2INF_W06: Achieves results in the category of knowledge for specialty data communications

relating to skills:

K2INF_U05: Can - in formulating and solving engineering tasks - integrate knowledge of the fields of science and scientific disciplines relevant to the study being studied and applied a systemic approach, taking into account the non-technical aspects

K2INF_U06: Can solve the modeling, analysis and decision making for different types of objects

K2INF_U08: Achieves results and skills in areas of data exchange and computer communications systems

relating to social competences:

K2INF_K01: Can think and act in a creative and enterprising

K2INF_K02: Has aware of the social role of technical graduating, especially understands the need for the formulation and communication to the public, especially through the mass media, information and opinion on the achievements of technology and other aspects of engineering, shall endeavor to provide such information and opinions in a widely understood the reasons for the different points of view

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Classification of ICT systems from different points of view. Quality of Experience (QoE) and Quality of Service (QoS) in ICT systems with elastic and streaming traffic.	2
Lec 2	Introduction to queuing. Open and close networks of queues.	2
Lec 3	Queuing models of circuit-switched and packet-switched computer communication systems. Burke's theorem and Kleinrock approximation.	2
Lec 4	Access control, flow control and routing tasks formulation and solution in distributed environments.	2
Lec 5	Requirements analysis	1
Lec 6	Models (Poisson, Markov modulated, self-similarity, etc) of teletraffic and its application in traffic engineering tasks.	2
Lec 7	QoS delivery concepts: best effort, integrated services and differentiated services	2
Lec 8	New concepts of systems and networks - NXGN (Next Generation Networks) i NWGN (New Generation Network). Summary.	2
	Total hours	15

PROGRAMME CONTENT

Form of classes - project		Number of hours
Proj 1	Formulation design task based on the analysis of the literature, documentation, etc.	2
Proj 2	Justification for the choice task and purpose of the task design - an analysis of the expected benefits of the project task.	2
Proj 3	Quantitative requirements analysis for the communication system under design	2
Proj 4	Qualitative requirements analysis for the communication system under design	2
Proj 5	Analysis of state of the art on how to solve the task design	2
Proj 6	Analysis and selection of the task design methodology	2
Proj 7	Tools (methods, algorithms, procedures, software and hardware) analysis and selection required for the implementation of the project task	2
Proj 8	Implementation of prototype of modules solve the task	2
Proj 9	Prototype testing and evaluation	2
Proj 10	Modification of solutions using prototype test results	2
Proj 11	Integration of modules distinguished at the stages of requirements analysis and prototyping	2
Proj 12	Verification and testing of an integrated solution design task	2
Proj 13	Analysis of the possibility of extending the project tasks	2
Proj 14	Preparation of the presentation and documentation of the design task	2
Proj 15	Presentation of the results of the design task	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture supported by whole class multimedia presentations based on literature and open access and commercial sources.
N2. Student's own works – solving experiments and tasks in laboratory as well as homework.
N3. Student's own works – literature and open access sources studies.
N5. Collective works in laboratory
N5. Student's own works – preparation of presentations and technical documentations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05	Observation and verification of student activity. Solving the sample jobs.

	K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	
F1 – F15 (project)	K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and assessment of student autonomy.
P (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	Colloquium (course credit) in the evaluation of forming F1 (lecture)
P (project)	K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Total weighted ratings F1 - F15 (project) and the assessment for the presentation of the final results of the project.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[23] A.S. Tanenbaum, „Computer networks", Prentice Hall; 1996
[24] G. Pujolle, D. Seret, D. Dromard, E. Horlait, „Integrated Digital Communication Networks", J. Wiley & Sons
[25] B. Russell, „The art of computer networks", Prentice Hall; 2009
[26] V.S. Bagad, I.A. Dhotre, „Computer networks", Technical Publications, 2009.
[27] M. Roden, „Analog and digital communication systems", Prentice Hall
[28] http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

SECONDARY LITERATURE:

[14] S. Haykin, „Telecommunication systems", Prentice Hall, 1999.
[15] MIT Free Open Course Materials (http://ocw.mit.edu/index.htm)
[16] CCNA Exploration Network Fundamentals, Cisco Academy, PWN, 2008

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Adam Grzech, adam.grzech@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Theory and engineering of teletraffic

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer science

AND SPECIALIZATION
Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1, C2, C3	Lec 1 – Lec 8	N1, N4
PEK_W02	K2INF_W03	C1	Lec 1 – Lec 8	N1,N2, N4
PEK_W03	K2INF_W06	C1	Lec 1 – Lec 8	N1, N4
PEK_U01 (skills)	K2INF_U05	C1, C2, C3	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_U02	K2INF_U06	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_U03	K2INF_U08	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_K01 (competences)	K2INF_K01	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_K02	K2INF_K02	C1, C2	Lec 1 – Lec 8	N1, N2, N3, N4, N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Zaawansowane metody i techniki analizy danych
Name in English Advanced Methods and Techniques of Data Analysis
Main field of study (if applicable): computer science
Specialization (if applicable): …….
Level and form of studies: 2nd* level, full-time
Kind of subject: obligatory
Subject code INZ003758
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	crediting with grade*		crediting with grade*		

For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes	0		4		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of mathematics and mathematical statistics

\

SUBJECT OBJECTIVES

C1 Introduce the methods and techniques of the statistical data analysis to students
C2 Gather knowledge for Knowledge Discovery (Data Mining)
C3 Applying the gathered knowledge to drawing conclusions based on data analysis

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has a basic knowledge of Knowledge Discovery (Data Mining)
PEK_W02 student has a basic knowledge of statistical data analysis
PEK_W03 student is able to present differences between parametric and non-parametric tests

relating to skills:
PEK_U01 student is able to choose a proper statistical test
PEK_U02 student is able to draw conclusion from data analysis
PEK_U03 student is able to select a proper data mining method

relating to social competences:
PEK_K01 student is able to search and reuse the primary and secondary literature listed below and is able to gather the proper knowledge
PEK_K02 student understands the need for systematic and individual work in order to cover the scope of the course

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to knowledge discovery	2
Lec 2	Classification and Data Clustering	2
Lec 3	Clustering Algorithms	2
Lec 4	Discovering association rules	2
Lec 5	Statistics - basic notions	2
Lec 6	The selected problems of estimation theory	2
Lec 7	Introduction to verification of statistical hypothesis	2
Lec 8	Parametric tests for one population	2
Lec 9	Non-parametric tests for one population	2
Lec 10	Parametric tests for two populations	2
Lec 11	Non-parametric tests for two populations	2

Lec 12	Parametric tests for more than 2 populations	2
Lec 13	Non-parametric tests for more than 2 population	2
Lec 14	Correlation and regression methods	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Introduction to WEKA	2
Lab 2	Knowledge discovery in WEKA	8
Lab 3	Introduction to MATLAB	2
Lab 4	Statistical data analysis in MATLAB	8
Lab 5	Introduction to R	2
Lab 6	Statistical data analysis in R	8
	Total hours	30

Form of classes - project		**Number of**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Traditional lecture N2. Labs N3. One-to-one consultancy during stuff hours

N4. Student self-study

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P -laboratory	PEK_U01-PEK_U03, PEK_K01-PEK_K02	Evaluation of the prepared tasks during labs, oral test
P-lecture	PEK_W01-PEK_W03 PEK_K01-PEK_K02	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[29] M. Sobczyk: Statystyka, Wydawnictwo Naukowe PWN, 2007

[30] W.Krysicki, J.Bartos, W. Dyczka, K. Królikowska, M. Wasilewski: Statystyka, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, cz. 2 Statystyka matematyczna, Wydawnictwo Naukowe PWN, 2007

[31] Marek Walesiak, Eugeniusz Gatnar (Red. nauk.) :Statystyczna analiza danych z wykorzystaniem programu R, Wydawnictwo Naukowe PWN, 2009

[32] M. Korzyński: Metodyka eksperymentu Planowanie realizacja i statystyczne opracowanie wyników eksperymentów technologicznych, Wydawnictwo Naukowo-Techniczne 2006

[33] Nong Ye, : The Handbook of Data Mining, Lawrence Erlbaum Associates, Publishers, 2003

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Prof. dr hab. inż Ngoc Thanh Nguyen, Ngoc-Thanh.Nguyen@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Advanced Methods and Techniques of Data Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY computer science
AND SPECIALIZATION **……**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C2	Lec1-4 Lab1-2	N1-4
PEK_W02	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_W03	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_U01	K2INF_U01, K2INF_W06, K2INF_W08	C1	Lec5-14 Lab3-6	N1-4
PEK_U02	K2INF_U01, K2INF_W06, K2INF_W08	C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_U03	K2INF_U01, K2INF_W06, K2INF_W08	C2	Lec1-4 Lab1-2	N1-4
PEK_K01		C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_K02		C1, C2, C3	Lec1-14 Lab1-6	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY …Computer Science and Management / DEPARTMENT…Informatics……

SUBJECT CARD

Name in Polish … Zarządzanie wytwarzaniem i integracją systemów informacyjnych
Name in English … Management of Development and Integration of Information Systems

Main field of study (if applicable): …Informatics…….
Specialization (if applicable): …Software engineering……..
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university wide~~*
Subject code INZ003764
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30				15
Number of hours of total student workload (CNPS)	60				60
Form of crediting	~~Examination /~~ crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination /~~ crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	**2**				2
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2				1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of project management topics
2. Knowledge of issues relating to software systems development

\

SUBJECT OBJECTIVES

C1 To familiarize students with the basic issues related to the integration of information systems in the enterprise, and with the problems in project planning (development projects);
C2 To equipped students with the knowledge of the roles and responsibilities of key members of the integration project,
C3 To form the students ability to prepare a critical essays

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student knows and understands the problems of system integration; knows and understands the design methods and implementation approach to data-level integration and functionality
PEK_W02 student knows and understands the technology which ensures cooperation between the components of an information system in a distributed network environment that allows to achieve complex functionality
PEK_W03 student knows the roles and responsibilities of key members of the integration project

relating to skills:
PEK_U01 is able to prepare a critical essay topics based on multiple sources, including these written in English
PEK_U02
…
relating to social competences:
PEK_K01
PEK_K02

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Documents EU and national rules and challenges in the integration of ICT systems	2
Lec 2	European and National Interoperability Framework	2
Lec 3	Technological Interoperability	2
Lec 4	Organizational and legal interoperability	2
Lec 5	Semantic interoperability - the construction of semantic mediators	2
Lec 6	Mobile technologies and their determinants in the development and integration of heterogeneous systems	4
Lec 7	Safety of integrated information systems	2
Lec 8	Barriers to the integration of ICT systems.	2
Lec 9	Managing service level integrated information systems – ITIL, SLA	4
Lec10	Cloud computing as an environment for resource sharing and processing for integrated information systems	4
Lec 11	Outsourcing development and integration of information systems - problems of virtual teams, tools, and applications such as mashups tests	2
Lec12	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		

Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Introductory seminar, overview of topics	1
Sem 2	The evolution of the development and integration of IA - the role of PM	2
Sem 3	The scale and complexity of IS vs. layer architecture	2
Sem4	Levels and integration layers of IS	2
Sem 5	Management problems of development and integration IS	2
Sem 6	Managing the development and integration of IS in the cloud	2
Sem 7	Trend reviews in integration issues	2
Sem8	IT services market in Poland - a popular qualifications	2
	Total hours	15

TEACHING TOOLS USED

N1. Informative lecture, supported by multimedia presentations.
N2. Examples of current management documentation used in companies.
N3. Software which supports the management of the development and integration of information systems.
N4. E-learning system used for the publication of teaching materials, collection and assessment of student work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1		Rating for active participation in seminar classes (discussion). Scale points (up 3 points in one class for the relevant comments to the subject).
F2		Score resulting from prepared and presented seminars topic. Point scale: 40% for the presentation and 60% for the written study topic

P1 Rating determined from the points forming the F1, F2, according to the formula:
90% of the points F2 and 10% of the points F1, and takes the value:
less then 40% of the points ◊ unsatisfied
<40%, 53%) => satisfied
<53%, 64%) => satisfied plus
<60%, 70%) => good
<70%, 88%) => good plus
<88%, 95%) => very good
> 95% => excellent

P2 Written test to the knowledge of the course. The test is given a positive evaluation, if the student scores at least 50% of the maximum number of points

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[34] Fryzlewicz Zbigniew, Salamon Adam. Podstawy architektury I technologii usług XML sieci WEB. Wydawnictwo Naukowe PWN 2008 r.

[35] Surhe, Lambert M. Timpledon, Martam T. Marseken, Susan F. Open Esb. Wyd. VDM Verlag Dr. Mueller AG&Co.kg, 2010

[36] Kasprzak Tadeusz, Integracja i architektury systemów informacyjnych przedsiębiorstw, Katedra Informatyki Gospodarczej i Analiz Ekonomicznych. Wydział Nauk Ekonomicznych. Uniwersytet Warszawski, 2000 - 262

[37] Roshen Waseem , SOA-based enterprise integration : a step-by-step guide to services-based application integration, New York : McGraw-Hill, 2009.

[38] Fong Joseph, Information systems reengineering and integration, Springer, London, 2006

SECONDARY LITERATURE:

[17] Krafzig Dirk , Banke Karl , Slama Dirk , Enterprise SOA: Service-Oriented Architecture Best Practices, Upper Saddle River, NJ : Prentice Hall, 2005

[18] Kazimierz Frączkowski.: Problemy integracji usług ICT w ochronie zdrowia. W. Integracja systemów informatycznych:nowe wyzwania. Red. Janusz Górski, Cezary Orłowski, Gdańsk: Pomorskie Wydawnictwo Naukowo-Techniczne PWNT, 2011 s. 33-41.

[19] Kazimierz Frączkowski, Antoni Zwiefka.: Open standards ICT as interoperability elements in Health care area. W . Global Telemedicine and eHealth Updates: Knowlage Resources, vol.4. s. 30-36.

[20] Kazimierz Frączkowski. : Systemy informacyjne oraz usługi w ochronie zdrowia oparte na technologiach SOA (Service Oriented Architectur), w. Acta Bio-Optica et Informatica Medica, 2010, vol. 16.nr 1, s. 81-86

[21] Frączkowski K., Mazur Z., SOA – architektura zorientowana na usługi, Bazy Danych, nr 7, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2006

[22] http://pmanager.pl/index.php?option=com_content&view=article&id=79:modelowanie-procesow-w-ramach-systemow-soa&catid=47:bussinesprocess&Itemid=61

[23] Kazimierz Frączkowski, Paweł Schmidt.*Business processes modeling within a framework of SOA technology* W: Project management essential reality for business and government : 21st IPMA World Congress Cracow 2007 : 18–20 June 2007 Cracow, Poland / eds: Jerzy A. Kisielnicki, Stanisław Sroka. — Kraków : Wydawnictwo Naukowe ,,Akapit", 2007. — Opis częśc. wg okł. — ISBN 978-83-89541-93-2. — S. 469–471

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr inż. Kazimierz Frączkowski, mail: kazimierz.fraczkowski@pwr.wroc.pl

Dr inż. Iwona Dubielewicz, mail: iwona.dubielewicz@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Management of Development and Integration of Information Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
……Informatics……..
AND SPECIALIZATION …Software engineering……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2IO_W02	C1	Lec1, …, Lec 6,	N1- N2
PEK_W02	K2INF_W06_S2IO_W05	C1	Lec 7, .., Lec 10,	N1- N3
PEK_W03	K2INF_W06_S2IO_W05	C1	Lec 11	N1- N3
…				
PEK_U01 (skills)	K2INF_U08_S2IO_U03	C2	Sem2,..,Sem8	N4
…				
PEK_K01 (competences)				
PEK_K02				
…				

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Zarządzanie wytwarzaniem i integracją systemów II
Name in English Production management and integration systems II
Main field of study (if applicable): Informatics
Specialization (if applicable): Software engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time*~~
Kind of subject: ~~obligatory~~ / optional / ~~university-wide*~~
Subject code INZ003769
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)				15	
Number of hours of total student workload (CNPS)				60	
Form of crediting	Examination /	Examination /	Examination /	~~Examination~~ /	Examination /

	crediting with grade*	crediting with grade*	crediting with grade*	crediting with grade*	crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points				2	
including number of ECTS points for practical (P) classes				2	
including number of ECTS points for direct teacher-student contact (BK) classes				1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge from field from ICT system design and business process modelling
2. Ability to analyse basic management documents of ICT projects
3. Skills in analysing ICT systems architecture
4. Knowledge validated by passing part I of "Production management and integration of information systems"

\

SUBJECT OBJECTIVES

C1 Knowledge transfer and expertise in area of management processes and products for creating ICT systems
C2 Knowledge transfer and expertise in area of management processes and products in integration of ICT systems in a heterogenic architecture environment
C3 Acquiring skills in area of technical and organisational resources for creating and integrating ICT systems

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 – has knowledge about management processes and products and integration of ICT systems
relating to skills:
PEK_U01 – has skills of choosing technical and organisational resources for enabling integration and creation of ICT systems
relating to social competences:
PEK_K01 – has expertise in area of management processes and products for creating and integrating ICT systems

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1		
Lec 2		
Lec 3		
Lec 4		
Lec 5		
….		
	Total hours	

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1	Choosing ICT systems, which integration grants additional value	2
Proj 2	Choosing a platform – integration environment	2
Proj 3	Implementation of database integration mechanisms for two ICT systems	4
Proj 4	Integration of business processes	3
Proj 5	Integration of a communication interface	4
	Total hours	15

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. MS Project N2. ESB as an open source integration platform for example Mule ESB, MelaMatric and others N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_W01	Colloquium
P	PEK_U01	Colloquium

P	PEK_K01	Seminar

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[39] Fryzlewicz Z., Salamon A., Podstawy architektury I technologii usług XML sieci WEB. Wydawnictwo Naukowe PWN, 2008

[40] Surhe, Lambert M. Timpledon, Martam T. Marseken, Susan F. Open Esb. Wyd. VDM Verlag Dr. Mueller AG&Co.kg, 2010

[41] Kasprzak T., Integracja i architektury systemów informacyjnych przedsiębiorstw, Katedra Informatyki Gospodarczej i Analiz Ekonomicznych. Wydział Nauk Ekonomicznych. Uniwersytet Warszawski, 2000

[42] Roshen W. , SOA-based enterprise integration : a step-by-step guide to services-based application integration, New York : McGraw-Hill, 2009

[43] Fong J., Information systems reengineering and integration, Springer, London, 2006

[44] Mateos A., Rosennberg J., Chmura obliczeniowa-rozwiązania dla biznesu.wy. Helion, 2011

SECONDARY LITERATURE:

[24] Krafzig D., Banke K. , Slama D. , Enterprise SOA: Service-Oriented Architecture Best Practices, Upper Saddle River, NJ : Prentice Hall, 2005

[25] Kazimierz F., Problemy integracji usług ICT w ochronie zdrowia. W. Integracja systemów informatycznych : nowe wyzwania. Red. Górski J., Orłowski C., Gdańsk: Pomorskie Wydawnictwo Naukowo-Techniczne PWNT, 2011 s. 33-41.

[26] Frączkowski K., Zwiefka A., Open standards ICT as interoperability elements in Health care area. W . Global Telemedicine and eHealth Updates: Knowlage Resources, vol.4. s. 30-36.

[27] Frączkowski K. : Systemy informacyjne oraz usługi w ochronie zdrowia oparte na technologiach SOA (Service Oriented Architectur), w. Acta Bio-Optica et Informatica Medica, 2010, vol. 16.nr 1, s. 81-86

[28] Frączkowski K., Mazur Z., SOA – architektura zorientowana na usługi, Bazy Danych, nr 7, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2006

[29] http://pmanager.pl/index.php?option=com_content&view=article&id=79:modelowanie-procesow-w-ramach-systemow-soa&catid=47:bussinesprocess&Itemid=61

[30] Frączkowski K., Schmidt P., Business processes modeling within a framework of SOA technology W: Project management essential reality for business and government : 21st IPMA World Congress Cracow 2007 : 18–20 June 2007 Cracow, Poland eds: Kisielnicki J.A., Sroka S., Kraków : Wydawnictwo Naukowe ,,Akapit", 2007.Opis częśc. wg okł. — ISBN 978-83-89541-93-2. S. 469–471

http://www.onkol.kielce.pl/onkol/projekt/konferencja_otwierajaca_prezentacje/3.%20K.%20Fr%C4%85czkowski%20-%20Rozw%C3%B3j%20Technologii%20ITC%20%20a%20nowe%20Wyzwania%20w.pdf

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Kazimierz Frączkowski Ph D. mail : kazimierz.fraczkowski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Production management and integration of information systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION Software engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2_SWD_K01	C1,C2	Proj1, Proj2,Proj3,Proj4,Proj5	
PEK_U01	K2_SWD_K01 K2INF_U08_S2IO_U04	C3	Proj3,Proj4,Proj5	N1,N2
PEK_K01	K2_SWD_K01	C1,C2	Proj1,Proj2,Proj3,Proj4,Proj5	N1,N2

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish *Zwinne Metodyki Wytwarzania Oprogramowania*
Name in English *Agile Software Development*
Main field of study (if applicable): Computer Science
Specialization (if applicable): ……..
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: ~~obligatory~~ / optional ~~/ university wide~~*
Subject code INZ3814
Group of courses YES / ~~NO~~*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			15	15
Number of hours of total student workload (CNPS)	30			60	30
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course				X	
Number of ECTS points	1			2	1

including number of ECTS points for practical (P) classes	0			2	0
including number of ECTS points for direct teacher-student contact (BK) classes	1			1	1

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5. Is able to use programming language (e.g. Java) to solve problems and develop an application.

\

SUBJECT OBJECTIVES

C1 To familiarize students with selected agile methodologies.

C2 To familiarize students with the selected practices and tools used in agile software development.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Has a basic knowledge which allows to name and describe selected agile methodologies and practices of software development.

PEK_W02 Has a basic knowledge which allows to name and describe sample practices or tools used in agile software development

PEK_W03 Has a basic knowledge which allows to name sample results of empirical studies on agile software development.

…

relating to skills:

PEK_U01 Is able to solve complex engineering tasks related to installation and configuration of the software project infrastructure and software project development using selected agile methodologies, practices and tools.

PEK_U02 Is able to prepare a multimedia presentation in English related to agile methodologies, practices and tools.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to the course.	1
Lec 2	From Nothing, to Monumental, to Agile	2
Lec 3	eXtreme Programming methodology I	2
Lec 4	eXtreme Programming methodology II	2
Lec 5	SCRUM methodology	2
Lec 6	KANBAN and SCRUMBAN methodologies	2

Lec 7	Agile methodologies and practices – results of empirical research	2
Lec 8	Retrospection and test	2
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes – laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes – project		**Number of hours**
Proj 1	Introduction, passing criteria.	1
Proj 2	Software infrastructure	2
Proj 3	Software development methodology, practices and tools setup I	2
Proj 4	Software development methodology, practices and tools setup II	2
Proj 5	Software development iteration 1	2
Proj 6	Software development iteration 2	2
Proj 7	Software development iteration 3	2
Proj 8	Software development iteration 4	2
	Total hours	15

Form of classes - seminar		**Number of hours**
Sem 1	Introduction, passing criteria, schedule and selection of topics.	1
Sem 2	Topic 1 is selected by students from the pool including, for example, the following ones: XP, SCRUM, KANBAN, LEAN, CRYSTAL, Test-Driven Development, Continuous Test-Driven Development, Acceptance Test-Driven Development, Behaviour-Driven Development, Pair-Programming, Continuous Delivery, narzędzia do zwinnego wytwarzania oprogramowania w Scali, narzędzia do zwinnego wytwarzania oprogramowania w Javie, narzędzia do testowania oprogramowania, programowania parami i przeglądów kodu, dobre praktyki zwinnego wytwarzania aplikacji webowych,	2

	szkielety aplikacji webowych wspierające zwinne tworzenie oprogramowania – Play framework i in.	
Sem 3	Topic 2 is selected from the aforementioned pool of topics	2
Sem 4	Topic 3 is selected from the aforementioned pool of topics	2
Sem 5	Topic 4 is selected from the aforementioned pool of topics	2
Sem 6	Topic 5 is selected from the aforementioned pool of topics	2
Sem 7	Topic 6 is selected from the aforementioned pool of topics	2
Sem 8	Topic 7 is selected from the aforementioned pool of topics	2
	Total hours	15

TEACHING TOOLS USED
N1. Lecture N2. The course web page with references to literature and course related stuff. N3. Software development tools. N4. Internet and server-side software infrastructure (e.g. versioning repository SVN or Git). N5. Software to prepare presentations and technical reports (Latex, TeXnicCenter, PowerPoint/Beamer)

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01	Assessment of the software development ecosystem (agile methodologies, practices and tools) [0…30 pkt] (Pr2-Pr4) .
F2	PEK_U01	Assessment on a basis of progress of a software project and compliance with and use of agile methodologies, practices and tools [0…80 pkt] (Pr5-Pr8).
P1 – project	PEK_U01	P1 is obtained on a basis of the points from F1…F2 in the following way (mark – points): • 5.5 – 91…110 pkt and F2=70 pkt • 5.0 – 91…110 pkt • 4.5 – 81…90 pkt

		• 4.0 – 71…80 pkt • 3.5 – 61…70 pkt • 3.0 – 51…60 pkt • 2.0 <=50 pkt
P2 – lecture	PEK_W01 … PEK_W03	A written test to evaluate knowledge covered in lectures. A positive mark is given if student obtains at least 50% of the points possible to achieve.
P3 – seminar	PEK_U01, PEK_U02	P3 is based on how well a presentation has been conducted (e.g. clearly defined goals of presentation or benefits for the listeners, communication, presentation content, level of details, examples, timing, presentation flow - order of topics, capturing audience / listeners involvement). Given mark may be changed due to active discussions and creative contributions during seminars or (after an agreement with a lecturer) a detailed report or tutorial on a given topic.
P – final mark	PEK_W01… 03, PEK_U01… 02	P is based on the following equation: P=(P2+2*P1+P3)/4 if and only if P1 is positive. Otherwise P=2.0.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[45] Kent Beck, Cynthia Andres, Wydajne programowanie = Extreme Programming, MIKOM, 2006.

[46] Henrik Kniberg, Scrum and XP from the Trenches http://www.infoq.com/minibooks/scrum-xp-from-the-trenches

[47] Henrik Kniberg, Mattias Skarin, Kanban and Scrum – making the most of both http://www.infoq.com/minibooks/kanban-scrum-minibook

[48] Jeff Langr, Agile Java : crafting code with test-driven development, Prentice Hall 2005.

SECONDARY LITERATURE:

[31] Lech Madeyski: Test-Driven Development - An Empirical Evaluation of Agile Practice. Springer 2010 http://dx.doi.org/10.1007/978-3-642-04288-1

[32] Ron Jeffries, Programowanie ekstremalne w C#, Warszawa : APN PROMISE, 2005.

[33] Tore Dybå, Helen Sharp: What's the Evidence for Lean? IEEE Software 29(5): 19-21 (2012) http://doi.ieeecomputersociety.org/10.1109/MS.2012.126

[34] Tore Dybå, Torgeir Dingsøyr: What Do We Know about Agile Software Development? IEEE Software 26(5): 6-9 (2009) http://doi.ieeecomputersociety.org/10.1109/MS.2009.145

[35] Tore Dybå, Torgeir Dingsøyr: Empirical studies of agile software development: A systematic review. Information & Software Technology 50(9-10): 833-859 (2008) http://dx.doi.org/10.1016/j.infsof.2008.01.006

[36] Lech Madeyski, Marcin Kawalerowicz, "Continuous Test-Driven Development — A Novel Agile Software Development Practice and Supporting Tool", Proceedings of the 8th International Conference on Evaluation of Novel Approaches to Software Engineering (ENASE'2013), p.209–216. http://madeyski.e-informatyka.pl/download/Madeyski13ENASE.pdf

[37] Lech Madeyski: The impact of Test-First programming on branch coverage and mutation score indicator of unit tests: An experiment. Information & Software Technology (INFSOF) 52(2):169-

184 (2010) http://dx.doi.org/10.1016/j.infsof.2009.08.007
http://madeyski.e-informatyka.pl/download/Madeyski10c.pdf

[38] Lech Madeyski: Impact of pair programming on thoroughness and fault detection effectiveness of unit test suites. Software Process: Improvement and Practice (SOPR) 13(3):281-295 (2008)
http://dx.doi.org/10.1002/spip.382
http://madeyski.e-informatyka.pl/download/Madeyski08.pdf

[39] Lech Madeyski, Wojciech Biela: Capable Leader and Skilled and Motivated Team Practices to Introduce eXtreme Programming. CEE-SET 2007:96-102
http://dx.doi.org/10.1007/978-3-540-85279-7_8
http://madeyski.e-informatyka.pl/download/Madeyski08d.pdf

[40] Lech Madeyski, Lukasz Szala: The Impact of Test-Driven Development on Software Development Productivity - An Empirical Study. EuroSPI 2007:200-211
http://dx.doi.org/10.1007/978-3-540-75381-0_18
http://madeyski.e-informatyka.pl/download/Madeyski07d.pdf

[41] Lech Madeyski: On the Effects of Pair Programming on Thoroughness and Fault-Finding Effectiveness of Unit Tests. PROFES 2007:207-221
http://dx.doi.org/10.1007/978-3-540-73460-4_20
http://madeyski.e-informatyka.pl/download/Madeyski07.pdf

[42] Lech Madeyski, Wojciech Biela: Empirical Evidence Principle and Joint Engagement Practice to Introduce XP. XP 2007:141-144
http://dx.doi.org/10.1007/978-3-540-73101-6_19
http://madeyski.e-informatyka.pl/download/Madeyski07b.pdf

[43] Lech Madeyski: The Impact of Pair Programming and Test-Driven Development on Package Dependencies in Object-Oriented Design - An Experiment. PROFES 2006:278-289
http://dx.doi.org/10.1007/11767718_24
http://madeyski.e-informatyka.pl/download/Madeyski06.pdf

[44] Lech Madeyski: Is External Code Quality Correlated with Programming Experience or Feelgood Factor? XP 2006:65-74
http://dx.doi.org/10.1007/11774129_7
http://madeyski.e-informatyka.pl/download/Madeyski06b.pdf

[45] Lech Madeyski: Preliminary Analysis of the Effects of Pair Programming and Test-Driven Development on the External Code Quality. Software Engineering: Evolution and Emerging Technologies 2005:113-123
http://www.booksonline.iospress.nl/Content/View.aspx?piid=1150
http://madeyski.e-informatyka.pl/download/Madeyski05b.pdf

[46] Mary Poppendieck, Leading lean software development : results are not the point, Addison-Wesley, 2011.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Lech Madeyski

Lech.Madeyski /at/ pwr.wroc.pl http://madeyski.e-informatyka.pl/

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Agile Software Development
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION
Software Engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2IO_W05	C1	Lec1-6	N1, N2
PEK_W02	K2INF_W06_S2IO_W05	C2	Lec3-4	N1, N2
PEK_W03	K2INF_W06_S2IO_W05	C1	Lec7	N1, N2
PEK_U01 (skills)	K2INF_U08_S2IO_U10	C1, C2	Proj2-8	N3, N4
PEK_U02	K2INF_U08_S2IO_U03,	C1, C2	Sem2-8	N5, N2

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish … *Inżynieria języka naturalnego*
Name in English … *Natural Language Engineering*
Main field of study (if applicable): …Computer Science….
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time
Kind of subject: optional
Subject code INZ003782

Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		30		
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes			4		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge and skills in the area of programming.
2. Basic knowledge from the domain of Artificial Intelligence
3. Ability to read with understanding scientific and technical texts in English.

\

SUBJECT OBJECTIVES

C1 To make students aware of possibilities for utilising Natural Language as a tool for communication and storing of information in the computer system.
C2 To present ways of applying Language Technology in information systems.
C3 To familiarise students with types of language tools and resources and their accessibility with focus on Polish Language Technology.
C4 Students have acquired basic skills in formalised description of the natural language and construction of intelligent systems processing natural language utterances.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 A student have basic knowledge from the area of formal description of the natural language.

PEK_W02 A student knows methods of the construction of systems processing natural language utterances.

PEK_W03 A student knows Basic language resources and tools and the extent to chich they can be used in an information system.

PEK_W04 A student is familiar with the contemporary state of language technology for Polish and English.

…

relating to skills:

PEK_U01 A student is able to apply natural language engineering methods during construction of intelligent Information Retrieval systems and practical Information Extraction systems.

PEK_U02 A student knows proficiently different types of language tools, their availability and

PEK_U03 A student is able to combine basic language resources and tools in an appropriate workflow for the natural language processing.

PEK_U04 A student have basic skills in the area of formal description of the natural language and construction of intelligent systems for processing natural language utterances.

PEK_U05 A student knows how to find in internet information concerning the present state of the Polish and English language technology.

…

relating to social competences:

PEK_K01 A student is able to explain importance of the language technology for the construction of computer systems.

PEK_K02 A student is able to select and organise an interdisciplinary team for the construction of a system processing natural language.

PROGRAMME CONTENT

	Form of classes - lecture	**Number of**
Lec 1	Computational Linguistics bases: a natural language as a tool for communication, basic levels of the natural language decription, use formal models for the description of the natural language.	2
Lec 2	Typical phases in natural language processing. Notions of language resources and language tools. Overview of natural language engineering applications.	2
Lec 3	Text tokenisation and segmentation; fundaments of finite state automatons technology.	2
Lec 4	Morphosyntactic analysis: morphological analysers, transducers, description disambiguation, construction and applications of taggers.	2

Lec 5	Syntactic analysis: different gram mar formalisms and their use, deep vs shallow analysis, construction of parsers.	2
Lec 6	Semantic analysis: deep – based on the semantic representation and shallow – an analysis performer on the level of semantic features, e.g. Information Extraction, Dialogue Systems or automatem summarisation; representation of lexical meaning (senses), Word Sense Disambiguation, Discourse Analisys.	2
Lec 7	Selected applications of Natural Language Engineering in: Information Retrieval, Information Extraction, Question Anwering and multilingual versions of those systems.	3
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Pr1	Choice of the project topic and its specification.	2
Pr2	Literature overview and becoming familiar with the necessary theoretical bases.	4
Pr3	Choice of methods to be used in implementation.	2
Pr4	Selecting necessary programming tools and components and language tools and resources.	2
Pr5	Installing selected programming components combined, becoming aware about their applications, integration of components with the developers environment, adaptation of language technology elements to the specific problem.	4
Pr6	Implementation.	6
Pr7	Collecting data necessary for research and experiments.	4
Pr8	Performing experiments and optimising parameters of the selected methods.	4
Pr9	Preparation of the final report.	2
	Total hours	30

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
...		

	Total hours	
Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED

N1. Textbooks

N2. Electronic materials on selected Web pages and Internet portals.

N3. Available language resources and tools for Polish.

N4 Language resources and tools, general architectures for natural language processing that are available on the selected Web pages.

N5 Electronic materials for the lecture and Project that are Publisher on the e-learning portal of the Faculty of Computer Science and Management.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 Evaluation of project preparatory phase	PEK_U02, PEK_U03, PEK_U05	A student delivers a report which is evaluated.
F2 Evaluation of the system construction	PEK_U01, PEK_U04	A student delivers a report which is evaluated.
F3 Complex evaluation of the system and results of experiments	PEK_U01- PEK_U05 and PEK_K01 and PEK_K02	A student presents the achieved results and delivers the final report which is evaluated.
C final test – effects PEK_W01- PEK_W04		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[49] Handbook of Natural Language Processing (Second Edition). (Ed.) Nitin Indurkhya i Fred J. Damerau. CRC Press, 2010

[50] Sholom M. Weiss, Nitin Indurkhya, Tong Zhang i Fred Damerau. Text Mining: Predictive Methods for Analyzing Unstructured Information, 2010.

[51] Christopher D. Manning, Prabhakar Raghavan i Hinrich Schütze. Introduction to Information Retrieval. Cambridge Univ. Press, 2008.

[52] Jurafsky, D. & Martin, J. H. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition Prentice Hall, 2000.

[53] Manu Konchady Text Mining Application Programming (Programming Series) Charles River Media, Inc., 2006.

[54] Mykowiecka A. Inżynieria lingwistyczna, Komputerowe przetwarzanie tekstów w języku naturalnym, Wydawnictwo PJWSTK, Warszawa 2007

[55] Piasecki Maciej. Selektywne wprowadzenie do semantyki formalnej. Red. Szymanik J. i Zajenkowski M., Kognitywistyka. O umyśle umyślnie i nieumyślnie, Koło Filozoficzne przy MISH, Uniwersytet Warszawski, str. 113-155, 2004.

SECONDARY LITERATURE:

[47] Daniel Bikel i Imed Zitouni. Multilingual Natural Language Processing Applications: From Theory to Practice

[48] Manning, C. D. i Schütze, H. Foundations of Statistical Natural Language Processing The MIT Press, 2001.

[49] Mitkov, R. (ed.) The Oxford Handbook of Computational Linguistics Oxford University Press, 2003.

[50] Piasecki, M.; Szpakowicz, S. & Broda, B. (2009), *A Wordnet from the Ground Up*, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Maciej Piasecki, maciej.piasecki@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

……

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..

AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2ISI_W04	C4	Wy1	1,2,5
PEK_W02	K2INF_W06_S2ISI_W04	C2	Wy7	1,2,5
PEK_W03	K2INF_W06_S2ISI_W04	C3	Wy2-Wy6	1,2,3,4,5
PEK_W04	K2INF_W06_S2ISI_W04	C1	Wy3-Wy6	1,2,3,4,5
PEK_U01 (skills)	K2INF_U08_S2ISI_U06	C1	Pr1,Pr8,Pr9	1,2,3,4,5
PEK_U02	K2INF_U08_S2ISI_U08	C3	Pr2	1,2,3,4,5
PEK_U03	K2INF_U08_S2ISI_U06	C2	Pr3-Pr6	1,2,3,4,5
PEK_U04	K2INF_U08_S2ISI_U09	C4	Pr3,Pr4,Pr8	1,2,3,4,5
PEK_U05	K2INF_U08_S2ISI_U06	C3	Pr7	1,2,3,4,5
PEK_K01 (competences)	K2INF_U08_S2ISI_U06	C1	Pr9	1,2,5
PEK_K02	K2INF_U08_S2ISI_U06	C4	Pr1,Pr9	1,2,5

** - enter symbols for main-field-of-study/specialization educational effects

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Metodologia badań naukowych

Name in English Methodology of empirical sciences…….

Main field of study (if applicable): Informatics…….

Specialization (if applicable): ……..

Level and form of studies: 2nd* level, full-time /

Kind of subject: obligatory /

Subject code INZ003763…….

Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of	30	0	0	0	0

organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)	90	0	0	0	0
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3				
including number of ECTS points for practical (P) classes	0				
including number of ECTS points for direct teacher-student contact (BK) classes	1,8				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Competence in basic algebra
2. Competence in mathematical analysis
3. Differential equations

\

SUBJECT OBJECTIVES

C1 Knowledge on the methodological postulates
C2Competence in mathematical modeling on the base of methodology of empirical sciences
C3Competence in hypothesis testing
C4Competence in creation of homogeneous and invariant in relation to the system of units models

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01Knowledge on methodological postulates
PEK_W02Logical postulates of mathematical models construction (invariance and homogeneity)
PEK_WOO3Logical base of hypothesis testing

…
relating to skills:
PEK_U01Competence in mathematical modeling with accordance to methodological postulates
PEK_U02Competence in hypothesis and empirical models testing
…
relating to social competences:
PEK_K01Competence in the exactness of process description
PEK_K02Competence on ability of studying and reflection on experiment

PROGRAMME CONTENT

Form of classes - lecture	**Number of**

Lec 1Methods of scientific and technical project validation on the base of citation analysis	2	
Lec 2Methodological postulates of determinism, closed system, interconnectedness, simplicity and Popper's condition of falsification	2	
Lec 3Classical theory of measurements and the postulate of uniquenes	2	
Lec 4Dimensionally invariant description of a process, dimensional space	2	
Lec 5Theorem Pi of dimensional analysis and examples of its applications	2	
Lec 6Applications of theorem Pi in: models construction, experiment planning, identification Lec 7Theory of similarity Lec 8Invariance of models in relation to rotations group, tensors homogeneity Lec 9 Models testing and falsification of hypothesis Lec 10Identification of mathematical models Lec 11Multistage identification, models interpretability Lec 12Description of models construction Lec 13Models testing	2 2 2 2 2 2 2 2 2 2	
	Total hours26	Plus 2 colloqiums

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
...		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		

Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1.Literature N2.Examples analysis N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1P-1colloquium evaluation	WO1,WO2	Evaluation of students work
F2P-2colloquium evaluation	UO1,UO2	Evaluation of examples solving
F3		
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J.M. Bochenski The methods of contemporary thought. Harper Torchbooks, NY,1968
[2] W.Kasprzak, B. Lysik, M.Rybaczuk Measurements, Dimensions, Invariant Models and Fractals Spolom Wroclaw Lviv 2004
[3]
[4]

SECONDARY LITERATURE:

[1] K. R. Popper The logic of Scientific Discovery. Hutchinson Publ. Comp. 1959
[2]
[3]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Waclaw Kasprzak waclaw.kasprzak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Methodology of empirical sciences……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_WO1	Methodology basis	K1,K2,K3	N1,N2,P1
PEK_W02	K2INF_WO6	Models testing	K4,K13	P1
…				
…				
PEK_U01 (skills)	K2INF_UO6	Construction of models	K5,K6,K7	N1,N2,P2
PEK_U02	K2INF_UO8	Hyothesis testing	K8,K13	N1,N2,P2
…				
PEK_K01 (competences)	K_2SWD_KO1		K2	N1,N2
PEK_K02	K2_SWD_KO2		K13	N1,N2,P2
…				

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: Informatics and Management

SUBJECT CARD

Name in Polish: Modelowanie i analiza biznesowa
Name in English: Modeling and business analysis
Main field of study (if applicable): Informatics
Specialization (if applicable): Computer Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ3760
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	30			
Number of hours of total student workload (CNPS)	60	90			
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points	2	3			
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	1,8			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

10. Practice in object-oriented programming.
11. Basic knowledge of software engineering.

\

SUBJECT OBJECTIVES

C1. Basic knowledge in the area of software system modeling with the stress on business modeling as the initial phase of the software development process.
C2. Basic knowledge in the area of the requirements specification.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEK_W01: Students have basic knowledge on business modeling.
PEK_W02: Students know and understand the role of specification requirements.
PEK_W03: Students have basic knowledge on selected modeling languages.

Relating to skills:
PEK_U01: Students, in cooperation with domain experts, can construct and analyze business models.
PEK_U02: Students can build models of system requirements.

Relating to social competences:
PEK_K01: Students are able to cooperate with representatives of application domain.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Basic notions for software development cycle. Survey of modeling languages – UML and BPMN.	2
Lec 2	Class diagrams – classes, associations, generalizations.	2
Lec 3	Validation and verification.	1
Lec 4	Object Constraint Language.	2
Lec 5	UML activity diagrams.	2
Lec 6	BPMN process diagrams.	2
Lec 7	UML statechart diagrams.	2
Lec 8	System requirements; use case diagrams.	2

	Total hours	15

Form of classes - class		Number of hours
Cl 1	Construction and analysis of simple class diagrams.	2
Cl 2	Construction and analysis of advanced class diagrams.	2
Cl 3	Analysis of textual descriptions of exemplary application domains – structural aspect (1).	2
Cl 4	Analysis of textual descriptions of exemplary application domains – structural aspect (2).	2
Cl 5	Case study – an example of structural modeling.	2
Cl 6	Construction and analysis of OCL constraints imposed on diagrams.	2
Cl 7	Test 1.	2
Cl 8	Analysis of textual descriptions of exemplary application domains – structural and behavior aspect.	2
Cl 9	Analysis of simple BPMN diagrams.	2
Cl 10	Construction of simple BPMN diagrams.	2
Cl 11	Construction and analysis of advanced BPMN diagrams.	2
Cl 12	Construction and analysis of simple state diagrams.	2
Cl 12	Construction and analysis of advanced state diagrams..	2
Cl 13	Construction and analysis of use case diagrams.	2
Cl 14	Test 2.	2
Cl 15	Corrective test.	2
	Total hours	30

TEACHING TOOLS USED

N1. Lecturer's presentation at a blackboard, supported by a multimedia presentation using a laptop and a projector.
N2. Individual search and study of literature and Internet sources.
N3. Access to teaching materials published in the local area network.
N4. Individual consultations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 PEK_U01 PEK_K01	Each student gets 1 point for own solution of a problem from the list of problems for the given class.

<table>
<tr><td>F2</td><td>PEK_W01
PEK_W02
PEK_U01
PEK_U02
PEK_K01</td><td>Each student gets up to 10 points for own solution of problems for the given test (intermediate and final).</td></tr>
<tr><td>F3</td><td>PEK_W01
PEK_W02
PEK_W03
PEK_U01
PEK_U02
PEK_K01</td><td>The final evaluation for the classes is determined on the basis of total marks obtained by the student's activity for exercise (F1) and colloquia (F2). Positive mark is awarded to a student who has obtained at least 4 points for each of the symposia and has won a total of 10 points.
If this condition is met, the number of points P is the basis for evaluation in accordance with the following table:
<table>
<tr><td>P</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table>
Students who get at least a very good grade are exempt from the examination with the same mark as for the classes.</td></tr>
<tr><td colspan="3">C: The final evaluation of the course is determined based on the results of the examination. The examination lasts two hours and consists of a set of tasks, the total number of 20 points. The condition for a positive assessment of the final exam is to get 10 points and a positive final evaluation of the exercise.
The final evaluation of the examination is determined in accordance with the following table:
<table>
<tr><td>Points</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table></td></tr>
</table>

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[11] Rumbaugh J., Jacobson I., Booch G., *The Unified Modeling Language – Reference Manual*. Second edition, Addison-Wesley, 2005.

[12] Weilkiens T., Oestereich B., *UML 2 Certification Guide. Fundamental and Intermediate Exams*, Elsevier 2007.

[13] Maciaszek L. A., *Requirements Analysis and System Design*, Second edition, Pearson, Addison-Wesley, 2005.

[14] Adolph S., Bramble P., *Patterns for Effective Use Cases,* Addison-Wesley, 2003

[15] Gašević D., Djurić D., Devedžić V., *Model Driven Architecture and Ontology Development*, Springer, 2006.

SECONDARY LITERATURE:

[56] Graessle P., Baumann H., Baumann P., *UML 2.0 w akcji. Przewodnik oparty na projektach*, Helion, 2006.

[57] Object Management Group, Unified Modeling Language (available on the website: www.omg.com).

[58] Object Management Group, System Modeling Language SysML (available on the website: www.omg.com).

[59] Object Management Group, Business Process Modeling Notation BPMN (available on the website: www.omg.com).

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Zbigniew Huzar, zbigniew.huzar@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems Modeling and Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION
Computer Engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W02	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W03	K2INF_W03		Lec1-Lec8	N1, N2, N3, N4
PEK_U01 (skills)	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_U02	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_K01 (competences)	K2_SWD_K01	C1, C2	Lec1-Lec15 Cl1-Cl15	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from the table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish *Nowe trendy w obliczeniach neuronowych* …….
Name in English *New Trends in Neural Computation* …….
Main field of study (if applicable): Informatics
Specialization (if applicable): ISI……..
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time*~~
Kind of subject: obligatory / ~~optional / university wide~~*
Subject code *INZ001640***….**
Group of courses YES / ~~NO~~*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload (CNPS)					
Form of crediting	Examination / ~~crediting with grade*~~	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination /~~ crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points	2			2	
including number of ECTS points for practical (P) classes	0			2	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2			1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_U02; K1INF_U03 skills in coding at any high programming language 2.K1INF_W01 fundamental knowledge in differential calculus and matrices

\

SUBJECT OBJECTIVES

C1 Presentation of new neural networks, their training methods and applications.

C2 Teaching practical application of new neural network paradigms.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Knowledge of new models of neural network presented during lecture

PEK_W02 Knowledge of application specificity of the soft computing methods

relating to skills:

PEK_U01 Is able to choose appropriate neural network model to the considered problem.

PEK_U02 Can design ad implement application using assumed model neural network

PEK_U03 Is able to plan and conduct experiments testing efficiency of applied neural network

PEK_U04 Is able to prepare result analysis and to write a report from the project.

relating to social competences:

PROGRAMME CONTENT

	Form of classes - lecture	**Number of**
Lec	Introduction. Description of the course content, its organization and instructions	2

1	concerning exams procedure and grading scheme for the project. History and short description of neural network models presented in the course.	
Lec 2	Neural networks with stochastic nature - Boltzmann Machine as an introduction to Hinton neural network	2
Lec 3	Deep belief networks	2
Lec 4	Pulsed networks – neuron model, Network architecture	2
Lec 5	Pulsed network – methods of training, input – output coding, examples of applications	2
Lec 6	Neocognitron, convolutional neural network	2
Lec 7	Recurrent neural Network and LSTM	2
Lec 8	Final Test	1
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Introductory information - presentation of the formal principles of the course and the project assessment. Presentation of exemplary project subjects.	2
Proj 2	Discussion on a choice of the project subject, part1	2
Proj 3	Discussion on a choice of the project subject, part2. Delivery of subject project declaration	2
Proj 4	Theoretical background preparation, collecting data if necessary	2

Proj 5	Introductory conception of solution	2
Proj 6	Case sudy	2
Proj 7	Presentation of the conception of the problem solution, part 1	2
Proj 8	Presentation of the conception of the problem solution, part 2	2
Proj 9	Modification of the solution if necessary. Implementation part 1	2
Proj 10	Implementation part2.	2
Proj 11	Implementation part3.	2
Proj 12	Validation of the solution (conducting experiments)	2
Proj 13	Report preparation and its delivery to the lecturer	2
Proj14	Discussion about realization of the project	2
Proj 15	Discussion referring to the feedback about the course	2
	Total hours	30

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED

N1. Informational lecture supported by multimedia presentation

N2. Design specification needed to the project

N3. Design document template

N4. e-learning system applied for publication of dydatic materials

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1– Delivery of Project declaration with formulated subject of the first project	PEK_U01	Every week of unjustified delay in delivering project declaration results in grade reduction in course grade
F2 – Presentation of partial results of the project	PEK_U02	Assessed are: Correctness of the task formulation , assumptions the scheme of coding input and output information and the current progress of the project. The

		way of presentation is also evaluated. The grade scale 1-10.
F3 – Report from the implementation of the project	PEK_U03, PEK_U04	Appraisal refers to the way of problem solution, experiment quality, the experiment documentation and the project report (structure, theoretical introduction and bibliography). The grade scale 1-10.
P1 – the final grade for project	PEK_U01 PEK_U02 PEK_U03 PEK_U04	The final number of points is calculated according to the following formulae P1=0.4 F2+ 0.6 F3, The final grade is calculated on the base of the number of points in the following way: <50%, 60%) → dst <60%, 70%) → dst+ <70%, 80%) → db <80%, 90%) → db+ <90%, → bdb Remark: the final grade is reduced by half of a grade for each week of unjustified delay of a declaration or a report
P2 – the final grade for the lecture	PEK_W01, PEK_W02	The test consists of open questions with given number of points. The sum of points is translated to the grades as follows: <50%, 60%) → dst <60%, 70%) → dst+ <70%, 80%) → db <80%, 90%) → db+ <90%, → bdb
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[60] W. Maass, Ch. Bishop: Pulsed Neural Network, MIT 1998
[61] Original papers and articles in .pdf format referring to the new paradigm in neural networks and their applications published on e-learning platform
[62] L. Rutkowski: Metody i techniki sztucznej inteligencji PWN, 2006

SECONDARY LITERATURE:

[1]
[2]
[3]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Urszula Markowska-Kaczmar, urszula.markowska-kaczmar@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2ISI_W01 K2INF_W06_S2ISI_W02	C1	Lec1 – Lec8	N1, N4
PEK_W02	K2INF_W06_S2ISI_W01 K2INF_W06_S2ISI_W02	C1	Lec1 – Lec8	N1,N4
PEK_U01 (skills)	K2INF_U08_S2ISI_U04	C2	Lec1 – Lec8 Proj2 – Proj3	N1,N2, N3, N4
PEK_U02	K2INF_U08_S2ISI_U04	C2	Lec1 – Lec8 Proj4 – Proj11	N3, N4
PEK_U03	K2INF_U08_S2ISI_U04	C2	Proj12	N2, N4
PEK_U04	K2INF_U08_S2ISI_U04	C2	Proj13 – Proj14	N1, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish *Obliczenia miękkie – metody i zastosowania* …….
Name in English *Soft Computing – methods and applications* …….
Main field of study (if applicable): Informatics
Specialization (if applicable): ISI……..
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time*~~
Kind of subject: obligatory / ~~optional / university-wide~~*
Subject code INZ003778
Group of courses YES / ~~NO~~*

	Lecture	Classes	Laboratory	Project	Seminar

Number of hours of organized classes in University (ZZU)	30			30	
Number of hours of total student workload (CNPS)	60			120	
Form of crediting	Examination / ~~crediting with grade*~~	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination /~~ crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2			4	
including number of ECTS points for practical (P) classes	0			4	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2			2,4	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_U02; K1INF_U03 skills in coding at any high programming language 2.K1INF_W01 fundamental knowledge in differential calculus and matrices

\

SUBJECT OBJECTIVES

C1 Presentation of various soft computing approaches applied in modeling systems with imprecise, uncertain, rough and incomplete information

C2 Teaching how to solve problems containing imprecise, uncertain, rough and incomplete information using soft computing techniques.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Knows theoretical basics and general principles of soft computing techniques.

relating to skills:

Is able to choose appropriate soft computing method for a considered problem

PEK_U02 Has a way with design and implementation of application using soft computing technique.

PEK_U03 Is able to plan and conduct experiments testing accuracy of the applied method

PEK_U04 Is able to prepare result analysis and to write a report from the experiments

PROGRAMME CONTENT

Form of classes - lecture	**Number of**

Lec 1	Official guidelines and instructions referring to the course: description of the course content, its organization and instructions concerning exams procedure and grading scheme for the project. Introduction to the course and to basic concepts.	2
Lec 2	Introduction to evolutionary methods – evolutionary programming , evolutionary strategies and differentia evolution	2
Lec 3	Neural computation – basic concepts and examples of applications	2
Lec 4	Immune systems	2
Lec 5	Ant systems	2
Lec 6	Particle swarm intelligence	2
Lec7	Bee algorithm and their applications	2
Lec 8	New nature based algorithms (coocoo algorithm, weed algorithm, bat algorithm and others)	2
Lec9	Agent Techniques	2
Lec10	Chaos Theory	2
Lec 11	Fuzzy logic and fuzzy sets type 2	2
Lec12	Rough sets	2
Lec 13	Probabilistic approaches	2
Lec14	Hybrid systems	2
Lec15	Short surveyr of material	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		

Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Introductory project. Presentation of the formal principles of the course and the project assessment. Debriefing exemplary project subjects.	2
Proj 2	Discussion on a choice of the project subject, part1	2
Proj 3	Discussion on a choice of the project subject, part2. Delivery of subject project declaration	2
Proj 4	Theoretical background preparation, collecting data if necessary	2
Proj 5	Introductory conception of a solution	2
Proj6	Design of problem solution	2
Proj 7	Presentation of the conception of the problem solution,	2
Proj8	Presentation of the proposed solution	
Proj 9	Modification of the solution if necessary	2
Proj 10	Implementation. Part1	2
Proj11	Implementation. Part2	2
Proj12	Validation of the application	2
Proj13	Report preparation	2
Proj14	Presentation of the project	2
Proj15	Discussion about the course	2
	Total hours	30

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED

N1. Informational lecture supported by multimedia presentation

N2. Design specification needed for the project

N3. Design document template

N4. e-learning system applied for publication of dydatic materials

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	The way of evaluating educational effect achievement
F1– Delivery of Project declaration with formulated subject of the first project	PEK_U01	Every week of unjustified delay in delivering project declaration results in grade reduction in course grade
F2 – Presentation of partial results of the project	PEK_U02	Assessed are: Correctness of task formulation , assumptions and current progress of the project. The way of presentation is also evaluated. The grade scale 1-10.
F3 – Report from the implementation of the project	PEK_U03, PEK_U04	Appraisal refers to the way of problem solution, experiment quality,the experiment documentation and the project report (structure, theoretical introduction and bibliography). The grade scale 1-10.
P1 – the final project grade	PEK_U03 PEK_U04	The final number of points is calculated according to the following formulae: P1=0.4 F2+ 0.6 F3, The final grade is based on the number of points and is calculated in the following way: <50%, 60%) → dst <60%, 70%) → dst+ <70%, 80%) → db <80%, 90%) → db+ <90%, → bdb Remark: the final grade is reduced by half of a grade for each week of unjustified delay of a declaration or a report
P2 – the final exam grade	PEK_W01	The exam has a written form. It consists of open questions with given number of points. The sum of points is translated to the grades as follows: <50%, 60%) → dst <60%, 70%) → dst+ <70%, 80%) → db <80%, 90%) → db+ <90%, → bdb

C

PRIMARY AND SECONDARY LITERATURE

[63] Leszek **Rutkowski:** Metody i techniki sztucznej inteligencji, Seria: Informatyka-Zastosowania, Wydawnictwo Naukowe PWN, 2006

[64] S. Wierzchoń: **Sztuczne systemy immunologiczne. Teoria i zastosowania, Akademicka Oficyna Wydawnicza EXIT, 2001**

[65] R. A. Kosiński: Sztuczne sieci neuronowe. Dynamika nieliniowa i chaos Wydanie III uaktualnione, 2007

[66] L. Rutkowski: Metody i techniki sztucznej inteligencji PWN, 2006

[67] Original papers and articles in .pdf format referring to the soft computing methods and applications published on e-learning platform

[68] Z. Michalewicz, David B. Fogel: Jak to rozwiązać czyli nowoczesna heurystyka, WNT 2006

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Soft Computing methods and applications

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics……..

AND SPECIALIZATION …ISI……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2ISI_W02	C1	Lec1 – Lec14	N1, N4
PEK_U01 (skills)	K2INF_U08_S2ISI_U03, K2INF_U08_S2ISI_U02, K2INF_U08_S2ISI_U01, K2INF_U08_S2ISI_U10,	C2	Lec1 – Lec14 Proj1– Proj3, Proj14	N1, N2, N4
PEK_U02	K2INF_U08_S2ISI_U02,	C2	Proj4 – Proj11	N2, N3, N4
PEK_U03	K2INF_U08_S2ISI_U02, K2INF_U08_S2ISI_U04,	C2	Proj12	N2, N4
PEK_U04	K2INF_U08_S2ISI_U04,	C2	Proj13	N2, N4

** - enter symbols for main-field-of-study/specialization educational effects

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish …… Odkrywanie wiedzy z danych **……**
Name in English …… Data Mining Techniques **…….**
Main field of study (if applicable): … Computer Science **…….**
Specialization (if applicable): …Intelligent Information Systems …
Level and form of studies: ~~1st~~/ 2nd* level, ~~full-time~~ / part-time*
Kind of subject: obligatory / ~~optional / university-wide~~*
Subject code INZ3785
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					210
Form of crediting	Examination /	Examination /	Examination /	Examination /	~~Examination~~ /

	crediting with grade*	crediting with grade*	crediting with grade*	crediting with grade*	crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points					4
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes					2,4

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W15
2. K1INF_U16
3. Is familiar with SUBJECT EDUCATIONAL EFFECTS of the course Machine Learning

\

SUBJECT OBJECTIVES

C1: To familiarize students with the process of knowledge acquiring from data
C2: Understanding the techniques used at various stages of the process of knowledge acquiring.
C2: The acquisition of an ability to select appropriate techniques and validation methods for a given task.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01: Student knows the approach used in the knowledge acquisition from data of different types, for different tasks.
PEK_W02: Student knows the potential applications of knowledge acquisition techniques.
PEK_W03: Student has detailed knowledge of how the validate of acquired knowledge.
…
relating to skills:
PEK_U01: Can point to learn the right technique for the job.
PEK_U02: Can transmit knowledge in an interesting and understandable way for the audience.
…
relating to social competences:
PEK_K01: Can work in a team.
PEK_K02: Can find the necessary knowledge.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1		
Lec 2		
Lec 3		
Lec 4		
Lec 5		
….		
	Total hours	

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Organizational lecture. Discussion of the course and the requirements. The allocation of tasks to students. Discussion on the field of KDD (Knowledge Data Discovery), tasks and role in the modern world.	2
Sem 2	Association rules generation - methods, applications	2
Sem 3	Outlier detection – methods, applications	2
Sem 4	Data visualization as a Data Mining technique	2
Sem 5	Active learning – approaches, techniques, - application examples	2
Sem 69	*Image annotation* as a DM task	2
Sem 7	DM techniques in Management	2
Sem 8	Soft computing techniques in data mining	2
Sem 9	Measures of evaluation of acquired knowledge.	2
	Total hours	30

TEACHING TOOLS USED
N1. Discussion of topics supported by multimedia presentations. N2. E-learning system used for the publication of teaching materials.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester),	Educational effect number	Way of evaluating educational

P – concluding (at semester end)		effect achievement
F1 - Content - related evaluation of the student's presentations	PEK_W01; PEK_W02; PEK_W03; PEK_K02;	The presentation should contain new elements, the student must understand the transmitted knowledge. Evaluation of the mater according to the current scale of assessments.
F2 - Assessment of the quality of presentation	PEK_W01; PEK_W02; PEK_W03; PEK_U02;	Evaluation of transparency prepared presentation, selection of appropriate issues for the given subject. Evaluation of way of presenting, contact with the audience, the pace of the presentation. Grade F2 is the arithmetic mean of the quality of the presentation and the quality of its conduct.
F3 - Evaluation of the students' activity in the classroom	PEK_W01; PEK_W02; PEK_W03; PEK_U01; PEK_U02; PEK_K01;	For the activity a student can receive points: 0 - inactive, passive listener; 1 - Active or 2 - outstanding activity. Up to 30 points can be achieved. The unjustified absence deducts two points, justified - one point. Rating F3 depends on the number of accumulated points: = <15 points: 2.0; 16-18 points: 3.0; 19-21 points: 3.5; 22-24 points: 4.0; 25-27 points: 4.5 28-30 points: 5.0
P1 – Final grade Sem	PEK_W01; PEK_W02; PEK_W03; PEK_U01; PEK_U02; PEK_K01; PEK_K02;	Final grade is an average of F1 – F3
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Scientific publications indicated by the teacher, mainly articles from scientific journals. For each topic will be designated primary literature, modified annually, so that was correct. Will be promoted independence in searching the literature not older than 3 years.

[2]

SECONDARY LITERATURE:

[1] An extensive collection of electronic resources - scientific publications - supplied by the lecturer of the seminar.

[2]

[3]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Halina Kwaśnicka halina.kwasnicka@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
…… Data Mining Techniques **……**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY …… Computer Science …..
AND SPECIALIZATION … Intelligent Information Systems …..

Subject educational effect	**Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)****	**Subject objectives*****	**Programme content*****	**Teaching tool number*****
PEK_W01 (knowledge)	K2INF_W06_S2ISI_W05;	C1, C2, C3	Se1-Se9	N1, N2
PEK_W02	K2INF_W06_S2ISI_W05;	C1, C2, C3	Se1-Se9	N1, N2
PEK_W03	K2INF_W06_S2ISI_W05;	C1, C2, C3	Se1-Se9	N1, N2
…				
PEK_U01 (skills)	K2INF_U08_S2ISI_U07;	C1, C2, C3	Se1-Se9	N1,N2
PEK_U02	K2INF_U08_S2ISI_U01; K2INF_U08_S2ISI_U02;	C1, C2, C3	Se1-Se9	N1,N2
…				
PEK_K01 (competences)	K1INF_K03;	C1, C2, C3	Se1-Se9	N1,N2
PEK_K02	K1INF_K01;	C1, C2, C3	Se1-Se9	N1,N2
…				

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa I
Name in English MSc Thesis I
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code INZ003818
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				60	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*

For group of courses mark (X) final course					
Number of ECTS points				2	
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes				0,6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 2rd semester

\

SUBJECT OBJECTIVES

C1 Preparation of students to write a master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology, with special attention of all stages of writing a thesis.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project	**Number of hours**

Proj 1	Preparation of students to write a master thesis according the internal requirements of Faculty of Computer Science and Management (Computer Science field of study), Wrocław University of Technology, with special attention of all stages of writing a thesis. Literature studies, selection and learning of systems, tools, methods and algorithms needed for the realization of the chosen subject of thesis. The preparation of an outline of work and schedule of future work. Basic work on the research, design and implementation. Familiarization with the research works carried out at the Institute of Informatics. Final results: the initial solution and / or the prototype of developed system, knowledge about the current state of art in the field of thesis, an outline of future work and timetable for further works documented in English and Polish languages.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED

N1. Literature study - analysis of publications (including websites) related to subject of thesis, including the research works of the Institute of Informatics.
N2. Own work, independent research on the tasks defined in the master's thesis
N3. Student consultation with the supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessment based on the final results achieved

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[69] Literature related to the scope of realized project selected by student and recommended by the teacher.
[70] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis I
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U03, K2INF_U08	C1	Pr1	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa II
Name in English MSc Thesis II
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005221
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				540	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points				18	
including number of ECTS points for practical (P) classes				18	
including number of ECTS points for direct teacher-student contact (BK) classes				6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 4th semester

\

SUBJECT OBJECTIVES

C1 Preparation of master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish language, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes – project		**Number of hours**
Proj 1	Subject is the main component of the process of realization the master thesis and involves the preparation by the student his master thesis. Master thesis is done under the direction of his supervisor, with whom student defines its scope, goals, tasks and timetable for implementation.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED

N1. Preparation of master thesis N2. The text of the master thesis N3. Thesis review prepared by the supervisor N4. Students consultation with supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of master thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessed is the final text of the diploma thesis. The assessment is carried out in the form of a review done by the promoter. The condition to pass the course is delivering the final text of master thesis before the defined deadline. The second review, which does not, however the condition for pass the course is done by the reviewer appointed by the Faculty Dean. Reviews are made according to the standard format. The student is admitted to the defense (final exam) if both reviews are positive

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[71] Literature related to the scope of realized project selected by student and recommended by the teacher.

[72] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis II
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K1INF_U03, K2INF_U08	C1	Proj1	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY of **Computer Science and Management**/ DEPARTMENT……

SUBJECT CARD

Name in Polish: Przetwarzanie równoległe i rozproszone
Name in English: Parallel and Distributed Processing
Main field of study (if applicable): Informatics
Specialization (if applicable): Intelligent Information Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part time~~*
Kind of subject: ~~obligatory~~ / optional ~~/ university-wide*~~
Subject code INZ003783WL
Group of courses ~~YES~~ / NO~~*~~

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		30		
Number of hours of total student workload (CNPS)	60		60		
Form of crediting	~~Examination /~~ crediting with grade*	Examination / crediting with grade*	~~Examination /~~ crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	**2**		2		
including number of ECTS points for practical (P) classes	0		2		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		1,2		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

6. Basic knowledge related to distributed and parallel systems.
7. Programming skills in C/C++ language.

\

SUBJECT OBJECTIVES

C1 Acquainting students with techniques of parallel programming.
C2 Acquainting students with the basic parallel algorithms.
C3 Acquainting students with chosen parallel and distributed environments.
C4 Acquisition of the ability to write parallel programs.
C5 Acquisition of the ability to use different parallel and distributed execution Environments.
C6 Acquisition of skills to plan and conduct simple computer experiments.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 He knows basic techniques of parallel processing.
PEK_W02 He knows basic parallel algorithms
PEK_W03 He knows chosen parallel and distributed execution environments.

relating to skills:
PEK_U01 He is able to write parallel programs.
PEK_U02 He is able to write programs under different parallel distributed environment.
PEK_U03 He is able to use chosen parallel and distributed execution environment.

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Parallel programming languages, shared-memory and distributed memory programming paradigms, data and algorithm parallelism basic performance metrics.	1
Lec 2	Static and dynamic interconnection networks - typical topologies. Communication in distributed systems – algorithms of collective communication. MPI standard - message passing communication. An example of simple parallel algorithm.	2
Lec 3	Parallel algorithms: matrix multiplication, sorting and search.	2
Lec 4	Evaluations of parallel algorithms: computational complexity, speedup, efficiency, scalability. Amdhal and Gustafson laws.	2
Lec 5	Architecture and programming of GPU. Programming in CUDA environment.	2
Lec 6	Automatic parallelizm detection – dependencies types, parallelism identification, loop parallelization, vectorization.	2
Lec 7	Parallel and distributed processing environments: shared memory parallel processing, message passing and client-server models.	2
Lec 8	Multicore processor programming. New trends in parallel and distributed computing	2
	Total hours	15

	Form of classes - class	**Number of hours**
Cl 1		

	Total hours	
Form of classes - laboratory		**Number of hours**
Lab1	Presentation of lab scope, presentation of grading principles, training from health and safety at work. Familiarization with used at laboratory MPI environment.	2
Lab2	Testing execution environment, running simple programs that implement communication between two processors in MPI environment.	2
Lab3	Implementation of chosen algorithms of collective communication.	2
Lab4	Implementation of simple parallel algorithm in MPI environment.	2
Lab5	Implementation of chosen parallel matrix multiplication algorithm, carrying out the tests for different data, calculation of speedup.	2
Lab6	Presentation results of experiments performed during lab 5	2
Lab7	Implementation of other than at lab 5 parallel algorithm, carrying out the tests for different data, calculation of speedup	2
Lab8	Presentation results of experiments performed during lab 7.	2
Lab9	Familiarization with CUDA environment, running simple programs.	2
Lab10	Implementation of chosen algorithm that used shared memory at GPU, carrying out the tests and calculation of speedup.	2
Lab11	Implementation of chosen algorithm with data parallelism in CUDA environment, calculation of speedup.	2
Lab12	Presentation results of experiments performed during lab 11	2
Lab13	Implementation of an example algorithm from Artificial Intelligence scope using chosen execution environment (MPI, CUDA).	2
Lab 14	Carrying out the tests of implemented algorithm, calculation of speedup, scalability analysis.	2
Lab 15	Presentation results of experiments performed during lab 14.	2
	Total hours	30
Form of classes - project		**Number of hours**
Proj1		
	Total hours	
Form of classes - seminar		**Number of hours**
Sem1		
	Total hours	

TEACHING TOOLS USED
N1. Lecture supported by multimedia presentations (slideshow) N2. Cluster of computers running under MPI N3. GPU server that uses NVIDIA graphics cards - CUDA environment.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation(F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 – (lecture)	PEK_W01 PEK_W02 PEK_W03	Test and quizzes during the lecture, student activity during the lecture, students answering on

		questions during lecture.
F2 – (laboratory)	PEK_U01 PEK_U02 PEK_U03	Checking of student preparation for exercise realization, assessment of reports from exercises. Evaluation of the quality of submitted by students programs (points allocated).
P - the final grade from lecture will be issued on the basic of partial grades (points) received from the test (T) and quizzes (Q) as follows: Grade = 20% * Q + 80% *T. The final grade from the laboratory will be issued on the basis of partial grades (points) obtained from all exercises.		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[73] Kumar Vipin, Grama Ananth, Gupta Anshul, Karypis George "Introduction to Parallel Computing" The Benjamin/Cumming Publishing Company, Inc.

[74] B. Wilkinson, M. Allen, “Parallel Programming, Prentice Hall, 2005

[75] Writing Message-Passing Parallel Programs with MPI, Course Notes, http://www.zib.de/zibdoc/mpikurs/mpi-course.pdf

[76] Peter Pacheco, Parallel Programming with MPI, Morgan Kaufmann Pub. http://www.cs.usfca.edu/~peter/ppmpi/

[77] Zbigniew Czech, Wprowadzenie do obliczeń równoległych, PWN, Warszawa 2010

[78] CUDA documentation

[79] Different microprocessors documentation

SECONDARY LITERATURE:

[1] Karbowski, E. Niewiadomska-Szynkiewicz, "Obliczenia Równoległe i Rozproszone", Wyd. Politechniki Warszawskiej, 2001

[2] Ian Foster, Designing and Building Parallel Programs, http://www.mcs.anl.gov/~itf/dbpp/

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr inż. Jan Kwiatkowski, jan.kwiatkowski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Parallel and Distributed Processing
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **Intelligent Information Systems**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W04	C1	Lec1, Lec 6, Lec 8	N1
PEK_W02	K2INF_W04	C2	Lec 2, Lec 3, Lec 5	N1
PEK_W03	K2INF_W04	C3	Lec 2, Lec 5, Lec 7, Lec 8	N1
PEK_U01 (skills)	K2INF_U07	C4	Lab1, Lab2, Lab3, Lab4, Lab5, Lab7, Lab10, Lab11. Lab13	N2, N3
PEK_U02	K2INF_U07	C5	Lab1, Lab2, Lab9, Lab10	N2, N3
PEK_U02	K2INF_U07	C6	Lec4, Lab6, Lab8, Lab1, Lab12, Lab14, Lab15	N1,N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Seminarium dyplomowe
Name in English Diploma seminar
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005220
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					90

Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points					2
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes					1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge, skills and competences acquired at Informatics field at second level of study until 3th semester

\

SUBJECT OBJECTIVES

C1 Preparing students to write a master thesis according the internal requirements in Informatics field at Faculty of Computer Science and Management, Wrocław University of Technology,
C2 Providing students with basic skills related to preparation and presentation of scientific texts, beginning from the choice of topic, selection of tasks to be performed, use of literature to interpretation of the results.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
…
relating to skills:
PEK_U01 He is able to acquire information from literature, databases and other sources, also in English or other language used for communication in Informatics field, is able to integrate the information obtained, interpret them, make critical evaluation and also draw conclusions and formulate and justify opinions related to prepared master thesis.
PEK_U02 He can communicate using a variety of techniques in his professional environment and in other environments, also in English or other foreign language used for communication in Informatics field and also to present the results of his master thesis
relating to social competences:
…

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1		
Lec 2		
	Total hours	

	Form of classes - class	**Number of hours**
Cl 1		
Cl 2		

	Total hours	
Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	
Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
	Total hours	
Form of classes - seminar		**Number of hours**
Sem 1	Familiarization with the principles of master thesis realization at Informatics field. Rules related to student presentations. Determining the schedule of student presentations.	2
Sem 2	Review of basic skills related to preparation and presentation of scientific texts by students, beginning from the choice of topic, selection of tasks to be performed, use of literature and also how to write thesis and how obtained results should be interpret.	2
Sem 3 – Sem15	During semester each student has 2 presentations. The first presentation is related to the general view of the thesis topic, its placement in the literature and in the Informatics field. The student should present the primary aim of thesis, the state of art related to thesis topic, the concept of solution, the initial structure of thesis and timetable for further work. The purpose of the second presentation is preparation to defense and demonstrate presentation skills in English. The second presentation consists of two parts, namely, discussion of the results of the work in English and a short presentation in Polish devoted to the results of the thesis.	26
	Total hours	30

TEACHING TOOLS USED
N1. Multimedia presentations N2. Examples of scientific papers and reports from the field of computer science. N3. E-Learning System used to publish teaching materials and announcements, also used for collection and evaluation of student work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01 PEK_U02	Evaluation of the presentation of the work at the seminar and prepared documentation from the presentation. The evaluation shall be subject to the fulfillment of the requirements for the presentation, including its substantive scope, structure and organization of presentation, techniques of conversation, a form of presentation, compactness of presentation and

		conclusions reached. Participation in the discussions after presentation is also evaluated. In addition, the seminar leader is able to control the cooperation between supervisors and graduate students.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[80] Literature related to the scope of realized project selected by student and recommended by the teacher.

[81] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. inż. Leszek Borzemski, prof. PWr, leszek.borzemski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Diploma seminar
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
AND SPECIALIZATION **every specjalization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3
PEK_U02	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT…

SUBJECT CARD

Name in Polish Systemy informacyjne
Name in English Information systems
Main field of study (if applicable): Informatics
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code INZ3762
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				30
Number of hours of total student workload (CNPS)	60				60
Form of crediting	crediting with grade	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	crediting with grade
For group of courses mark (X) final course					
Number of ECTS points	2				2
including number of ECTS points for practical (P) classes	0				0
including number of ECTS points for direct teacher-student contact (BK) classes	1,2				1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic mathematical knowledge for 1st level of studies.

2. Informatics knowledge background.
3. Algorithms knowledge background.

\

SUBJECT OBJECTIVES

C1 Acquiring knowledge about functions and significance of information systems in contemporary organizations
C2 Acquainting with the functions and development of information systems in information society
C3 Acquainting with the different methods of information retrieval by surfing the Web
C4 Recognizing the problems of passing of contemporary organizations to Internet space
C5 Obtainment of skills to analyze the literature from information systems area and to synthesize the contents from different sources
C6 Application of the obtained knowledge to presentation the problems from information systems area by means of using adequate tools

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Familiarity with basic models of information systems
PEK_W02 Basic knowledge about Web information systems
PEK_W03 Familiarity with common multimedia technologies
PEK_W04 Understanding of the measures of information retrieval efficiency

relating to skills:
PEK_U01 Student can to build information query for different types of information needs
PEK_U02 Can to determine basic features of information system for given organization
PEK_U03Student be able to evaluate the precision of retrieved information
PEK_U04 Can to present basic features of given information system

relating to social competences:
PEK_K01 Can individually to use literature of the subject and to select useful information
PEK_K02 Student is convinced above positive role of information systems in stimulation of the civilization development

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	History of information systems development. Information processing. Theoretical basis of information systems.	2
Lec 2	Main information systems' models. Automation of information flow in organization.	2
Lec 3	Information retrieval on Internet – fundamentals.	2
Lec 4	Web information systems.	2
Lec 5	Multimedia. Importance of multimedia technologies in information systems development.	2
Lec 6	How societies embrace information technology. Digital libraries.	2
Lec 7	Efficiency of information systems. Case study of chosen information system.	2
Lec 8	Test	1
	Total hours	15

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Introductory seminar.	2
Sem 2	Information systems – definitions, types, features, examples.	2
Sem 3	Information retrieval fundamentals – models, dictionaries, indexes.	2
Sem 4	Evaluation of information systems' efficiency.	2
Sem 5	Analytical retrieval of information.	2
Sem 6	Information retrieval on Internet.	2
Sem 7	ERP class systems.	2
Sem 8	Mobile information systems.	2
Sem 9	Multimedia information systems.	2
Sem 10	Information systems for teleworking.	2
Sem 11	How societies embrace information technology.	2
Sem 12	CRM systems.	2
Sem 13	Knowledge management systems.	2
Sem 14	Information society: e-business, e-administration, e-commerce, e-health	2

Sem 15	Seminar summation and credit.	2
	Total hours	30

TEACHING TOOLS USED

N1. Computerized presentation at the lectures.
N2. Presentation with visualization and using Internet resources during the seminar.
N3. Consultations.
N4. Students' homework with using software packages.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 PEK_U04 PEK_K02	Grade of presentation (quality of slides, oral presentation, relevance, duration), presence and activity.
F2	PEK_K01	Report's grade
P-seminar	PEK_U02	Grade result from F1 and F2
P-lecture	PEK_W01-PEKW04 PEK_U03	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Manning C. D., Raghavan P., Schutze H.: *Introduction to Information Retrieval*, Cambridge University Press, New York, 2009, dostępne także bezpłatnie: www.cambridge.org

[2] Kłopotek M. A.: *Inteligentne wyszukiwarki internetowe* , Akademicka Oficyna Wydawnicza EXIT, Warszawa, 2001.

[3] Wrycza S. (red.): *Informatyka ekonomiczna. Podręcznik akademicki*, PWE, Warszawa, 2010.

[4] Cortada J. W. : How Societies Embrace Information Technology, WILEY-IEEE, NY, 2009.

[5] Baeza-Yates R., Ribeiro-Neto B.: *Modern Information Retrieval*, ACM Press, Adison-Wesley, New York, 1999.

SECONDARY LITERATURE:

[1] Zgrzywa A., Choroś K., Siemiński A.(Eds.): *Multimedia and Internet Systems: Theory and Practice,* Spriger Verlag, Berlin, 2013.

[2] Nguyen N.T., Zgrzywa A., Czyżewski A.(Eds.): *Advances in Multimedia and Network Information System Technology,* Spriger Verlag, Berlin, 2010.

[3] Zawiła-Niedźwiecki J. : *Informatyka gospodarcza*, Wyd. C. H. Beck, 2010.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Aleksander Zgrzywa, Aleksander.Zgrzywa@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INFW03, K2INF_W06	C1	Lec1, Lec 6 Sem 2,Sem 14	N1-4
PEK_W02	K2INF_W04, K2INF_W06	C3,C4	Lec 3, Lec 4 Sem 6,Sem 7, Sem 11	N1-4
PEK_W03	K2INF_W02, K2INF_W06	C2	Lec 5, Lec 6 Sem 13,Sem 14	N1-4
PEK_W04	K2INF_W03	C3	Lec 3, Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U01	K2INF_U01, K2INF_U08	C3	Lec 3,Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U02	K2INF_U05, K2INF_U08	C4	Lec 2,Lec 7 Sem 7,Sem 8,Sem 12,Sem 13	N1-4
PEK_U03	K2INF_U05, K2INF_U08	C3	Lec 2, Lec 5 Sem 3, Sem 5, Se6,Se9	N1-4
PEK_U04	K2INF_U02, K2INF_U03	C5, C6	Lec 5, Lec 6 Sem 3, Sem 5, Sem 6, Sem 9, Sem 10	N1-4

PEK_K01	K2INF_K01, K2INF_U02	C5	Lec 5, Lec 6 Sem 9, Sem 10	N1-4
PEK_K02	K2INF_K02	C1	Lec 1, Lec 6 Sem 2, Sem 14	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: Systemy wspomagania decyzji
Name in English: Decision Support Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Decision Support Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / university-wide*
Subject code: INZ003761
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	15		15	
Number of hours of total student workload (CNPS)	60	30		60	
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / ~~crediting with grade~~*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2	1		2	
including number of ECTS points for practical (P) classes				2	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	0,6		1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None.

\

SUBJECT OBJECTIVES

C1 Getting to know foundations of designing computer science decision support systems using general systemic methods which make it possible to apply unified approaches for analysis and decision making for decision support systems of different nature.
C2 Acquisition of skills to represent in the form of mathematical formulas of decision making plants treated as input-output plants.
C3 Acquisition of skills to analyze of decision making plants treated as input-output plants.
C4 Getting acquainted with methods and algorithms of multi-stage decision making.
C5 Acquisition of skills to apply dynamic programming method.
C6 Getting to know metods and algorithms of multi-criteria decision making.
C7 Acquisition of skills to use AHP method.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Student knows foundations of designing of decision support systems for any kind of plants.
PEK_W02 Student knows foundations of analysis and decision making for input-output plants with logic knowledge representation.
PEK_W03 Student knows selected method of multi-stage and multi-criteria decision making.
relating to skills:
PEK_U01 Student is able to elaborate a mathematical model for an input-output decision making plant in discrete state space as well as with logic knowledge representation.
PEK_U02 Student can solve analysis and decision making tasks for elementary plants with logic knowledge representation.
PEK_U03 Student is able to solve multi-stage decision making problem using Bellman's Principle and dynamic programming.
PEK_U04 Student can use AHP algorithm for the solution od multi-criteria decision making problem
relating to social competences:
PEK_K01 Student can take advantage of professional literature by oneself and can perform the critical analysis of information mined.
PEK_K02 Student can think creatively.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Decision support systems – definitions, structures, problems.	1
Lec 2	Application of discrete state equations and logic expressions for representation of decision making plants.	2
Lec 3	Analysis of decision making plants, in particular logic-algebraic method.	2
Lec 4	Decision making – definition, typology, logic-algebraic plant.	2
Lec 5	Bellman's Principle and multi-stage decision making.	3
Lec 6	Multi-criteria decision making, Pareto sets, AHP method.	3
Lec 7	Examples of computer decision support systems.	2
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Solution of numerical exercises concerning difference equations.	1
Cl 2	Solution of numerical exercises concerning differential equations as well as propositional calculus.	2

Cl 3	Solution of numerical exercises concerning mathematical representations of input-output plants.	2
Cl 4	Solution of numerical exercises concerning analysis using logic-algebraic method.	2
Cl 5	Solution of numerical exercises concerning decision making using logic-algebraic method.	2
Cl 6	Solution of numerical exercises concerning dynamic programming.	2
Cl 7	Solution of numerical exercises concerning AHP method.	2
Cl 8	Final test.	2
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Collecting of indispensable information about selected plant being the decision making plant.	2
Proj 2	Determination of mathematical model of selected decision making plant and decision making problem formulation.	2
Proj 3	Analysis of decision making plant using its mathematical model.	2
Proj 4	Choice of decision making method for further usage as well as elaboration of decision making algorithm.	3
Proj 5	Implementation and alalysis of decision making algorithm.	4
Proj 6	Elaboration of conclusions and written report of the project performed.	2
	Total hours	15

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1 Lecture – traditional method. N2 Classes – traditional method. N3 Consultation. N4 Individual discussion with student. N5 Short test (10 mins.). N6 Self-contained work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Short tests during the classes.
F2	PEK_K01– PEK_K02	Individual discussion with student during the project.
P (Classes)	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Test.
P (Project)	PEK_U01–PEK_U04; PEK_K01–PEK_K02	Evaluation of written report of the project.
P (Lecture)	PEK_W01–PEK_W03; PEK_K02	Exam.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[82] [1] Józefczyk J., Wybrane problemy podejmowania decyzji w kompleksach operacji, Oficyna Wydawnicza PWr, Wrocław 2001.

[83] Bubnicki Z., Podstawy informatycznych systemów zarządzania, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1993.

[84] Roy B., Wielokryterialne podejmowanie decyzji, WNT, Warszawa 1990.

SECONDARY LITERATURE:

[1] Techniki informacyjne w badaniach systemowych, P. Kulczycki, O. Hryniewicz, J. Kacprzyk (red.), WNT, Warszawa 2007.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Jerzy Józefczyk, Jerzy.Jozefczyk@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Decision Support systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Decision Support systems

Subject educational effect	**Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)****	**Subject objectives*****	**Programme content*****	**Teaching tool number*****
PEK_W01 (knowledge)	K2INF_W02	C1	Lec1, Lec 2, Lec 7, Cl1, Cl 2, Pr1	N1, N3, N6
PEK_W02	K2INF_W02	C1	Lec3, Lec4	N1, N3, N6
PEK_W03	K2INF_W02	C4, C6	Lec5, Lec6	N1, N3, N6
PEK_U01 (skills)	K2INF_U05; K2INF_U06	C2	Lec2, Cl 3, Proj2	N2–N6
PEK_U02	K2INF_U05; K2INF_U06	C3	Cl 4, Cl 5, Proj3, Pro4	N2–N6
PEK_U03	K2INF_U05; K2INF_U06	C5	Cl 6, Proj4	N2–N6
PEK_U04	K2INF_U05; K2INF_U06	C7	Cl 7, Proj4	N2–N6
PEK_K01 (competences)	K2INF_K01	C1, C4, C6	Lec1– Lec7, Proj1, Proj4	N2–N6
PEK_K02	K2INF_K01	C1–C7	Proj1–Proj6	N2–N6

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8/ DEPARTMENT……

SUBJECT CARD

Name in Polish … Systemy uczące się **…….**
Name in English …… Machine Learning **…….**
Main field of study (if applicable): ……Computer Science **…….**
Specialization (if applicable): …Intelligent Information Systems **…..**
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / optional / ~~university-wide~~*
Subject code INZ3779
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	--	30	--	--
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	Examination / ~~crediting with grade~~*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					

Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes	-		4		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W15
2. K1INF_U16
3.

\

SUBJECT OBJECTIVES

C1: To familiarize students with the different approaches and methods used in machine learning tasks.
C2: The acquisition of an ability to select the appropriate method for the task.
C2: The acquisition of skills to assess the suitability of a learned computer system to solve practical tasks.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01: Student has knowledge of the approaches and methods of machine learning.
PEK_W02: Student knows the potential use of different methods.
PEK_W03: Student knows the data pre-processing methods and selection of attributes.
PEK_W04: Student knows validation methods of learned systems.
PEK_W05: Student knows the environment containing the selected machine learning methods.

relating to skills:
PEK_U01: Student can choose the right method of learning for a give task.
PEK_U02: Student can design and implement application - learning system.
PEK_U03: Student is able to plan and carry out experiments examining the effectiveness of the methods used and their usefulness.
PEK_U04: Student can analyze the results and prepare a report on the experiments.
PEK_U05: Student can practically use the selected environments: Weka and R.
…
relating to social competences:
PEK_K01
PEK_K02

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to the course - requirements. Basic concepts, types of learning.	2
Lec 2	Supervised learning: inductive methods of learning - learning version space, Induction of decision trees, ID3 and C4.5	2
Lec 3	Transformation and selection of attributes.	2
Lec 4	Induction of rules, covering sequential approach, algorithms AQ, CN2, ILA.	2

Lec 5	Emerging patterns.	2
Lec 6	Unsupervised Learning: clustering, hierarchical clustering, grouping in subspaces.	2
Lec 7	Ensemble of classifiers, and clustering ensemble.	2
Lec 8	Computational Learning Theory.	2
Lec 9	Statistical learning - introduction.	2
Lec 10	Statistical Learning - selected methods.	2
Lec 11	Reinforcement Learning.	2
Lec 12	Reinforcement Learning - Comprehensive view, analysis of the cases	2
Lec 13	Case Based Reasoning.	2
Lec 14	Explanation-Based Learning.	2
Lec 15	Summary of the course.	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Discussion of the requirements, discussion of exercises, introduction into the WEKA	2
Lab 2	Induction of decision trees C4.5 (using Weka)	4
Lab 3	Inductive Learning Algorithm (ILA) – own program	6
Lab 4	Bayesian learning (own program)	4
Lab 5	Clustering CLUSTER / 2 (R environment)	6
Lab 6	Learning automata L * (environment R)	4
Lab 7	Reinforcement Learning Q-learning (own program)	4
	Total hours	30

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
...		
	Total hours	

Form of classes - seminar	**Number of hours**

Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Lecture supported by multimedia presentations N2. Specifications documentation required for completion of tasks in the laboratory N3. E-learning system used for the publication of teaching materials and equipment, and documentation of laboratory tasks

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 - Presentation of the first task	PEK_W01; PEK_W05; PEK_W01; PEK_U05; PEK_U03; PEK_U04;	The task is worth 10 points. The delay in the implementation of the tasks will punished by deduction of 20% of the points per week. The implementation of an exercise lies on learning a given subject and the algorithm, follow the instruction of the exercise. Student creates a report describing the algorithm, used data, and research methodology course, common problems, conclusions and summary. The report is released in the electronic form.
F2 - Presentation of the 2nd task	PEK_W01; PEK_U02; PEK_U03; PEK_U04;	As above
F3 - Presentation of the 3rd task	PEK_W01; PEK_W03; PEK_U02; PEK_U03; PEK_U04	As above
F4- Presentation of the 4th task	PEK_W01; PEK_W03; PEK_W05; PEK_U05; PEK_U03; PEK_U04;	As above
F5 - Presentation of the 5th task	PEK_W01; PEK_W03; PEK_W05; PEK_U03; PEK_U05; PEK_U04;	As above
F6 - Presentation of the 6th task	PEK_U02; PEK_U03; PEK_U04;	As above
P1 – Final grade - lab	PEK_U01; PEK_U02; PEK_U03; PEK_U04; PEK_U01;	The final evaluation will be issued in accordance with the following scale: 0 - 29 : grade 2 30 - 34 : grade 3 35 - 40 : grade 3+ 41 - 45 : grade 4 45 - 50 : grade 4+ 51 - 60 :grade 5 Are allowed two absences (without giving their reasons). 3 or more

		absences (for whatever reason) results in the lack of assessment of the laboratory
P2 – final grade - lecture	PEK_W01; PEK_W02; PEK_W03; PEK_W04; PEK_W05; PEK_U01; PEK_K01	It is a written exam, checking knowledge of the lecture. It consists of open-ended questions. The assessment should be sufficient to obtain 50% of all possible points, plus one point. [0%,50%): grade 2 [50%, 60%): grade 3 [60%, 70%): grade 3 + [70%, 80%): grade 4 [80%, 90%): grade 4+ [90%, 100%]: grade 5

C

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[85] Paweł Cichosz: Systemy uczące się. WNT 2000.

[86] Kwaśnicka H., Spirydowicz A.: Uczący się komputer. Programowanie gier logicznych. Oficyna Wydawnicza PWr. Wrocław. 2004.

[87] Introduction to Machine Learning. Draft of Incomplete Notes by Nils J. Nilsson, 2010. Praca dostępna: http://robotics.stanford.edu/~nilsson/MLBOOK.pdf

[88] Mitchell T.M.: Machine Learning. McGraw-Hill Series in Computer Science.1997.

SECONDARY LITERATURE:

[1] Richard S. Sutton and Andrew G. Barto Reinforcement Learning: An Introduction. A Bradford Book. The MIT Press, Cambridge, Massachusetts. London, England. In memory of A. Harry Klopf. 1988.

[2] Data Mining and Knowledge Discovery in Real Life Applications. Edited by Julio Ponce and Adem Karahoca. In-Teh (Croatian branch of I-Tech Education and Publishing KG, Vienna, Austria), 2009.

[3] Machine Learning /Stanford Video Courses http://www.academicearth.org/courses/machine-learning

[4] Journal papers that contain news in ML field.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Halina Kwaśnicka halina.kwasnicka@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
… Machine Learning **……**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……Computer Science …..
AND SPECIALIZATION …Intelligent Information Systems..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2ISI_W01; K2INF_W06_S2ISI_W01;	C1, C2	W2-W14	N1, N3
PEK_W02	K2INF_W06_S2ISI_W01; K2INF_W06_S2ISI_W01;	C1, C3	W2-W14	N1, N3
PEK_W03	K2INF_W06_S2ISI_W01; K2INF_W06_S2ISI_W01;	C1, C2, C3	W2-W14	N1, N3
PEK_W04	K2INF_W06_S2ISI_W01; K2INF_W06_S2ISI_W01;	C1, C2, C3	W2-W14	N1, N3
PEK_W05	K2INF_W06_S2ISI_W01; K2INF_W06_S2ISI_W01;	C1, C2, C3	W2-W14	N1, N3
PEK_U01 (skills)	K2INF_U08_S2ISI_U01; K2INF_U08_S2ISI_U02;	C2, C3	L1-L15	N2,N3
PEK_U02	K2INF_U08_S2ISI_U01; K2INF_U08_S2ISI_U02;	C2, C3	L1-L15	N2,N3
PEK_U03	K2INF_U08_S2ISI_U01; K2INF_U08_S2ISI_U02;	C2, C3	L1-L15	N2,N3
PEK_U04	K2INF_U08_S2ISI_U01; K2INF_U08_S2ISI_U02;	C2, C3	L1-L15	N2,N3
PEK_U05	K2INF_U08_S2ISI_U01; K2INF_U08_S2ISI_U02;	C2, C3	L1-L15	N2,N3
PEK_K01 (competences)				
PEK_K02				
…				

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT……

SUBJECT CARD

Name in Polish Systemy Wizyjne
Name in English Vision systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Intelligent Information Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ001569
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	

Number of hours of total student workload (CNPS)	30			90	
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2			4	
including number of ECTS points for practical (P) classes				4	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2			2,4	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge in image processing
2. Basic knowledge in computer graphics
3. Programming skills in any high level programming language

\

SUBJECT OBJECTIVES

C1 Problem specific image and video data representation
C2 Solving of the following problems: retrieval, localization, recognition, annotation, interpretation
C3 Assessment of vision system quality

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01
relating to skills:
PEK_U01
PEK_U03
PEK_U04

PROGRAMME CONTENT		
Form of classes - lecture	**Number of hours**	
Lec 1	Introduction, image models	2
Lec 2	Image representation, image retrieval	2
Lec 3	Image localization, pattern recognition	2
Lec 4	Temporal aspects of video signal	2

Lec 5	Image filtering, edge detection, image segmentation	2
Lec 6	Image annotation and interpretation, semantics	2
Lec 7	Quality of vision systems, user feedback	2
Lec 8	Test	1
	Total hours	15

Form of classes - project	**Number of hours**	
Proj 1	Requirements, project scope declaration	2
Proj 2	Short presentation of proposed project scope, discussion	2
Proj 3	Short presentation of proposed project scope, discussion	2
Proj 4	Short presentation of proposed project scope, discussion	2
Proj 5	Project implementation	2
Proj 6	Project implementation	2
Proj 7	Short presentation of current project status, discussion	2
Proj 8	Short presentation of current project status, discussion	2
Proj 9	Project implementation	2
Proj 10	Project implementation	2
Proj 11	Project implementation	2
Proj 12	Short project summary presentation	2
Proj 13	Short project summary presentation	2
Proj 14	Project verification	2
Proj 15	Project summary	2
	Total hours	30

TEACHING TOOLS USED

N1. Multimedia lecture with exemplary solutions demonstration N2. Publicly available tools and libraries for image and video processing N3. Publicly available image databases with accompanying metadata

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 – project scope declaration, initial project idea	PEK_U01	Evaluation of initial project idea. Grade: 2-5.
F1 – final documentation	PEK_U01 PEK_U03 PEK_U04	Evaluation of final documentation. Grade: 2-5
F1 – final presentation	PEK_U01 PEK_U03 PEK_U04	Evaluation of final presentation. Grade: 2-5
F1 – final implementation	PEK_U01 PEK_U03	Evaluation of final implementation. Grade: 2-5
P1 – final project grade	PEK_U01 PEK_U03 PEK_U04	Average of partial grades.
P2 – final lecture grade	PEK_W01	Grade according to test result: <0%, 50%) : 2.0 <50%, 60%) : 3.0 <60%, 70%) : 3.5 <70%, 80%) : 4.0 <80%, 90%) : 4.5 <90%,100%) : 5.0
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] E. R. Davies: Machine Vision, Theory, Algorithms and Practicalities, Morgan Kaufmann Publishers, 2005.

[2] R. M. Rangayyan: Biomedical Image Analysis, Biomedical Engineering Series, CRC Press, 2004.

SECONDARY LITERATURE:

[1] R. Tadeusiewicz: Medical Image Understanding Technology, Springer Verlag, 2004.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr inż. Mariusz Paradowski, mariusz.paradowski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Vision systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Intelligent Information Systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2ISI_W03	C1, C2, C3	Lec1-Lec8	N1
PEK_U01 (skills)	K2INF_U08_S2ISI_U05	C2, C3	Proj1-Proj10	N1, N2, N3
PEK_U03	K2INF_U08_S2ISI_U05	C3	Proj7, Proj8, Proj11-Proj14	N1, N2, N3
PEK_U04	K2INF_U08_S2ISI_U05	C3	Proj15	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish … Techniki stymulacji twórczego myślenia …….
Name in English …… Creative Problem Solving **…….**
Main field of study (if applicable): … Computer Science **….**
Specialization (if applicable): …Intelligent Information Systems**..**
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time~~*
Kind of subject: obligatory / ~~optional / university-wide~~*
Subject code INZ3786
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					60
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					

Number of ECTS points					2
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes					1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_U16
2. K1INF_U05
3. K1INF_U12
4. K1INF_K03
5. K1INF_K06

\

SUBJECT OBJECTIVES

C1: Teaching students with creative problem solving.
C2: To familiarize students with the existing blockades of thought and ways to bypass them.
C3: To familiarize students with selected creative problem solving techniques.
C4: The acquisition of creative skills, group problem solving.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01: Understand the process of problem solving
PEK_W02: Students know creative techniques of problem solving
…
relating to skills:
PEK_U01: Can interact in a group to a creative solution to the problem.
PEK_U02: Can transmit knowledge in an interesting and understandable way for the audience.
…
relating to social competences:
PEK_K01: Can work in a team.
PEK_K02: Can find the necessary knowledge.
PEK_K03: It is open to the ideas of others.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1		
Lec 2		
Lec 3		
Lec 4		
Lec 5		
….		
	Total hours	

Form of classes - class	Number of hours

Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Organizational lecture. Discussion of the course and the requirements. The allocation of tasks to students. Discussion about what is creative thinking. Exercise for 'open mind'.	2
Sem 2	Knowledge representation in the brain, analog codes.	2
Sem 3	Gestalt principles of perception	2
Sem 4	Well and ill defined problems. Problem solving. Influence of the problem representation on the difficulty of solving.	2
Sem 5	Locks in mind.	2
Sem 6	Techniques of creative thinking stimulation - an overview	2
Sem 7	Mind mapping.	2
Sem 8	Brainstorming.	2
Sem 9	Morphological analysis.	2
Sem 10	Synectics.	2
Sem 11	6 hats.	2
Sem 12	Do It.	2
Sem 13	Technique proposed by students	2

Sem 14	The discussion on the effectiveness of various techniques practiced.	2
Sem 15	Summary of classes.	2
	Total hours	30

TEACHING TOOLS USED

N1. Presentations are supported by projector (multimedia presentations).
N2. E-learning system used for the publication of teaching materials, and documentation of presentations.
N3. Workshops - exercise of use selected creative problem solving techniques.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1- Content - related evaluation of the student's presentations	PEK_W01; PEK_W02;	Evaluation of the content matter, completeness of the knowledge. Student must understand the transmitted knowledge.
F2 - Evaluation of the way of presentation and/or conduct sessions/workshops that use considered technique to creatively solve the chosen problem.	PEK_W01; PEK_W02; PEK_U01; PEK_U02;	Evaluation of the adequate problem selection, preparation of the group to the session, a leader of the group.
F3 - Evaluation of the students' activity in the classroom		For the activity a student can receive points: 0 - inactive, passive listener; 1 - Active or 2 - outstanding activity. Up to 30 points can be achieved. The unjustified absence deducts two points, justified - one point. Rating F3 depends on the number of accumulated points: = <15 points: 2.0; 16-18 points: 3.0; 19-21 points: 3.5; 22-24 points: 4.0; 25-27 points: 4.5 28-30 points: 5.0
P1 – Final grade Sem		Final grade is an average of F1 – F3
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Scientific publications indicated by the teacher, mainly articles from scientific journals. For each topic will be designated primary literature, modified annually, so that was correct. Will be promoted independence in searching the literature not older than 3 years.
[2]

SECONDARY LITERATURE:

[1] An extensive collection of electronic resources - scientific publications - supplied by the lecturer of the seminar.
[2]
[3]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Halina Kwaśnicka halina.kwasnicka@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
… Creative Problem Solving **…**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
… Computer Science …..
AND SPECIALIZATION … Intelligent Information Systems …..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2ISI_W01;	C1, C2	Se1-Se5	N1, N2
PEK_W02	K2INF_W06_S2ISI_W01;	C3, C4	Se6-Se15	N1, N2, N3
…				
PEK_U01 (skills)	K1INF_U15;	C3, C4	Se6-Se15	N1, N2, N3
PEK_U02				
…				
PEK_K01 (competences)	K1INF_K03;	C3, C4	Se6-Se15	N1, N2, N3
PEK_K02	K1INF_K01;	C3, C4	Se6-Se15	N1, N2, N3
PEK_K03	K1INF_K03;	C3, C4	Se6-Se15	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: Teoria i inżynieria ruchu teleinformatycznego

Name in English: Theory and engineering of teletraffic

Main field of study (if applicable): Computer science

Specialization (if applicable): Teleinformatics

Level and form of studies: 2nd level, full-time

Kind of subject: obligatory

Subject code INZ3759

Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in	15			30	

University (ZZU)					
Number of hours of total student workload (CNPS)	30			90	
Form of crediting	Crediting with grade			Crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	1			3	
including number of ECTS points for practical (P) classes				3	
including number of ECTS points for direct teacher-student contact (BK) classes	0,6			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

13. Has a basic knowledge of ICT systems and computer communication networks (K1INF_W11).
14. Knows the basic methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_W16)
15. Can use the right tools to build a simple model of the process (the object), to formulate specific task analysis and decision making (K1INF_U15)
16. Can effectively use the methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_U16)
17. It has the ability to self-education, including in order to improve the professional competence (K1INF_U05)
18. Understands the need and knows the possibility of lifelong learning and to improve their professional and social competences (K1INF_K01)

SUBJECT OBJECTIVES

C1. Ordered, underpinned by theoretical knowledge of methods and techniques for transmitting signals using different modulation techniques, methods and techniques of information transmission, methods of organization and management of data communications traffic in the tasks of design and analysis of communication systems, methods of delivering service quality of ICT systems, analysis of quantitative and qualitative requirements and methods for sizing of distributed IT systems.

C2. Skills about the differences and benefits of the use of analog and digital data transmission techniques, the differences and benefits of the use of wired and wireless signal transmission techniques, developing the concept of using wired and wireless technologies in the basic applications of ICT systems, defining the qualitative and quantitative requirements of the user information and communication systems range of data, designing ICT solutions needed to achieve the qualitative and quantitative requirements of the user, using standards and solutions available on the market, estimating the cost of preparing and maintaining ICT solutions needed to achieve the qualitative and quantitative requirements, designing modernization of IT solutions needed to achieve the qualitative and quantitative requirements, identifying differences and similarities between solutions in a variety of applications (e-health, e-government and e-learning, in real-time systems, etc.).

C3. Skills for the design and analysis of complex, distributed ICT systems providing network services for distributed computer communication systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

K2INF_W02: Has a structured, theoretically founded essential knowledge of business modeling and requirements specification systems.

K2INF_W03: Has a structured, theoretically founded essential knowledge in the delivery of information distributed systems

K2INF_W06: Achieves results in the category of knowledge for specialty data communications

relating to skills:

K2INF_U05: Can - in formulating and solving engineering tasks - integrate knowledge of the fields of science and scientific disciplines relevant to the study being studied and applied a systemic approach, taking into account the non-technical aspects

K2INF_U06: Can solve the modeling, analysis and decision making for different types of objects

K2INF_U08: Achieves results and skills in areas of data exchange and computer communications systems

relating to social competences:

K2INF_K01: Can think and act in a creative and enterprising

K2INF_K02: Has aware of the social role of technical graduating, especially understands the need for the formulation and communication to the public, especially through the mass media, information and opinion on the achievements of technology and other aspects of engineering, shall endeavor to provide such information and opinions in a widely understood the reasons for the different points of view

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Classification of ICT systems from different points of view. Quality of Experience (QoE) and Quality of Service (QoS) in ICT systems with elastic and streaming traffic.	2
Lec 2	Introduction to queuing. Open and close networks of queues.	2
Lec 3	Queuing models of circuit-switched and packet-switched computer communication systems. Burke's theorem and Kleinrock approximation.	2
Lec 4	Access control, flow control and routing tasks formulation and solution in distributed environments.	2
Lec 5	Requirements analysis	1
Lec 6	Models (Poisson, Markov modulated, self-similarity, etc) of teletraffic and its application in traffic engineering tasks.	2
Lec 7	QoS delivery concepts: best effort, integrated services and differentiated services	2
Lec 8	New concepts of systems and networks - NXGN (Next Generation Networks) i NWGN (New Generation Network). Summary.	2
	Total hours	15

PROGRAMME CONTENT

Form of classes - project		Number of hours
Proj 1	Formulation design task based on the analysis of the literature, documentation, etc.	2
Proj 2	Justification for the choice task and purpose of the task design - an analysis of the expected benefits of the project task.	2
Proj 3	Quantitative requirements analysis for the communication system under design	2
Proj 4	Qualitative requirements analysis for the communication system under design	2
Proj 5	Analysis of state of the art on how to solve the task design	2
Proj 6	Analysis and selection of the task design methodology	2
Proj 7	Tools (methods, algorithms, procedures, software and hardware) analysis and selection required for the implementation of the project task	2
Proj 8	Implementation of prototype of modules solve the task	2
Proj 9	Prototype testing and evaluation	2
Proj 10	Modification of solutions using prototype test results	2
Proj 11	Integration of modules distinguished at the stages of requirements analysis and prototyping	2
Proj 12	Verification and testing of an integrated solution design task	2
Proj 13	Analysis of the possibility of extending the project tasks	2
Proj 14	Preparation of the presentation and documentation of the design task	2
Proj 15	Presentation of the results of the design task	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture supported by whole class multimedia presentations based on literature and open access and commercial sources.
N2. Student's own works – solving experiments and tasks in laboratory as well as homework.
N3. Student's own works – literature and open access sources studies.
N5. Collective works in laboratory
N5. Student's own works – preparation of presentations and technical documentations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05	Observation and verification of student activity. Solving the sample jobs.

	K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	
F1 – F15 (project)	K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and assessment of student autonomy.
P (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	Colloquium (course credit) in the evaluation of forming F1 (lecture)
P (project)	K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Total weighted ratings F1 - F15 (project) and the assessment for the presentation of the final results of the project.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[89] A.S. Tanenbaum, „Computer networks", Prentice Hall; 1996
[90] G. Pujolle, D. Seret, D. Dromard, E. Horlait, „Integrated Digital Communication Networks", J. Wiley & Sons
[91] B. Russell, „The art of computer networks", Prentice Hall; 2009
[92] V.S. Bagad, I.A. Dhotre, „Computer networks", Technical Publications, 2009.
[93] M. Roden, „Analog and digital communication systems", Prentice Hall
[94] http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

SECONDARY LITERATURE:

[51] S. Haykin, „Telecommunication systems", Prentice Hall, 1999.
[52] MIT Free Open Course Materials (http://ocw.mit.edu/index.htm)
[53] CCNA Exploration Network Fundamentals, Cisco Academy, PWN, 2008

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Adam Grzech, adam.grzech@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Theory and engineering of teletraffic

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer science

AND SPECIALIZATION
Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1, C2, C3	Lec 1 – Lec 8	N1, N4
PEK_W02	K2INF_W03	C1	Lec 1 – Lec 8	N1,N2, N4
PEK_W03	K2INF_W06	C1	Lec 1 – Lec 8	N1, N4
PEK_U01 (skills)	K2INF_U05	C1, C2, C3	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_U02	K2INF_U06	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_U03	K2INF_U08	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_K01 (competences)	K2INF_K01	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_K02	K2INF_K02	C1, C2	Lec 1 – Lec 8	N1, N2, N3, N4, N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Zaawansowane metody i techniki analizy danych
Name in English Advanced Methods and Techniques of Data Analysis
Main field of study (if applicable): computer science
Specialization (if applicable): …….
Level and form of studies: 2nd* level, full-time
Kind of subject: obligatory
Subject code INZ003758
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	crediting with grade*		crediting with grade*		

For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes	0		4		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of mathematics and mathematical statistics

\

SUBJECT OBJECTIVES

C1 Introduce the methods and techniques of the statistical data analysis to students
C2 Gather knowledge for Knowledge Discovery (Data Mining)
C3 Applying the gathered knowledge to drawing conclusions based on data analysis

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has a basic knowledge of Knowledge Discovery (Data Mining)
PEK_W02 student has a basic knowledge of statistical data analysis
PEK_W03 student is able to present differences between parametric and non-parametric tests

relating to skills:
PEK_U01 student is able to choose a proper statistical test
PEK_U02 student is able to draw conclusion from data analysis
PEK_U03 student is able to select a proper data mining method

relating to social competences:
PEK_K01 student is able to search and reuse the primary and secondary literature listed below and is able to gather the proper knowledge
PEK_K02 student understands the need for systematic and individual work in order to cover the scope of the course

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to knowledge discovery	2
Lec 2	Classification and Data Clustering	2
Lec 3	Clustering Algorithms	2
Lec 4	Discovering association rules	2
Lec 5	Statistics - basic notions	2
Lec 6	The selected problems of estimation theory	2
Lec 7	Introduction to verification of statistical hypothesis	2
Lec 8	Parametric tests for one population	2
Lec 9	Non-parametric tests for one population	2
Lec 10	Parametric tests for two populations	2
Lec 11	Non-parametric tests for two populations	2

Lec 12	Parametric tests for more than 2 populations	2
Lec 13	Non-parametric tests for more than 2 population	2
Lec 14	Correlation and regression methods	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Introduction to WEKA	2
Lab 2	Knowledge discovery in WEKA	8
Lab 3	Introduction to MATLAB	2
Lab 4	Statistical data analysis in MATLAB	8
Lab 5	Introduction to R	2
Lab 6	Statistical data analysis in R	8
	Total hours	30

Form of classes - project		**Number of**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Traditional lecture N2. Labs N3. One-to-one consultancy during stuff hours

N4. Student self-study

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P -laboratory	PEK_U01-PEK_U03, PEK_K01-PEK_K02	Evaluation of the prepared tasks during labs, oral test
P-lecture	PEK_W01-PEK_W03 PEK_K01-PEK_K02	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[95] M. Sobczyk: Statystyka, Wydawnictwo Naukowe PWN, 2007

[96] W.Krysicki, J.Bartos, W. Dyczka, K. Królikowska, M. Wasilewski: Statystyka, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, cz. 2 Statystyka matematyczna, Wydawnictwo Naukowe PWN, 2007

[97] Marek Walesiak, Eugeniusz Gatnar (Red. nauk.) :Statystyczna analiza danych z wykorzystaniem programu R, Wydawnictwo Naukowe PWN, 2009

[98] M. Korzyński: Metodyka eksperymentu Planowanie realizacja i statystyczne opracowanie wyników eksperymentów technologicznych, Wydawnictwo Naukowo-Techniczne 2006

[99] Nong Ye, : The Handbook of Data Mining, Lawrence Erlbaum Associates, Publishers, 2003

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Prof. dr hab. inż Ngoc Thanh Nguyen, Ngoc-Thanh.Nguyen@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Advanced Methods and Techniques of Data Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY computer science
AND SPECIALIZATION **……**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C2	Lec1-4 Lab1-2	N1-4
PEK_W02	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_W03	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_U01	K2INF_U01, K2INF_W06, K2INF_W08	C1	Lec5-14 Lab3-6	N1-4
PEK_U02	K2INF_U01, K2INF_W06, K2INF_W08	C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_U03	K2INF_U01, K2INF_W06, K2INF_W08	C2	Lec1-4 Lab1-2	N1-4
PEK_K01		C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_K02		C1, C2, C3	Lec1-14 Lab1-6	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish … Infrastruktura i badania Internetu ….
Name in English … Infrastructure and exploration of the Internet ….
Main field of study (if applicable): …Informatics….
Specialization (if applicable): ……..
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time~~*
Kind of subject: obligatory / ~~optional~~ / university-wide*
Subject code INZ3771
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	45		30		30
Number of hours of total student workload (CNPS)	120		90		60
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	4		3		2
including number of ECTS points for practical (P) classes	0		3		
including number of ECTS points for direct teacher-student contact (BK) classes	2,4		1,8		1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of local area networks.
2. Familiarity with Linux and Windows network operating systems.

\

SUBJECT OBJECTIVES

C1 Gaining knowledge of the organization and architecture of the Internet.
C2 Obtaining detailed knowledge of the implementation of the basic services on the Internet.
C3 Obtaining knowledge of modern Internet technologies.
C4 Understanding the sources of Internet performance degradation.
C5 Gaining practical skills to configure specialized software which control the basic operation of the Internet.
C6 Acquisition of the ability to perform measurements of parameters characterizing the state of the Internet.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Lists, defines and characterizes the essential elements of the Internet architecture and explains their functions.

PEK_W02 Knows and describes the mechanisms, protocols and algorithms used in the implementation of basic services of the Internet.

PEK_W03 Describes the operation and evaluates properties of modern Internet technologies

PEK_W04 Has an idea of the factors affecting the Internet activity.

relating to skills:

PEK_U01 Can plan a research experiment in the field of quality of the Internet activity and evaluate used methods and quality of Internet services.

PEK_U02 Can choose the means (methods and tools) and use them to study selected properties of the part of the Internet.

PEK_U03 Is able to assess the structure of the network and specify infrastructure requirements, and select and apply appropriate solutions for the realization of specific Internet services.

relating to social competences:

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction. The history of development, trends and the current state of the Internet. Internet architecture fundamentals. Internet Protocols.	3
Lec 2	The logical and physical structure of the Internet. Autonomous systems.	3
Lec 3	Routing internet traffic – issues and protocols.	3
Lec 4	Internet architecture at the operator level.	3
Lec 5	IPv6 protocol. IPv46 to IPv6 transition mechanisms.	3
Lec 6	Mobile Internet. IP Multicast.	1 2
Lec 7	Streaming. Multimedia services.	3
Lec 8	Issues of quality of service on the Internet.	3
Lec 9	Selected services and mechanisms of the modern Internet.	3
Lec 10	Sources of Internet performance degradation.	3
Lec 11	Delay measurements, transmission rate measurements	3
Lec 12	Discovering the structure of the Internet connection	3
Lec 13	Discovering geographic location	3
Lec 14	Performance testing on the example of web services	3
Lec 15	The use of measurements to model the Internet	3
	Total hours	45

Form of classes - class		**Number of hours**
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1	Discussion of the organization of classes and exercise program. Health and Safety Training. Presentation of teaching tools.	2
Lab 2	Preparation of tools, methods and scope of exploring of selected Internet parameters taking into account the geographic distance.	2
Lab 3	Carrying out the tests, and analysis and develop the results and conclusions of the experiment.	2
Lab 4	Preparation of tools, methods and scope of exploring of selected Internet parameters taking into account the structure of the network connections.	2
Lab 5	Carrying out the tests, and analysis and develop the results and conclusions of the experiment.	2
Lab 6	Preparation of tools, methods and scope of exploring Internet parameters using selected Internet distance evaluation methods.	2
Lab 7	Carrying out the tests, and analysis and develop the results and conclusions of the experiment.	2
Lab 8	Preparation of tools, methods and scope of research of selected Internet service.	2
Lab 9	Carrying out the tests, and analysis and develop the results and conclusions of the experiment.	2
Lab 10	Setting up and testing of the network at the autonomous systems level – part 1.	2
Lab 11	Setting up and testing of the network at the autonomous systems level – part 2.	2
Lab 12	Configuration and testing of IPv6 network.	2
Lab 13	Configuration and testing IPv4-to-IPv6 transition mechanisms.	2
Lab 14	Configuration and testing of IP multicast.	2
Lab 15	Summarization and final assessment of classes.	2
	Total hours	30

Form of classes - project		Number of hours
...		
	Total hours	

Form of classes - seminar		Number of hours
Sem1	Discussion and disposals of seminar topics. Discussion of the principles of seminar speech.	2
Sem2-Sem3	Low-level monitoring tools	4
Sem4-Sem6	Research and characteristics of the Internet topology at the AS level.	6
Sem7-Sem10	Research and characteristics of Internet links.	8
Sem11-Sem12	Methods and tools for internet geolocation.	4
Sem13-Sem14	Large-scale measurement systems	4
Sem15	Summarization and final assessment.	2

	Total hours	30

TEACHING TOOLS USED
N1. Lecture supported by multimedia presentations. N2. Lab aids. N3. Network equipment and specialized software of selected Internet technologies. N4. The e-learning system for publication of teaching materials, exercises, announcements and collection and evaluation of student work, as well as for testing of acquired knowledge. N2. Developing own reports on a given topic in the field of the course.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 – Lab3	PEK_U01, PEK_U02	Assessment of the completeness and quality of the laboratory exercise. Scoring 0÷10.
F2 – Lab5	PEK_U01, PEK_U02	Assessment of the completeness and quality of the laboratory exercise. Scoring 0÷10.
F3 – Lab7	PEK_U01, PEK_U02	Assessment of the completeness and quality of the laboratory exercise. Scoring 0÷10.
F4 – Lab9	PEK_U01, PEK_U02	Assessment of the completeness and quality of the laboratory exercise. Scoring 0÷10.
F5 – Lab11	PEK_U03	Assessment of the completeness and quality of the laboratory exercise. Scoring 0÷10.
F6 – Lab12	PEK_U03	The written test of skills. Scoring 0÷10
F7 – Lab13	PEK_U03	Assessment of the completeness and quality of the laboratory exercise. Scoring 0÷10.
F8 – Lab14	PEK_U03	Assessment of the completeness and quality of the laboratory exercise. Scoring 0÷10.
P1 – Lab15 - the final evaluation of the laboratory.	PEK_U01, PEK_U02, PEK_U03	The rate determined on the basis of the total points of forming ratings F1 to F8 according to the formula: - less than 50% of the points – 2.0 (insufficient) [50%, 60%) – 3.0 (sufficient) [60%, 70%) – 3.5 (sufficient+) [70%, 80%) – 4.0 (good) [80%, 90%) – 4.5 (good+) [90%, 100%) – 5.0 (very good) 100% – 5.5 (excellent)
F9 – Sem2-Sem14	PEK_W01, PEK_W03, PEK_W04	Attendance at the seminar. Scoring 0÷5.
F10 – Sem2-Sem14	PEK_W01, PEK_W03, PEK_W04	Evaluation of activity in the classroom (discussion on presentations). Scoring 0÷5.

F11 – own speech at the seminar	PEK_W01, PEK_W03, PEK_W04	Assessment of the substantive content of the speech, selection and completeness of sources, and the implementation of the presentation. Scoring 0÷10.
P2 – the final evaluation of the seminar	PEK_W01, PEK_W03, PEK_W04	The rate determined on the basis of the total points of forming ratings F9 to F11. The grading scale such as for P1.
P3 – the final evaluation of the lecture	PEK_W01, PEK_W02, PEK_W03, PEK_W04	Test of knowledge – exam (written or electronic using the e-learning system). Score points obtained from the test. The grading scale such as for P1.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[100] IBM Redbooks: TCP/IP Tutorial and Technical Overview, 2006.
[101] S. Halabi, D. McPherson: Internet Routing Architectures, Cisco Press, 2000.
[102] T. Lammle: CCNA: Cisco Certified Network Asociate – Study Guide, (Exam 640-802), Wiley Publishing, 2007
[103] T. Lammle, S. Odom, K. Wallace: CCNP: Cisco Certified Network Professional – Study Guide, Sybex Inc., 2001
[104] R. Steinmetz, K. Wehrle: Peer-to-Peer Systems and Applications, LNCS 3485, Springer, 2005.
[105] M. Crovella, B. Krishnamurthy: Internet Measurement: Infrastructure, Traffic and Applications, Wiley, 2006.
[106] RFC documents.

SECONDARY LITERATURE:

[1] J. Doyle, J. Carroll: Routing TCP/IP, Cisco Press, 2005.
[2] IBM Redbooks: IP Network Design Guide, 1999.
[3] Krishnamurthy B., J. Rexford, Web Protocols and Practice. Addison-Wesley Boston 2001.
[4] A. S. Tanenbaum: Sieci komputerowe, Helion, 2004.
[5] Buford J. Yu H., Lua E.K.: P2P Networking and Applications, Morgan Kaufman 2009
[6] M. Hofmann, L. R. Beaumont: Content Networking: Architecture, Protocols, and Practice, Morgan Kaufmann, 2005.
[7] Internet documents of network technologies providers.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Mariusz Fraś, mariusz.fras@pwr.wroc.pl
Ziemowit Nowak, ziemowit.nowak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Infrastructure and exploration of the Internet
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2ITM_W02	C1	Lec1, Lec2, Lec4	N1, N4

PEK_W02	K2INF_W06_S2ITM_W02	C2	Lec1, Lec3,…,Lec6	N1, N4
PEK_W03	K2INF_W06_S2ITM_W02	C3	Lec5,…,Lec9,	N1, N4
PEK_W04	K2INF_W06_S2ITM_W02	C4	Lec10,…,Lec15	N1, N4
PEK_U01 (skills)	K2INF_U08_S2ITM_U01, K2INF_U08_S2ITM_U04	C6	Lab1,…,Lab9	N2, N3
PEK_U02	K2INF_U08_S2ITM_U01, K2INF_U08_S2ITM_U04	C6	Lab1,…,Lab9 Sem2,…Sem15	N2, N3, N5
PEK_U03	K2INF_U08_S2ITM_U03, K2INF_U08_S2ITM_U06	C5	Lab10,…,Lab15	N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Metodologia badań naukowych
Name in English Methodology of empirical sciences…….
Main field of study (if applicable): Informatics…….
Specialization (if applicable): ……..
Level and form of studies: 2nd* level, full-time /
Kind of subject: obligatory /
Subject code INZ003763……
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	0	0	0	0
Number of hours of total student workload (CNPS)	90	0	0	0	0
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3				
including number of ECTS points for practical (P) classes	0				
including number of ECTS points for direct teacher-student contact (BK) classes	1,8				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Competence in basic algebra
2. Competence in mathematical analysis
3. Differential equations

\

SUBJECT OBJECTIVES

C1 Knowledge on the methodological postulates
C2Competence in mathematical modeling on the base of methodology of empirical sciences
C3Competence in hypothesis testing
C4Competence in creation of homogeneous and invariant in relation to the system of units models

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01Knowledge on methodological postulates
PEK_W02Logical postulates of mathematical models construction (invariance and homogeneity)
PEK_WOO3Logical base of hypothesis testing

…
relating to skills:
PEK_U01Competence in mathematical modeling with accordance to methodological postulates
PEK_U02Competence in hypothesis and empirical models testing
…
relating to social competences:
PEK_K01Competence in the exactness of process description
PEK_K02Competence on ability of studying and reflection on experiment

PROGRAMME CONTENT

Form of classes - lecture		**Number of**
Lec 1Methods of scientific and technical project validation on the base of citation analysis	2	
Lec 2Methodological postulates of determinism, closed system, interconnectedness, simplicity and Popper's condition of falsification	2	
Lec 3Classical theory of measurements and the postulate of uniquenes	2	
Lec 4Dimensionally invariant description of a process, dimensional space	2	
Lec 5Theorem Pi of dimensional analysis and examples of its applications	2	
Lec 6Applications of theorem Pi in: models construction, experiment planning, identification	2	
Lec 7Theory of similarity	2	
Lec 8Invariance of models in relation to rotations group, tensors homogeneity	2	
Lec 9 Models testing and falsification of hypothesis	2	
Lec 10Identification of mathematical models	2	
Lec 11Multistage identification, models interpretability	2	
Lec 12Description of models construction	2	
Lec 13Models testing	2	

	2	
	Total hours26	Plus 2 colloqiums

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1.Literature N2.Examples analysis N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1P-1colloquium evaluation	WO1,WO2	Evaluation of students work
F2P-2colloquium evaluation	UO1,UO2	Evaluation of examples solving
F3		
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J.M. Bochenski The methods of contemporary thought. Harper Torchbooks, NY,1968
[2] W.Kasprzak, B. Lysik, M.Rybaczuk Measurements, Dimensions, Invariant Models and Fractals Spolom Wroclaw Lviv 2004
[3]
[4]

SECONDARY LITERATURE:

[1] K. R. Popper The logic of Scientific Discovery. Hutchinson Publ. Comp. 1959
[2]
[3]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Waclaw Kasprzak waclaw.kasprzak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Methodology of empirical sciences……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_WO1	Methodology basis	K1,K2,K3	N1,N2,P1
PEK_W02	K2INF_WO6	Models testing	K4,K13	P1
…				
…				
PEK_U01 (skills)	K2INF_UO6	Construction of models	K5,K6,K7	N1,N2,P2
PEK_U02	K2INF_UO8	Hyothesis testing	K8,K13	N1,N2,P2
…				
PEK_K01 (competences)	K_2SWD_KO1		K2	N1,N2
PEK_K02	K2_SWD_KO2		K13	N1,N2,P2
…				

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Modelowanie i analiza systemów webowych
Name in English *Modeling and Analysis of Web Systems*
Main field of study (if applicable): Informatics
Specialization (if applicable): Internet and Mobile Technologies
Level and form of studies: 1st/ ~~2nd~~* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ003769
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		15		
Number of hours of total student workload (CNPS)	90		60		
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points	3		2		
including number of ECTS points for practical (P) classes			2		
including number of ECTS points for direct teacher-student contact (BK) classes	1,8		1,2		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge of advanced methods and techniques of data analysis
2 Knowledge of the basics of the Internet and Web-based systems
3 Knowledge of the basics of simulation systems

\

SUBJECT OBJECTIVES

C1 familiarize students with current knowledge in the field of Web-based systems modeling
C2 familiarize students with current knowledge in the field of forecasting efficiency of web data mining methods
C3 Presentation of the problems associated with the use of methods of spatial predictions about the performance of web systems
C4 Gain skills of students in characterization of issues from different fields and their spatial modeling and performance prediction.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 has detailed knowledge of the underpinnings of theory and knows the methods and tools and can solve complex tasks of modeling and analysis of web-based systems
relating to skills:
PEK_U01 It can be used to formulate and solve tasks and research problems of varying difficulty, on Web-based systems, simulation and experimental methods, as well as to evaluate their suitability.
PEK_U02 Can formulate and test hypotheses related to the problems of engineering and simple research problems, knows how to select and use appropriate techniques and technologies for the implementation of IT solutions in the field of studying a field, he can make a critical analysis of the course of action being developed solutions and propose improvements to the techniques
relating to social competences:
PEK_K01 recognizes the need to use these methods for modeling and data analysis in order to assess the performance of Web-based systems
PEK_K02 Identifies the use of spatial forecasting methods in other fields and technology

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction to the course. Description of the course, the organization of classes and examination. Introduction of the basic concepts. Problem modeling and analysis of web-based systems. Methods and tools for modeling and analysis of web systems. Performance prediction of Web-based systems - approaches and	2

	methods of solutions. Discussion of student assignments.	
Lec 2	The methodology and algorithms for efficient getting of web resources.	2
Lec 3	Review of methods of spatial econometrics. Presentation of the exemplary applications of these methods by using OpenGeoDa.	2
Lec 4	Introduction to geostatistics, familiar with the terminology, a discussion of the distribution methods and their application. Variogram and covariance functions and a discussion of theoretical models for their approximation.	2
Lec 5	Discussion of methods of interpolation and estimation.	2
Lec 6	Discussion of simulation methods (Turning Bands and Sequential Gaussian Simulation).	2
Lec 7	Presentation of examples of applications of simulation methods to predict the performance of the Internet with the help of selected software tool.	2
Lec 8	MWING measurement environment. Experiments measuring.	2
Lec 9	Prediction of time to download web resources using data mining methods. Sample results of the study.	2
Lec 10	Modeling and analysis of local distribution of http requests.	2
Lec 11	Modeling and analysis of the global distribution of http requests.	2
Lec 12	Modeling and analysis of system admission control and scheduling of http requests on the web server.	2
Lec 13	Modeling and analysis of web server management using auction algorithms.	2
Lec 14	Overview and discussion of current research topics of modeling and analysis of web-based systems.	2
Lec 15	Discussion of student assignments, preparation for the exam	2
	Total hours	30

Form of classes - class		**Number of hours**
Lab 1	Organisational Assessment and literature. Reminder of C + + language and introduction to the CSIM package.	2
Lab 2	Streams (generators) of random numbers. Objects in CSIM: processes, facility, event, tables.	2

Lab 3	Queuing networks. M/M/1 queue and M / M / N.	2
Lab 4	M/M/1 queue simulation using Markov chain.	2
Lab 5	Server farm with JSQ routing.	2
Lab 6	The Fork-Join queuing.	2
Lab 7	Generating synthetic trace file.	2
Lab 8	Credits	1
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
	Total hours	

Form of classes - seminar			Number of hours
	Total hours		

TEACHING TOOLS USED
N1. Lectures supported by multimedia presentations N2. Documentation manufacturers web infrastructure N3 Scientific and technical publications N4. E-learning system used for publication of teaching materials or announcements, collection and assessment of student work N5. Additional consultations for students.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P1 (Lab)	PEK_U01, PEK_U02	Evaluation of the work at the laboratory (observation of student activities. Brief individual interview on current laboratory practice (demonstration program, the results of its operations and applications), report.
P2 (Lec)	PEK_W01, PEK_U01-2, PEK_K01-2	Examination of the course or development problem made by the student on an assigned topic or research on the subject of the object.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Menasce D.A., Almeida V.A.F., *Capacity planning for Web performance. Metrics, models, and methods*, Prentice Hall PTR, New Jersey, 2002.

[2] Colajanni M., Yu P.S., Cardellini V., *Scalable Web-Server systems: architectures, models and load balancing algorithms*, SIGMETRICS, 2000

[3] Readings proposed by lectures and instructors

SECONDARY LITERATURE:

[1] Rak T., *Modelowanie i analiza interaktywnych systemów internetowych realizujących obsługę szybkozmiennych ofert*, rozprawa doktorska, AGH, Kraków 2007
[2] Zatwrnicki K., Zatwarnicka A., *Budowa symulatora serwisu webowego z wykorzystaniem pakietu CSIM* , Zeszyty 2004
[3] H-C. Lin, C.S. Raghavendra, *An Analysis of the Join the Shortest Queue (JSQ) Plicy*, IEEE, 1992
[4] V. Gupta, M. Harchol-Balter, K. Sigman, W. Whitt, *Insensitivity for PS server farms with JSQ routing*, IFIP, Cologne, Germany, 2007
[5] Kim, C., Agrawala, A. K. (Feb. 1989). *Analysis of the Fork-Join Queue*. IEEE Transactions on Computers 38 (2): 250–255
[6] Lebrecht, Abigail; Knottenbelt, William J. (June 2007). Response Time Approximations in Fork-Join Queue. 23rd Annual UK Performance Engineering Workshop (UKPEW).
[7] Serfozo, Richard (2009). Basics of Applied Stochastic Processes. Springer. p. 78–80
[8] Yan Hu, Dah-Ming Chiu, John C. S. Lui, *Entropy Based Adaptive Flow Aggregation.* IEEE/ACM Transactions on Networking, 2007.
[9] Yan Hu, Dah-Ming Chiu, John C. S. Lui, Adaptive Flow Aggregation - *A New Solution for Robust Flow Monitoring under Security Attacks.* *http://www.docstoc.com/docs/80768213/*

[10] Tutorial: *Getting Started: CSIM19 Simulation Engine (C++ Version)*, Mesquite Software, Inc.

[11] Mesquite Software, Inc.: *http://www.mesquite.com/*

[12] Geostatistical tools

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. inż. Leszek Borzemski, leszek.borzemski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Modeling and Analysis of Web Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
AND SPECIALIZATION **Internet and Mobile Technologies**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W06_S2ITM_W01	C1, C4	Lec1-15, Lab1-8	N1, N2, N3, N4, N5
PEK_U01	K2INF_U08_S2ITM_U02	C3, C4	Lec1-15, Lab1-8	N1, N2, N3, N4, N5
PEK_U02	K2INF_U08_S2ITM_U06	C3, C4	Lec1-15, Lab1-8	N1, N2, N3, N4, N5
PEK_K01	K2INF_U08_S2ITM_K01	C1, C2, C3,C4	Lec1-15, Lab1-8	N1, N2, N3, N4, N5
PEK_K02	K2INF_U08_S2ITM_K02	C1, C2, C3, C4	Lec1-15, Lab1-8	N1, N2, N3, N4, N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: Informatics and Management

SUBJECT CARD

Name in Polish: Modelowanie i analiza biznesowa
Name in English: Modeling and business analysis
Main field of study (if applicable): Informatics
Specialization (if applicable): Computer Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ3760
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	30			
Number of hours of total student workload (CNPS)	60	90			

Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2	3			
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	1,8			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

12. Practice in object-oriented programming.
13. Basic knowledge of software engineering.

\

SUBJECT OBJECTIVES

C1. Basic knowledge in the area of software system modeling with the stress on business modeling as the initial phase of the software development process.
C2. Basic knowledge in the area of the requirements specification.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEK_W01: Students have basic knowledge on business modeling.
PEK_W02: Students know and understand the role of specification requirements.
PEK_W03: Students have basic knowledge on selected modeling languages.

Relating to skills:
PEK_U01: Students, in cooperation with domain experts, can construct and analyze business models.
PEK_U02: Students can build models of system requirements.

Relating to social competences:
PEK_K01: Students are able to cooperate with representatives of application domain.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Basic notions for software development cycle. Survey of modeling languages – UML and BPMN.	2
Lec 2	Class diagrams – classes, associations, generalizations.	2
Lec 3	Validation and verification.	1
Lec 4	Object Constraint Language.	2
Lec 5	UML activity diagrams.	2

Lec 6	BPMN process diagrams.	2
Lec 7	UML statechart diagrams.	2
Lec 8	System requirements; use case diagrams.	2
	Total hours	15

Form of classes - class		Number of hours
Cl 1	Construction and analysis of simple class diagrams.	2
Cl 2	Construction and analysis of advanced class diagrams.	2
Cl 3	Analysis of textual descriptions of exemplary application domains – structural aspect (1).	2
Cl 4	Analysis of textual descriptions of exemplary application domains – structural aspect (2).	2
Cl 5	Case study – an example of structural modeling.	2
Cl 6	Construction and analysis of OCL constraints imposed on diagrams.	2
Cl 7	Test 1.	2
Cl 8	Analysis of textual descriptions of exemplary application domains – structural and behavior aspect.	2
Cl 9	Analysis of simple BPMN diagrams.	2
Cl 10	Construction of simple BPMN diagrams.	2
Cl 11	Construction and analysis of advanced BPMN diagrams.	2
Cl 12	Construction and analysis of simple state diagrams.	2
Cl 12	Construction and analysis of advanced state diagrams..	2
Cl 13	Construction and analysis of use case diagrams.	2
Cl 14	Test 2.	2
Cl 15	Corrective test.	2
	Total hours	30

TEACHING TOOLS USED

N1. Lecturer's presentation at a blackboard, supported by a multimedia presentation using a laptop and a projector.
N2. Individual search and study of literature and Internet sources.
N3. Access to teaching materials published in the local area network.
N4. Individual consultations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement

F1	PEK_W01 PEK_U01 PEK_K01	Each student gets 1 point for own solution of a problem from the list of problems for the given class.
F2	PEK_W01 PEK_W02 PEK_U01 PEK_U02 PEK_K01	Each student gets up to 10 points for own solution of problems for the given test (intermediate and final).
F3	PEK_W01 PEK_W02 PEK_W03 PEK_U01 PEK_U02 PEK_K01	The final evaluation for the classes is determined on the basis of total marks obtained by the student's activity for exercise (F1) and colloquia (F2). Positive mark is awarded to a student who has obtained at least 4 points for each of the symposia and has won a total of 10 points. If this condition is met, the number of points P is the basis for evaluation in accordance with the following table: P: 10 | 12 | 14 | 16 | 18 Mark: 3.0 | 3.5 | 4.0 | 4.5 | 5.0 Students who get at least a very good grade are exempt from the examination with the same mark as for the classes.

C: The final evaluation of the course is determined based on the results of the examination. The examination lasts two hours and consists of a set of tasks, the total number of 20 points. The condition for a positive assessment of the final exam is to get 10 points and a positive final evaluation of the exercise.

The final evaluation of the examination is determined in accordance with the following table:

Points	10	12	14	16	18
Mark	3.0	3.5	4.0	4.5	5.0

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[16] Rumbaugh J., Jacobson I., Booch G., *The Unified Modeling Language – Reference Manual*. Second edition, Addison-Wesley, 2005.

[17] Weilkiens T., Oestereich B., *UML 2 Certification Guide. Fundamental and Intermediate Exams*, Elsevier 2007.

[18] Maciaszek L. A., *Requirements Analysis and System Design*, Second edition, Pearson, Addison-Wesley, 2005.

[19] Adolph S., Bramble P., *Patterns for Effective Use Cases,* Addison-Wesley, 2003

[20] Gašević D., Djurić D., Devedžić V., *Model Driven Architecture and Ontology Development*, Springer, 2006.

SECONDARY LITERATURE:

[107] Graessle P., Baumann H., Baumann P., *UML 2.0 w akcji. Przewodnik oparty na projektach*, Helion, 2006.

[108] Object Management Group, Unified Modeling Language (available on the website: www.omg.com).

[109] Object Management Group, System Modeling Language SysML (available on the website: www.omg.com).

[110] Object Management Group, Business Process Modeling Notation BPMN (available on the website: www.omg.com).

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
Zbigniew Huzar, zbigniew.huzar@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems Modeling and Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION
Computer Engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W02	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W03	K2INF_W03		Lec1-Lec8	N1, N2, N3, N4
PEK_U01 (skills)	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_U02	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_K01 (competences)	K2_SWD_K01	C1, C2	Lec1-Lec15 Cl1-Cl15	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from the table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa I
Name in English MSc Thesis I
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code INZ003818
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				60	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points				2	
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes				0,6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 2rd semester

\

SUBJECT OBJECTIVES

C1 Preparation of students to write a master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology, with special attention of all stages of writing a thesis.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Preparation of students to write a master thesis according the internal	

	requirements of Faculty of Computer Science and Management (Computer Science field of study), Wrocław University of Technology, with special attention of all stages of writing a thesis. Literature studies, selection and learning of systems, tools, methods and algorithms needed for the realization of the chosen subject of thesis. The preparation of an outline of work and schedule of future work. Basic work on the research, design and implementation. Familiarization with the research works carried out at the Institute of Informatics. Final results: the initial solution and / or the prototype of developed system, knowledge about the current state of art in the field of thesis, an outline of future work and timetable for further works documented in English and Polish languages.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED
N1. Literature study - analysis of publications (including websites) related to subject of thesis, including the research works of the Institute of Informatics. N2. Own work, independent research on the tasks defined in the master's thesis N3. Student consultation with the supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessment based on the final results achieved

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[111] Literature related to the scope of realized project selected by student and recommended by the teacher.

[112] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis I
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U03, K2INF_U08	C1	Pr1	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa II
Name in English MSc Thesis II
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005221
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				540	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points				18	
including number of ECTS points for practical (P) classes				18	
including number of ECTS points for direct teacher-student contact (BK) classes				6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 4th semester

\

SUBJECT OBJECTIVES

C1 Preparation of master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish language, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes – project		**Number of hours**
Proj 1	Subject is the main component of the process of realization the master thesis and involves the preparation by the student his master thesis. Master thesis is done under the direction of his supervisor, with whom student defines its scope, goals, tasks and timetable for implementation.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED

N1. Preparation of master thesis N2. The text of the master thesis N3. Thesis review prepared by the supervisor N4. Students consultation with supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of master thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessed is the final text of the diploma thesis. The assessment is carried out in the form of a review done by the promoter. The condition to pass the course is delivering the final text of master thesis before the defined deadline. The second review, which does not, however the condition for pass the course is done by the reviewer appointed by the Faculty Dean. Reviews are made according to the standard format. The student is admitted to the defense (final exam) if both reviews are positive

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[113] Literature related to the scope of realized project selected by student and recommended by the teacher.

[114] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis II
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K1INF_U03, K2INF_U08	C1	Proj1	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY of **Computer Science and Management**/ DEPARTMENT……

SUBJECT CARD

Name in Polish: Programowanie równoległe i rozproszone
Name in English: Parallel and Distributed Programming
Main field of study (if applicable): Informatics
Specialization (if applicable): Internet and Mobile Technologies
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part time~~*
Kind of subject: ~~obligatory /~~ optional~~ / university-wide*~~
Subject code INZ3774
Group of courses ~~YES /~~ NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	90		90		
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	**3**		3		
including number of ECTS points for practical (P) classes	0		3		
including number of ECTS points for direct teacher-student contact (BK) classes	1,8		1,8		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

8. Basic knowledge on computer organization and parallel and distributed processing
9. Programming skills at C/C++ programming language

\

SUBJECT OBJECTIVES

C1 Acquainting students with different environments that allow parallel processing
C2 Acquainting students with the basic parallel algorithms
C3 Acquainting students with different techniques used during program parallelization
C4 Acquainting students with different parallel computer architectures
C5 Acquisition of the ability to choose the most suitable parallel architecture to the solved problem
C6 Acquisition of the ability of parallel programming using different environments

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 He knows different environments that allow parallel processing.
PEK_W02 He knows basic parallel algorithms
PEK_W03 He knows different approaches to program parallelization
PEK_W04 He knows different parallel computer architectures

relating to skills:
PEK_U01 He is able to choose the most convenient parallel environment to solved problem
PEK_U02 He is able to write programs under different parallel and distributed environmen

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Parallel and distributed computing - basic definitions. Taxonomy of parallel computers. Shared-memory and distributed memory Computers. Static and dynamic interconnection networks, typical topologies.	2
Lec 2	MPI standard. Message passing communication – basic concepts. Collective communication algorithms ("one-to-all", "all-to-all" and others) for different communication network topologies.	2
Lec 3	Parallel matrix multiplication and parallel sorting algorithms	2
Lec 4	Evaluations of parallel systems (algorithms): computational complexity, speedup, efficiency, scalability of parallel systems. Amdhal and Gustafson laws. Using granularity for parallel program evaluation.	2
Lec 5	Parallelization and vectorization techniques. Data dependencies in sequential programs and the ways of its elimination.	2
Lec 6	Parallel graph and search algorithms	2
Lec 7	Loop parallelizing (transformation) techniques. Loop carried dependence.	2
Lec 8	Automatic program parallelization. Loop carried dependence tests (exact, inexact).	2
Lec 9	Architecture and programming of GPU. Programming in CUDA environment	2
Lec 10	Load balancing, task mapping and task scheduling in parallel distributed environments	2

Lec 11	Parallel programming for multicore processors.	2
Lec 12	Parallel and distributed processing environments: shared memory parallel processing, message passing and client-server models.	2
Lec 13	Explicit\implicit parallel programming languages, shared\distributed memory programming paradigms, data and algorithm parallelism.	2
Lec 14	Parallel program design methodology	2
Lec 15	New trends in parallel and distributed computing	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab1	Presentation of lab scope, presentation of grading principles, training from health and safety at work. Familiarization with used at laboratory MPI execution environment.	2
Lab2	Testing execution environment, running simple programs that implement communication between two processors in MPI environment and group communication.	2
Lab3	Implementation of simple algorithm in MPI environment.	2
Lab4	Implementation of chosen parallel matrix multiplication or sorting algorithm, carrying out the tests for different data, calculation of speedup.	2
Lab5	Scalability analysis of the algorithm implemented in the framework of Lab4, practical verification of algorithm scalability	2
Lab6	Performance evaluation using the concept of granularity (lab4).	2
Lab7	Presentation results of experiments performed during lab 4 to lab6	2
Lab8	Implementation of chosen loop transformation techniques (loop parallelizing) in MPI environment.	2
Lab9	Performance analysis of implemented loop transformation (lab8) using the traditional method and by analyzing of its granularity	2
Lab10	Presentation results of experiments performed during lab 8 to lab9	2
Lab11	Familiarization with CUDA environment, running simple programs.	2
Lab12	Implementation of chosen algorithm that used shared memory at GPU, carrying out the tests and calculation of speedup	2
Lab13	Implementation of chosen algorithm with data parallelism in CUDA environment, calculation of speedup.	2
Lab14	Scalability analysis of the algorithm implemented in the framework of Lab13, practical verification of algorithm scalability	2
Lab15	Presentation results of experiments performed during lab 13 to lab14	2
	Total hours	30

Form of classes - project		**Number of hours**
Proj1		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem1		

	Total hours	

TEACHING TOOLS USED

N1. Lecture supported by multimedia presentations (slideshow)
N2. Cluster of computers running under MPI
N3. GPU server with CUDA environment

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation(F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 – (lecture)	PEK_W01 PEK_W02 PEK_W03 PEK_W04	Test and quizzes during the lecture, student activity during the lecture, students answering on questions during lecture.
F2 – (laboratory)	PEK_U01 PEK_U02	Checking of student preparation for exercise realization, assessment the reports of the exercises. Evaluation of the quality of submitted by students programs and prepared presentations (point allocated).
P - the final grade from lecture will be issued on the basic of partial grades (points) received from the test (T) and quizzes (Q) as follows: Grade = 20% * Q + 80% *T. The final grade from the laboratory will be issued on the basis of partial grades (points) obtained from all exercises.		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[115] Kumar Vipin, Grama Ananth, Gupta Anshul, Karypis George "Introduction to Parallel Computing" The Benjamin/Cumming Publishing Company, Inc.

[116] B. Wilkinson, M. Allen, “Parallel Programming, Prentice Hall, 2005

[117] Writing Message-Passing Parallel Programs with MPI, Course Notes, http://www.zib.de/zibdoc/mpikurs/mpi-course.pdf

[118] Peter Pacheco, Parallel Programming with MPI, Morgan Kaufmann Pub. http://www.cs.usfca.edu/~peter/ppmpi/

[119] Zbigniew Czech, Wprowadzenie do obliczeń równoległych, PWN, Warszawa 2010

[120] CUDA documentation

[121] Different microprocessors documentation

SECONDARY LITERATURE:

[1] Karbowski, E. Niewiadomska-Szynkiewicz, "Obliczenia Równoległe i Rozproszone", Wyd. Politechniki Warszawskiej, 2001

[2] Ian Foster, Designing and Building Parallel Programs, http://www.mcs.anl.gov/~itf/dbpp/

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr inż. Jan Kwiatkowski, jan.kwiatkowski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Parallel and Distributed Programming
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **Internet and Mobile Technologies**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06	C1	Lec2, Lec 12, Lec 13, Lec 15	N1
PEK_W02	K2INF_W06	C2	Lec 3, Lec 6	N1
PEK_W03	K2INF_W06	C3	Lec 5, Lec 7, Lec 8, Lec 11, Lec 14	N1
PEK_W04	K2INF_W06	C4	Lec 1, Lec 9, Lec 15	N1
PEK_U01 (skills)	K2INF_U08	C5	Lab1, Lab5, Lab6, Lab7, Lab8, Lab9, Lab10, Lab14, Lab15, Lec 4, Lec 10	N1, N2, N3
PEK_U02	K2INF_U08	C6	Lab2, Lab3, Lab4, Lab11, Lab12, Lab13	N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: Projekt zespołowy.
Name in English: Team project.
Main field of study (if applicable): …….
Specialization (if applicable): …….
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part time~~*
Kind of subject: ~~obligatory~~ / optional / ~~university wide~~*
Subject code …….
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)				45	
Number of hours of total student workload (CNPS)				240	
Form of crediting	Examination / ~~crediting with grade~~*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course				X	

Number of ECTS points				8	
including number of ECTS points for practical (P) classes				8	
including number of ECTS points for direct teacher-student contact (BK) classes				4,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Ability to program in selected popular computer language.
2. Ability to install and configure the development environment.

\

SUBJECT OBJECTIVES

C1 Ability to collaborate in a group throughout the semester.
C2 Practical ability of analysis of user's expectations.
C3 Ability to convert the user's expectations into functionality of the application of information engineering the Internet, distributed or parallel systems.
C4 Ability to split the functionality of the application into programming tasks.
C5 Ability of scheduling technique adopted in the framework of teamwork.
C6 Ability to proper assign tasks to team members
C7 Ability of critical discussion on the team over achieved partial results.
C8 Gaining knowledge about computing methods and techniques used in the teamwork.
C9 Ability to develop project documentation and applications.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

Relating to skills:
K2INF_U08_S2ITM_U05
K2INF_U08_S2ITM_U06
K2INF_U08_S2ITM_U07

PROGRAMME CONTENT

Form of classes – lecture		Number of hours
Lec 1		
Lec 2		
Lec 3		
…		
	Total hours	

Form of classes – class		Number of hours
Cl 1		
Cl 2		
Cl 3		

…		
	Total hours	

Form of classes – laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
…		
	Total hours	

Form of classes – project		Number of hours
Proj 1	Developing a project vision, learning of team management system.	3
Proj 2	Determination of features that will be developed in the first edition of the project and its implementation. Continuous verification of progress.	15
Proj 3	Presentation of the first edition of the project. Critical analysis of the implementation, problems and suggest ways to resolve them.	3
Proj 4	Determination of features that will be developed in the second edition of the project and its implementation. Continuous verification of progress.	15
Proj 5	Presentation of the second edition of the project. Critical analysis of the implementation, performance assessment and conclusions.	3
Proj 6	Completion of the implementation, development of final documentation	3
	Total hours	45

Form of classes – seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Group and team discussion of computer design. N2. Computer team management system. N3. Additional consultations for interested students

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), E – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	K2INF_U08_S2ITM_U05 K2INF_U08_S2ITM_U06 K2INF_U08_S2ITM_U07	Observation of group work in the first half of the semester, both in the classroom and through collaboration tool. Discussion of the solutions chosen by the group.
F2	K2INF_U08_S2ITM_U05 K2INF_U08_S2ITM_U07	Rate of presentation and teamwork effects shown.

F3	K2INF_U08_S2ITM_U05 K2INF_U08_S2ITM_U06 K2INF_U08_S2ITM_U07	Observation of group work in the second half of the semester, both in the classroom and through collaboration tool. Discussion of the solutions chosen by the group.
E	K2INF_U08_S2ITM_U05 K2INF_U08_S2ITM_U06 K2INF_U08_S2ITM_U07	Assessment of the application, its features, implementation, documentation prepared, engagement team members

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: **SECONDARY LITERATURE:**
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
Dr inż. Dariusz Konieczny dariusz.konieczny@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
K2INF_U08_S2ITM_U05	T2A_U02 T2A_U07	C1 C6 C7 C8	Pr1 Pr2 Pr3 Pr4 Pr5 Pr6	N1 N2 N3
K2INF_U08_S2ITM_U06	T2A_U11 T2A_U12 T2A_U15 T2A_U16	C2 C3 C4	Pr2 Pr3 Pr4 Pr5	N1 N3
K2INF_U08_S2ITM_U07	T2A_U19	C2 C5 C8 C9	Pr1 Pr6	N1 N2 N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Przedmiot monograficzny
Name in English Monographic Subject
Main field of study (if applicable): Informatics
Specialization (if applicable): Internet and Mobile Technologies
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional~~ ~~/ university-wide*~~
Subject code INZ003775
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		30		

Number of hours of total student workload (CNPS)	60		60		
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	1		3		
including number of ECTS points for practical (P) classes			3		
including number of ECTS points for direct teacher-student contact (BK) classes	0,6		1,8		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field at second level of study until 3th semester

\

SUBJECT OBJECTIVES

C1 The aim of subject is to acquire the ability to define and solve problems on the nature of the research and development especially related to development and implementation regarding various aspects of computer engineering.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 He has an extended knowledge of the curriculum content defined for the current edition of the course.

relating to skills:

PEK_U01 He is able to solve chosen task defined by the content of current edition of the course

relating to social competences:

…

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec1 – lec8	Classes are adapted to current needs indicated by students, including needs arising from their master theses and current trends in their field of study related to computer engineering. Depending on the students' needs different courses can be offer every year. The number of open courses will be depend on students voting and internal Faculty regulation, which defined the number of students that need to participated in the course. Lectures will be related to one (monographic approach) from the areas of research and development conducted by the teachers. The subject of the course should be related with educational effects specified for the Informatics field of study or for Internet and Mobile Technologies specialization.	15
	Total hours	15

Form of classes - class		Number of hours
Cl 1		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1	Presentation of lab scope, presentation of grading principles, training from health and safety at work. Familiarization with used laboratory tool.	2
Lab2 – lab8	Classes are adapted to current needs indicated by students, including needs arising from their master theses and current trends in their field of study related to computer engineering. Laboratories will be related to one (monographic approach) from the areas of research and development conducted by the teachers.	28
	Total hours	30

Form of classes - project		Number of hours
Proj 1		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1		
	Total hours	

TEACHING TOOLS USED
N1. Lecture supported by multimedia presentations (slideshow) N2. Laboratory equipped with hardware and programming tools needed for the subject of course.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 – (lecture)	PEK_W01	Quizzes during the lecture, student activity during the lecture, students answering on questions during lecture, evaluation of homeworks.
F2 – (laboratory)	PEK_U01	Checking of student preparation for exercise realization, assessment (points allocated) the reports of the exercises. Evaluation of the quality of submitted by students programs.
The final assessment will be issued on the basis of partial grades (points) received from the lecture (F1) and laboratory (F2) as follows: Grade = 50% * F1 + 50% * F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[122] Literature related to the subject of course recommended by the teacher

SECONDARY LITERATURE:

[1] Literature related to the subject of course recommended by the teacher

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. inż. Leszek Borzemski, Prof. PWr

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Monographic Subject
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **Internet and Mobile Technologies**

Subject educational effect	**Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)****	**Subject objectives*****	**Programme content*****	**Teaching tool number*****
PEK_W01 (knowledge)	K2INF_W06	C1	Lecture	N1
PEK_U02 (skills)	K2INF_U08	C1	Laboratory	N2

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Seminarium dyplomowe
Name in English Diploma seminar
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005220
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					90
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points					2
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes					1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge, skills and competences acquired at Informatics field at second level of study until 3th semester

\

SUBJECT OBJECTIVES

C1 Preparing students to write a master thesis according the internal requirements in Informatics field at Faculty of Computer Science and Management, Wrocław University of Technology,

C2 Providing students with basic skills related to preparation and presentation of scientific texts, beginning from the choice of topic, selection of tasks to be performed, use of literature to interpretation of the results.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He is able to acquire information from literature, databases and other sources, also in English or other language used for communication in Informatics field, is able to integrate the information obtained, interpret them, make critical evaluation and also draw conclusions and formulate and justify opinions related to prepared master thesis.

PEK_U02 He can communicate using a variety of techniques in his professional environment and in other environments, also in English or other foreign language used for communication in Informatics field and also to present the results of his master thesis

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
	Total hours	

Form of classes - seminar	**Number of hours**

Sem 1	Familiarization with the principles of master thesis realization at Informatics field. Rules related to student presentations. Determining the schedule of student presentations.	2
Sem 2	Review of basic skills related to preparation and presentation of scientific texts by students, beginning from the choice of topic, selection of tasks to be performed, use of literature and also how to write thesis and how obtained results should be interpret.	2
Sem 3 – Sem15	During semester each student has 2 presentations. The first presentation is related to the general view of the thesis topic, its placement in the literature and in the Informatics field. The student should present the primary aim of thesis, the state of art related to thesis topic, the concept of solution, the initial structure of thesis and timetable for further work. The purpose of the second presentation is preparation to defense and demonstrate presentation skills in English. The second presentation consists of two parts, namely, discussion of the results of the work in English and a short presentation in Polish devoted to the results of the thesis.	26
	Total hours	30

TEACHING TOOLS USED

N1. Multimedia presentations
N2. Examples of scientific papers and reports from the field of computer science.
N3. E-Learning System used to publish teaching materials and announcements, also used for collection and evaluation of student work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01 PEK_U02	Evaluation of the presentation of the work at the seminar and prepared documentation from the presentation. The evaluation shall be subject to the fulfillment of the requirements for the presentation, including its substantive scope, structure and organization of presentation, techniques of conversation, a form of presentation, compactness of presentation and conclusions reached. Participation in the discussions after presentation is also evaluated. In addition, the seminar leader is able to control the cooperation between supervisors and graduate students.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[123] Literature related to the scope of realized project selected by student and recommended by the teacher.

[124] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. inż. Leszek Borzemski, prof. PWr, leszek.borzemski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Diploma seminar
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
AND SPECIALIZATION **every specjalization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3
PEK_U02	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT…

SUBJECT CARD

Name in Polish Systemy informacyjne
Name in English Information systems
Main field of study (if applicable): Informatics
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code INZ3762
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				30
Number of hours of total student workload (CNPS)	60				60
Form of crediting	crediting with grade	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	crediting with grade
For group of courses mark (X) final course					
Number of ECTS points	2				2
including number of ECTS points for practical (P) classes	0				0
including number of ECTS points for direct teacher-student contact (BK) classes	1,2				1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic mathematical knowledge for 1st level of studies.

2. Informatics knowledge background.
3. Algorithms knowledge background.

\

SUBJECT OBJECTIVES

C1 Acquiring knowledge about functions and significance of information systems in contemporary organizations
C2 Acquainting with the functions and development of information systems in information society
C3 Acquainting with the different methods of information retrieval by surfing the Web
C4 Recognizing the problems of passing of contemporary organizations to Internet space
C5 Obtainment of skills to analyze the literature from information systems area and to synthesize the contents from different sources
C6 Application of the obtained knowledge to presentation the problems from information systems area by means of using adequate tools

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Familiarity with basic models of information systems
PEK_W02 Basic knowledge about Web information systems
PEK_W03 Familiarity with common multimedia technologies
PEK_W04 Understanding of the measures of information retrieval efficiency

relating to skills:
PEK_U01 Student can to build information query for different types of information needs
PEK_U02 Can to determine basic features of information system for given organization
PEK_U03Student be able to evaluate the precision of retrieved information
PEK_U04 Can to present basic features of given information system

relating to social competences:
PEK_K01 Can individually to use literature of the subject and to select useful information
PEK_K02 Student is convinced above positive role of information systems in stimulation of the civilization development

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	History of information systems development. Information processing. Theoretical basis of information systems.	2
Lec 2	Main information systems' models. Automation of information flow in organization.	2
Lec 3	Information retrieval on Internet – fundamentals.	2
Lec 4	Web information systems.	2
Lec 5	Multimedia. Importance of multimedia technologies in information systems development.	2
Lec 6	How societies embrace information technology. Digital libraries.	2
Lec 7	Efficiency of information systems. Case study of chosen information system.	2
Lec 8	Test	1
	Total hours	15

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Introductory seminar.	2
Sem 2	Information systems – definitions, types, features, examples.	2
Sem 3	Information retrieval fundamentals – models, dictionaries, indexes.	2
Sem 4	Evaluation of information systems' efficiency.	2
Sem 5	Analytical retrieval of information.	2
Sem 6	Information retrieval on Internet.	2
Sem 7	ERP class systems.	2
Sem 8	Mobile information systems.	2
Sem 9	Multimedia information systems.	2
Sem 10	Information systems for teleworking.	2
Sem 11	How societies embrace information technology.	2
Sem 12	CRM systems.	2
Sem 13	Knowledge management systems.	2
Sem 14	Information society: e-business, e-administration, e-commerce, e-health	2

Sem 15	Seminar summation and credit.	2
	Total hours	30

TEACHING TOOLS USED

N1. Computerized presentation at the lectures.
N2. Presentation with visualization and using Internet resources during the seminar.
N3. Consultations.
N4. Students' homework with using software packages.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 PEK_U04 PEK_K02	Grade of presentation (quality of slides, oral presentation, relevance, duration), presence and activity.
F2	PEK_K01	Report's grade
P-seminar	PEK_U02	Grade result from F1 and F2
P-lecture	PEK_W01-PEKW04 PEK_U03	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Manning C. D., Raghavan P., Schutze H.: *Introduction to Information Retrieval*, Cambridge University Press, New York, 2009, dostępne także bezpłatnie: www.cambridge.org

[2] Kłopotek M. A.: *Inteligentne wyszukiwarki internetowe* , Akademicka Oficyna Wydawnicza EXIT, Warszawa, 2001.

[3] Wrycza S. (red.): *Informatyka ekonomiczna. Podręcznik akademicki*, PWE, Warszawa, 2010.

[4] Cortada J. W. : How Societies Embrace Information Technology, WILEY-IEEE, NY, 2009.

[5] Baeza-Yates R., Ribeiro-Neto B.: *Modern Information Retrieval*, ACM Press, Adison-Wesley, New York, 1999.

SECONDARY LITERATURE:

[1] Zgrzywa A., Choroś K., Siemiński A.(Eds.): *Multimedia and Internet Systems: Theory and Practice,* Spriger Verlag, Berlin, 2013.

[2] Nguyen N.T., Zgrzywa A., Czyżewski A.(Eds.): *Advances in Multimedia and Network Information System Technology,* Spriger Verlag, Berlin, 2010.

[3] Zawiła-Niedźwiecki J. : *Informatyka gospodarcza*, Wyd. C. H. Beck, 2010.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Aleksander Zgrzywa, Aleksander.Zgrzywa@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INFW03, K2INF_W06	C1	Lec1, Lec 6 Sem 2,Sem 14	N1-4
PEK_W02	K2INF_W04, K2INF_W06	C3,C4	Lec 3, Lec 4 Sem 6,Sem 7, Sem 11	N1-4
PEK_W03	K2INF_W02, K2INF_W06	C2	Lec 5, Lec 6 Sem 13,Sem 14	N1-4
PEK_W04	K2INF_W03	C3	Lec 3, Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U01	K2INF_U01, K2INF_U08	C3	Lec 3,Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U02	K2INF_U05, K2INF_U08	C4	Lec 2,Lec 7 Sem 7,Sem 8,Sem 12,Sem 13	N1-4
PEK_U03	K2INF_U05, K2INF_U08	C3	Lec 2, Lec 5 Sem 3, Sem 5, Se6,Se9	N1-4
PEK_U04	K2INF_U02, K2INF_U03	C5, C6	Lec 5, Lec 6 Sem 3, Sem 5, Sem 6, Sem 9, Sem 10	N1-4

PEK_K01	K2INF_K01, K2INF_U02	C5	Lec 5, Lec 6 Sem 9, Sem 10	N1-4
PEK_K02	K2INF_K02	C1	Lec 1, Lec 6 Sem 2, Sem 14	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **W8** / DEPARTMENT……

SUBJECT CARD

Name in Polish Systemy mobilne i multimedia
Name in English Mobile Systems and Multimedia
Main field of study (if applicable): IT
Specialization (if applicable): ITM
Level and form of studies: ~~1st~~/ 2nd* level, full-time / part-time*
Kind of subject: ~~obligatory~~ / optional / ~~university-wide~~*
Subject code INZ003772
Group of courses YES / ~~NO~~*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		45		
Number of hours of total student workload (CNPS)	45		135		
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of object-oriented programming.
2. Basic knowledge of computer application interface design.
3. Elementary knowledge of graphics programs.

\

SUBJECT OBJECTIVES

C1 Presentation of the basic knowledge of the design of mobile multimedia applications.
C2 Teaching mobile application development in Android and Adobe Flash.
C3 Learning how to analyze user requirements of mobile applications.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Know and understand the specifics of mobile multimedia applications.
PEK_W02 Has knowledge in an area of the design and development of mobile multimedia applications.

relating to skills:

PEK_U01 Able to define a set of potential functional requirements of mobile multimedia applications and, based on this set, can design a mobile multimedia application.
PEK_U02 He can program the mobile multimedia application.

relating to social competences:

PEK_K01 Able to work with a potential user of a mobile multimedia application in order to define a set of functional requirements.
PEK_K02 He can take into account in the design of mobile interface mobile application specific requirements of the intended user.

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Presentation and discussion of the lecture plan. Discussion of recommended literature. Discussion of laboratory tasks. Discussion of the Android SDK. Presentation of Adobe Flash programming environment.	1
Lec 2	Overview multimedia mobile applications available on the Android platform. Presentation Android. Discussion of the principles of the preparation of the development environment and applications running under the emulator and on your mobile device. Discussion of the Android application structure and the rules defining an application using the manifest file. Discussion of the application resources, and rules for working with resources.	2
Lec 3	Presentation of the basic principles of user interface design application for Android. Discussion of the visual elements of the user interface. Discussion of the principles of designing a user interface layouts - characteristics of embedded layouts.	2
Lec 4	Discussion of the rules on the use of location-based services available on Android. Presentation and discussion of the application code implements a location service.	2
Lec 5	Presentation of the principles of design and multimedia applications run in Adobe Flash. Programming mechanisms of interaction. Grammar describes the basics of ActionScript 3.0. Presentation and discussion of selected examples of programs in ActionScript 3.0.	2

Lec6	Presentation and discussion of program code in AS 3.0, dedicated mobile platforms. Discussion of the principles of designing mechanisms for navigation of mobile multimedia content applications.	2
Lec7	Describes the basics of computer animation. Discussion of the animation in the timeline and animation implemented in AS 3.0. Presentation of the arrangements for using the motion editor panel (Motion Editor). Explanation idea of inverse kinematics and transformations. Discussion of methods of drawing and animation available on Android. Discussion of the principles of media on Android. Presentation of the principles of 3D graphics using OpenGL ES.	2
Lec8	Review and comparative analysis of possibilities to create new multimedia mobile applications in the Android SDK and the environment in Adobe Flash. Development prospects of mobile technology. Summary of the lecture.	2
	Total hours	**15**

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Presentation of the principles of operation of the laboratory and the principles of assessment. Basic configuration of the environment in the Android SDK Eclipse. Running the test application in emulation mode. Launching test application on a mobile device.	3
Lab 2	Implementation of standard models of user interfaces on Android - design and construction of the user interface with layouts.	3
Lab 3	The implementation of complex mechanisms of interaction in the Android environment.	3
Lab 4	Design and programming a mobile application that uses location-based services available on Android.	3
Lab 5 Lab 6	Practical introduction to Adobe Flash. Principles of creating applications on the timeline and ActionScript 3.0. Practical basics of AS 3.0. Running and editing programs implemented in AS 3.0 in Adobe Flash. Launching a mobile application constructed in Adobe Flash in emulation mode. Launching a mobile application constructed in Adobe Flash on a mobile device.	6
Lab7	Implementation of standard models of user interfaces in Adobe Flash ActionScript 3.0.	3
Lab8	The implementation of complex mechanisms navigation mobile application in Adobe Flash ActionScript 3.0.	3
Lab9	The design of multimedia applications using video files and audio files in Adobe Flash ActionScript 3.0. Testing applications on a mobile device.	3
Lab10	Media Management. MediaStore class. Construction applications managing video files, image files, audio files, and well ordered. The implementation of multimedia	3

	applications using video files and audio files in an Android environment. Testing applications on a mobile device.	
Lab11	Multimedia support - registration of images, video and sound. Design programs that use the resources generated by the multimedia device operating on Android. Testing applications on a mobile device.	3
Lab12	Fundamentals of computer animation in Adobe Flash. Animation on the timeline and animation done in AS 3.0. How to use the motion editor panel (Motion Editor). Design programs using interactive animation. Testing applications on a mobile device.	3
Lab13	Methods for drawing and animation available on Android. Using Android 3d Graphics with OpenGL ES. Design programs that use animation on Android. Testing applications on a mobile device.	3
Lab14 Lab15	Design, implementation, running and testing of mobile multimedia applications on Android or in the Adobe Flash. Summary laboratory. Credit lab.	6
	Total hours	**45**

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED

N1. Lectures in the form of multimedia presentations.
N2. Introduction to laboratory prepared in the form of a multimedia presentation that contains the specification of the tasks and detailed, documented and contain comments sections of code, useful for the task. Materials sent by e-mail.
N3. Collections of web addresses and articles in electronic form, which are an additional source of teaching material, contextually related laboratory tasks. Materials sent by e-mail.
N4. Individual consultations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming	Educational effect	Way of evaluating educational effect achievement

(during semester), P – concluding (at semester end)	number	
F1	PEK_W01 PEK_W02 PEK_U01 PEK_U02	During the laboratory classes, students solve 9 laboratory tasks in accordance with the specification. For each correctly solved problem is worth 0, 1 or 2 points.
F2	PEK_W01 PEK_W02 PEK_U01 PEK_U02 PEK_K01 PEK_K02	The summary of the laboratory is to design, programming and running on a mobile device multimedia application in accordance with the specification 10 laboratory task. The task 10 may be obtained 0, 1, 2, 3 or 4 points.

C The final evaluation of the laboratory is determined by the points P obtained during the laboratory according to the table. Assessment 5.0 and 5.5 can be obtained only under the condition that solves the task 10.

P	10-11	12-13	14-15	16-17	18-20	21-22
Grade	3,0	3,5	4,0	4,5	5,0	5,5

The final evaluation of the lecture is determined based on a paper written about the programming of mobile multimedia systems.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[125] Charlie Collins, Michael Galpin, Matthias Kaeppler, Android in Practice, Manning Publications Co, 2012.
[126] Ian F. Darwin, Android. Android Cookbook, O'Reilly, 2012.
[127] Frank Ableson, Robi Sen, Android in Action. Second edition, Manning Publications Co, 2011.
[128] Shane Condor, Lauren Darcey, Android Wireless Application Development(2nd Edition), Addison-Wesley, 2011.
[129] Jeff Friesen, Learn Java for Android Development, Appres, 2010.
[130] Derrick Ypenburg, ActionScript 3.0: Visual QuickStart Guide, Peachpit Press, 2009.
[131] Adobe Creative Team, Adobe Flash Professional CS6 Classroom in a Book, Adobe System Incorporeted, 2012.
[132] Stephen Chin, Dean Iverson, Oswald Campesato, Paul Trani, Pro Android Flash, Appres, 2011.

SECONDARY LITERATURE:

[54] Lyza Danger Gardner, Jason Grisby, Head First Mobile,O'Reilly, 2012.
[55] Jeremy Kerfs, Beginning Android Tablet Games Programming, Appres, 2011.
[56] Julian Dolce, Android Development with Flash, Wiley Publishing Inc, 2010.
[57] Juhani Lehtimaki, Smashing Android UI, John Wiley & Sons, 2013.
[58] Jason Ostrander, Android UI Fundamentals. Develop and Design, Peachpit Press, 2012.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Doc. dr inż. Krzysztof Waśko, krzysztof.wasko@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Mobile and Multimedia Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2ITM_W03 K2INF_W06_S2ITM_W04	C1, C2, C3	Lec1-Lec8	N1, N2, N3, N4
PEK_W02	K2INF_W06_S2ITM_W03 K2INF_W06_S2ITM_W04	C1, C2, C3	Lec1-Lec8	N1, N2, N3, N4
PEK_U01 (skills)	K2INF_U08_S2ITM_U09 K2INF_U08_S2ITM_U10	C1, C2, C3	Lab1-Lab15	N1, N2, N3, N4
PEK_U02	K2INF_U08_S2ITM_U09 K2INF_U08_S2ITM_U10	C1, C2, C3	Lab1-Lab15	N1, N2, N3, N4
PEK_K01 (competences)		C1, C2, C3	Lec1-Lec8 Lab1-Lab15	N1, N2, N3, N4
PEK_K02		C1, C2, C3	Lec1-Lec8 Lab1-Lab15	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: Systemy wspomagania decyzji
Name in English: Decision Support Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Decision Support Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / university-wide*
Subject code: INZ003761
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	15		15	
Number of hours of total student workload (CNPS)	60	30		60	
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / ~~crediting with grade~~*	Examination / crediting with grade*
For group of courses mark (X) final course					

Number of ECTS points	2	1		2	
including number of ECTS points for practical (P) classes				2	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	0,6		1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None.

\

SUBJECT OBJECTIVES

C1 Getting to know foundations of designing computer science decision support systems using general systemic methods which make it possible to apply unified approaches for analysis and decision making for decision support systems of different nature.
C2 Acquisition of skills to represent in the form of mathematical formulas of decision making plants treated as input-output plants.
C3 Acquisition of skills to analyze of decision making plants treated as input-output plants.
C4 Getting acquainted with methods and algorithms of multi-stage decision making.
C5 Acquisition of skills to apply dynamic programming method.
C6 Getting to know metods and algorithms of multi-criteria decision making.
C7 Acquisition of skills to use AHP method.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Student knows foundations of designing of decision support systems for any kind of plants.
PEK_W02 Student knows foundations of analysis and decision making for input-output plants with logic knowledge representation.
PEK_W03 Student knows selected method of multi-stage and multi-criteria decision making.
relating to skills:
PEK_U01 Student is able to elaborate a mathematical model for an input-output decision making plant in discrete state space as well as with logic knowledge representation.
PEK_U02 Student can solve analysis and decision making tasks for elementary plants with logic knowledge representation.
PEK_U03 Student is able to solve multi-stage decision making problem using Bellman's Principle and dynamic programming.
PEK_U04 Student can use AHP algorithm for the solution od multi-criteria decision making problem
relating to social competences:
PEK_K01 Student can take advantage of professional literature by oneself and can perform the critical analysis of information mined.
PEK_K02 Student can think creatively.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Decision support systems – definitions, structures, problems.	1
Lec 2	Application of discrete state equations and logic expressions for representation of decision making plants.	2
Lec 3	Analysis of decision making plants, in particular logic-algebraic method.	2
Lec 4	Decision making – definition, typology, logic-algebraic plant.	2

Lec 5	Bellman’s Principle and multi-stage decision making.	3
Lec 6	Multi-criteria decision making, Pareto sets, AHP method.	3
Lec 7	Examples of computer decision support systems.	2
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Solution of numerical exercises concerning difference equations.	1
Cl 2	Solution of numerical exercises concerning differential equations as well as propositional calculus.	2
Cl 3	Solution of numerical exercises concerning mathematical representations of input-output plants.	2
Cl 4	Solution of numerical exercises concerning analysis using logic-algebraic method.	2
Cl 5	Solution of numerical exercises concerning decision making using logic-algebraic method.	2
Cl 6	Solution of numerical exercises concerning dynamic programming.	2
Cl 7	Solution of numerical exercises concerning AHP method.	2
Cl 8	Final test.	2
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Collecting of indispensable information about selected plant being the decision making plant.	2
Proj 2	Determination of mathematical model of selected decision making plant and decision making problem formulation.	2
Proj 3	Analysis of decision making plant using its mathematical model.	2
Proj 4	Choice of decision making method for further usage as well as elaboration of decision making algorithm.	3
Proj 5	Implementation and alalysis of decision making algorithm.	4
Proj 6	Elaboration of conclusions and written report of the project performed.	2
	Total hours	15

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1 Lecture – traditional method. N2 Classes – traditional method. N3 Consultation. N4 Individual discussion with student. N5 Short test (10 mins.). N6 Self-contained work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Short tests during the classes.
F2	PEK_K01– PEK_K02	Individual discussion with student during the project.
P (Classes)	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Test.
P (Project)	PEK_U01–PEK_U04; PEK_K01–PEK_K02	Evaluation of written report of the project.
P (Lecture)	PEK_W01–PEK_W03; PEK_K02	Exam.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[133] [1] Józefczyk J., Wybrane problemy podejmowania decyzji w kompleksach operacji, Oficyna Wydawnicza PWr, Wrocław 2001.
[134] Bubnicki Z., Podstawy informatycznych systemów zarządzania, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1993.
[135] Roy B., Wielokryterialne podejmowanie decyzji, WNT, Warszawa 1990.

SECONDARY LITERATURE:

[1] Techniki informacyjne w badaniach systemowych, P. Kulczycki, O. Hryniewicz, J. Kacprzyk (red.), WNT, Warszawa 2007.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Jerzy Józefczyk, Jerzy.Jozefczyk@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Decision Support systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Decision Support systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1	Lec1, Lec 2, Lec 7, Cl1, Cl 2, Pr1	N1, N3, N6
PEK_W02	K2INF_W02	C1	Lec3, Lec4	N1, N3, N6
PEK_W03	K2INF_W02	C4, C6	Lec5, Lec6	N1, N3, N6
PEK_U01 (skills)	K2INF_U05; K2INF_U06	C2	Lec2, Cl 3, Proj2	N2–N6
PEK_U02	K2INF_U05; K2INF_U06	C3	Cl 4, Cl 5, Proj3, Pro4	N2–N6
PEK_U03	K2INF_U05; K2INF_U06	C5	Cl 6, Proj4	N2–N6
PEK_U04	K2INF_U05; K2INF_U06	C7	Cl 7, Proj4	N2–N6
PEK_K01 (competences)	K2INF_K01	C1, C4, C6	Lec1– Lec7, Proj1, Proj4	N2–N6
PEK_K02	K2INF_K01	C1–C7	Proj1–Proj6	N2–N6

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: Teoria i inżynieria ruchu teleinformatycznego

Name in English: Theory and engineering of teletraffic

Main field of study (if applicable): Computer science

Specialization (if applicable): Teleinformatics

Level and form of studies: 2nd level, full-time

Kind of subject: obligatory

Subject code INZ3759

Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload	30			90	

(CNPS)					
Form of crediting	Crediting with grade			Crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	1			3	
including number of ECTS points for practical (P) classes				3	
including number of ECTS points for direct teacher-student contact (BK) classes	0,6			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

19. Has a basic knowledge of ICT systems and computer communication networks (K1INF_W11).
20. Knows the basic methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_W16)
21. Can use the right tools to build a simple model of the process (the object), to formulate specific task analysis and decision making (K1INF_U15)
22. Can effectively use the methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_U16)
23. It has the ability to self-education, including in order to improve the professional competence (K1INF_U05)
24. Understands the need and knows the possibility of lifelong learning and to improve their professional and social competences (K1INF_K01)

SUBJECT OBJECTIVES

C1. Ordered, underpinned by theoretical knowledge of methods and techniques for transmitting signals using different modulation techniques, methods and techniques of information transmission, methods of organization and management of data communications traffic in the tasks of design and analysis of communication systems, methods of delivering service quality of ICT systems, analysis of quantitative and qualitative requirements and methods for sizing of distributed IT systems.

C2. Skills about the differences and benefits of the use of analog and digital data transmission techniques, the differences and benefits of the use of wired and wireless signal transmission techniques, developing the concept of using wired and wireless technologies in the basic applications of ICT systems, defining the qualitative and quantitative requirements of the user information and communication systems range of data, designing ICT solutions needed to achieve the qualitative and quantitative requirements of the user, using standards and solutions available on the market, estimating the cost of preparing and maintaining ICT solutions needed to achieve the qualitative and quantitative requirements, designing modernization of IT solutions needed to achieve the qualitative and quantitative requirements, identifying differences and similarities between solutions in a variety of applications (e-health, e-government and e-learning, in real-time systems, etc.).

C3. Skills for the design and analysis of complex, distributed ICT systems providing network services for distributed computer communication systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

K2INF_W02: Has a structured, theoretically founded essential knowledge of business modeling and requirements specification systems.

K2INF_W03: Has a structured, theoretically founded essential knowledge in the delivery of information distributed systems

K2INF_W06: Achieves results in the category of knowledge for specialty data communications

relating to skills:

K2INF_U05: Can - in formulating and solving engineering tasks - integrate knowledge of the fields of science and scientific disciplines relevant to the study being studied and applied a systemic approach, taking into account the non-technical aspects

K2INF_U06: Can solve the modeling, analysis and decision making for different types of objects

K2INF_U08: Achieves results and skills in areas of data exchange and computer communications systems

relating to social competences:

K2INF_K01: Can think and act in a creative and enterprising

K2INF_K02: Has aware of the social role of technical graduating, especially understands the need for the formulation and communication to the public, especially through the mass media, information and opinion on the achievements of technology and other aspects of engineering, shall endeavor to provide such information and opinions in a widely understood the reasons for the different points of view

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Classification of ICT systems from different points of view. Quality of Experience (QoE) and Quality of Service (QoS) in ICT systems with elastic and streaming traffic.	2
Lec 2	Introduction to queuing. Open and close networks of queues.	2
Lec 3	Queuing models of circuit-switched and packet-switched computer communication systems. Burke's theorem and Kleinrock approximation.	2
Lec 4	Access control, flow control and routing tasks formulation and solution in distributed environments.	2
Lec 5	Requirements analysis	1
Lec 6	Models (Poisson, Markov modulated, self-similarity, etc) of teletraffic and its application in traffic engineering tasks.	2
Lec 7	QoS delivery concepts: best effort, integrated services and differentiated services	2
Lec 8	New concepts of systems and networks - NXGN (Next Generation Networks) i NWGN (New Generation Network). Summary.	2
	Total hours	15

PROGRAMME CONTENT

Form of classes - project		Number of hours
Proj 1	Formulation design task based on the analysis of the literature, documentation, etc.	2
Proj 2	Justification for the choice task and purpose of the task design - an analysis of the expected benefits of the project task.	2
Proj 3	Quantitative requirements analysis for the communication system under design	2
Proj 4	Qualitative requirements analysis for the communication system under design	2
Proj 5	Analysis of state of the art on how to solve the task design	2
Proj 6	Analysis and selection of the task design methodology	2
Proj 7	Tools (methods, algorithms, procedures, software and hardware) analysis and selection required for the implementation of the project task	2
Proj 8	Implementation of prototype of modules solve the task	2
Proj 9	Prototype testing and evaluation	2
Proj 10	Modification of solutions using prototype test results	2
Proj 11	Integration of modules distinguished at the stages of requirements analysis and prototyping	2
Proj 12	Verification and testing of an integrated solution design task	2
Proj 13	Analysis of the possibility of extending the project tasks	2
Proj 14	Preparation of the presentation and documentation of the design task	2
Proj 15	Presentation of the results of the design task	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture supported by whole class multimedia presentations based on literature and open access and commercial sources.
N2. Student's own works – solving experiments and tasks in laboratory as well as homework.
N3. Student's own works – literature and open access sources studies.
N5. Collective works in laboratory
N5. Student's own works – preparation of presentations and technical documentations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05	Observation and verification of student activity. Solving the sample jobs.

	K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	
F1 – F15 (project)	K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and assessment of student autonomy.
P (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	Colloquium (course credit) in the evaluation of forming F1 (lecture)
P (project)	K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Total weighted ratings F1 - F15 (project) and the assessment for the presentation of the final results of the project.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[136] A.S. Tanenbaum, „Computer networks", Prentice Hall; 1996
[137] G. Pujolle, D. Seret, D. Dromard, E. Horlait, „Integrated Digital Communication Networks", J. Wiley & Sons
[138] B. Russell, „The art of computer networks", Prentice Hall; 2009
[139] V.S. Bagad, I.A. Dhotre, „Computer networks", Technical Publications, 2009.
[140] M. Roden, „Analog and digital communication systems", Prentice Hall
[141] http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

SECONDARY LITERATURE:

[59] S. Haykin, „Telecommunication systems", Prentice Hall, 1999.
[60] MIT Free Open Course Materials (http://ocw.mit.edu/index.htm)
[61] CCNA Exploration Network Fundamentals, Cisco Academy, PWN, 2008

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Adam Grzech, adam.grzech@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Theory and engineering of teletraffic

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer science

AND SPECIALIZATION
Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1, C2, C3	Lec 1 – Lec 8	N1, N4
PEK_W02	K2INF_W03	C1	Lec 1 – Lec 8	N1,N2, N4
PEK_W03	K2INF_W06	C1	Lec 1 – Lec 8	N1, N4
PEK_U01 (skills)	K2INF_U05	C1, C2, C3	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_U02	K2INF_U06	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_U03	K2INF_U08	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_K01 (competences)	K2INF_K01	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_K02	K2INF_K02	C1, C2	Lec 1 – Lec 8	N1, N2, N3, N4, N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Zaawansowane metody i techniki analizy danych
Name in English Advanced Methods and Techniques of Data Analysis
Main field of study (if applicable): computer science
Specialization (if applicable): …….
Level and form of studies: 2nd* level, full-time
Kind of subject: obligatory
Subject code INZ003758
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	crediting with grade*		crediting with grade*		

For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes	0		4		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of mathematics and mathematical statistics

\

SUBJECT OBJECTIVES

C1 Introduce the methods and techniques of the statistical data analysis to students
C2 Gather knowledge for Knowledge Discovery (Data Mining)
C3 Applying the gathered knowledge to drawing conclusions based on data analysis

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has a basic knowledge of Knowledge Discovery (Data Mining)
PEK_W02 student has a basic knowledge of statistical data analysis
PEK_W03 student is able to present differences between parametric and non-parametric tests

relating to skills:
PEK_U01 student is able to choose a proper statistical test
PEK_U02 student is able to draw conclusion from data analysis
PEK_U03 student is able to select a proper data mining method

relating to social competences:
PEK_K01 student is able to search and reuse the primary and secondary literature listed below and is able to gather the proper knowledge
PEK_K02 student understands the need for systematic and individual work in order to cover the scope of the course

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to knowledge discovery	2
Lec 2	Classification and Data Clustering	2
Lec 3	Clustering Algorithms	2
Lec 4	Discovering association rules	2
Lec 5	Statistics - basic notions	2
Lec 6	The selected problems of estimation theory	2
Lec 7	Introduction to verification of statistical hypothesis	2
Lec 8	Parametric tests for one population	2
Lec 9	Non-parametric tests for one population	2
Lec 10	Parametric tests for two populations	2
Lec 11	Non-parametric tests for two populations	2

Lec 12	Parametric tests for more than 2 populations	2
Lec 13	Non-parametric tests for more than 2 population	2
Lec 14	Correlation and regression methods	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Introduction to WEKA	2
Lab 2	Knowledge discovery in WEKA	8
Lab 3	Introduction to MATLAB	2
Lab 4	Statistical data analysis in MATLAB	8
Lab 5	Introduction to R	2
Lab 6	Statistical data analysis in R	8
	Total hours	30

Form of classes - project		**Number of**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Traditional lecture N2. Labs N3. One-to-one consultancy during stuff hours

N4. Student self-study

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P -laboratory	PEK_U01-PEK_U03, PEK_K01-PEK_K02	Evaluation of the prepared tasks during labs, oral test
P-lecture	PEK_W01-PEK_W03 PEK_K01-PEK_K02	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[142] M. Sobczyk: Statystyka, Wydawnictwo Naukowe PWN, 2007

[143] W.Krysicki, J.Bartos, W. Dyczka, K. Królikowska, M. Wasilewski: Statystyka, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, cz. 2 Statystyka matematyczna, Wydawnictwo Naukowe PWN, 2007

[144] Marek Walesiak, Eugeniusz Gatnar (Red. nauk.) :Statystyczna analiza danych z wykorzystaniem programu R, Wydawnictwo Naukowe PWN, 2009

[145] M. Korzyński: Metodyka eksperymentu Planowanie realizacja i statystyczne opracowanie wyników eksperymentów technologicznych, Wydawnictwo Naukowo-Techniczne 2006

[146] Nong Ye, : The Handbook of Data Mining, Lawrence Erlbaum Associates, Publishers, 2003

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Prof. dr hab. inż Ngoc Thanh Nguyen, Ngoc-Thanh.Nguyen@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Advanced Methods and Techniques of Data Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY computer science
AND SPECIALIZATION **……**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C2	Lec1-4 Lab1-2	N1-4
PEK_W02	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_W03	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_U01	K2INF_U01, K2INF_W06, K2INF_W08	C1	Lec5-14 Lab3-6	N1-4
PEK_U02	K2INF_U01, K2INF_W06, K2INF_W08	C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_U03	K2INF_U01, K2INF_W06, K2INF_W08	C2	Lec1-4 Lab1-2	N1-4
PEK_K01		C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_K02		C1, C2, C3	Lec1-14 Lab1-6	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Faculty of Computer Science and Management/ DEPARTMENT……

SUBJECT CARD

Name in Polish Integracja systemów informatycznych
Name in English Integration of Information Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Information System Design
Level and form of studies: 2nd* level, full-time *
Kind of subject: obligatory / optional / university-wide*
Subject code INZ003794
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30				30
Number of hours of total student workload (CNPS)	60				60
Form of crediting	crediting with grade*				crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2				2
including number of ECTS points for practical (P) classes	0				0
including number of ECTS points for direct teacher-student contact (BK) classes	1.2				1.2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Knowledge of databases, object-oriented programming, computer systems and networks

\

SUBJECT OBJECTIVES

C1 To acquaint students with modern methods of systems integration.
C2 Gaining knowledge about the techniques of system integration.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has a basic understanding of system integration.
PEK_W02 student knows and understands the concept of system integration.
PEK_W03 student is able to present the available technology to system integration.

relating to skills:
PEK_U01 student is able to independently develop strategies for systems integration
PEK_U02 student is able to choose the appropriate methods for the integration of information systems
PEK_U03 student is able to evaluate the integration of information systems conducted

relating to social competences:
PEK_K01 student is able to find and use the recommended literature course and independently acquire knowledge
PEK_K02 student understands the need for systematic and independent work on mastery of course material

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Construction and integration of information systems	2
Lec 2	Strategies integration	2
Lec 3	Business and Industrial Transformation	2
Lec 4	Physical integration	2
Lec 5	Logical integration	2
Lec 6	Semantic integration	2
Lec 7	integration organization	2
Lec 8	Integration based on Middleware	2
Lec 9	SOA - service-based architecture	2
Lec 10	BPMN as a standard notation business processes	2
Lec 11	Integration of business processes	2
Lec 12	Standard RosettaNet business process integration	2
Lec 13	Advanced integration processes	2
Lec 14	Management systems integration	2
Lec 15	Final test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Introduction to the problems of system integration	1
Sem 2	Specialization and integration conditions	2
Sem 3	The history and development of information systems integration	2
Sem 4	The use of services-based architecture (SOA) integration of information systems	2
Sem 5	Integration of information	2
Sem 6	CORBA, RMI, SOAP, DCOP DCOM.	2
Sem 7	The integration between databases	2
Sem 8	Standards integration	2
	Total hours	15

TEACHING TOOLS USED
N1. Traditional lecture N2. Laboratory N3. Consultation N4. Student self-preparation laboratory

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P-laboratory	PEK_U01-PEK_U03, PEK_K01-PEK_K02	Verbal response, assessment tasks performed during laboratory

P-lecture	PEK_W01-PEK_W03 PEK_K01-PEK_K02	Final test
F3		
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Joseph Fong, Information Systems Reengineering and Integration, Springer, 2006

[2] G.Hohpe, B. Woolf, Enterprise integration patterns: designing, building, and deploying messaging solutions, Addison-Wesley, Boston 2004

SECONDARY LITERATURE:

[1] T. Erl, SOA: principles of service design, Upper Saddle River, Prentice-Hall 2009

[2] B. GOLD-BERNSTEIN, W. A. RUH, Enterprise integration: the essential guide to integration solutions, Addison-Wesley, Boston 2005

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

dr inż. Zbigniew Telec, zbigniew.telec@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

……

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..

AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02, K2INF_W06, K2INF_W06_S2PSI_W03	C1	Lec1-14 Sem2-8	N1-4
PEK_W02	K2INF_W02, K2INF_W06, K2INF_W06_S2PSI_W03	C1	Lec1	N1-4
PEK_W03	K2INF_W02, K2INF_W06, K2INF_W06_S2PSI_W03	C1	Lec2-8 Sem3	N1-4
PEK_U01 (skills)	K2INF_U01, K2INF_W08, K2INF_U08_S2PSI_04,	C1,C2	Lec1-14 Sem2-8	N1-4
PEK_U02	K2INF_U01, K2INF_W08, K2INF_U08_S2PSI_04	C1, C2,	Lec1-14 Sem2-8	N1-4
PEK_U03	K2INF_U01, K2INF_W08, K2INF_U08_S2PSI_04	C1,C2	Lec1-14 Sem2-8	N1-4
PEK_K01 (competences)	K2INF_W02, K2INF_W06, K2INF_W06_S2PSI_W03	C1, C2	Lec1-14 Sem2-8	N1-4
PEK_K02		C1, C2	Lec1-14 Sem2-8	N1-4
…				

** - enter symbols for main-field-of-study/specialization educational effects

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY …Computer Sience and Management…… / DEPARTMENT……

SUBJECT CARD

Name in Polish ……Interakcja Człowiek-Komputer…….
Name in English ……Human-Computer Interaction…….
Main field of study (if applicable): …Computer Science….
Specialization (if applicable): ……Information Systems Design..
Level and form of studies: ~~1st~~/ 2nd* level, full-time /~~ part-time~~*
Kind of subject: obligatory /~~ optional / university-wide~~*
Subject code …INZ003790..
Group of courses YES / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	90		90		
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3		3		
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,8		1,8		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge in the area of methods and techniques of digital data analysis
2. Ability to design and implement of web-based systems
3.

\

SUBJECT OBJECTIVES

C1 Gaining knowledge in the area of Human-Computer Interaction
C2 Gaining knowledge in the field of information systems usability verification
C3 Obtaining ability to design and implement of natural user interface interactive systems
C4 Obtaining ability to verify user interface usability and accessibility

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 student has a knowledge concerning methods and tools for interactive systems design

PEK_W02 student has a knowledge concerning methods of user modeling of interactive systems

PEK_W03 student has a knowledge concerning methods of usability and accessibility verification of interactive systems

relating to skills:

PEK_U01 student is able to prepare consequent phases of interactive systems design process

PEK_U02 student is able to implement natural user interface

PEK_U03 student is able to verify usability and accessibility of interactive systems

relating to social competences:

PEK_K01 student is able to search and reuse the primary and secondary literature listed below and is able to gather the proper knowledge

PEK_K02 student understands the need for systematic and individual work in order to cover the scope of the course

PEK_K03 student is able to manage a small design team and a usability testing group

PROGRAMME CONTENT

Form of classes – lecture		**Number of hours**
Lec 1	Introduction to Human-Computer Interaction	2
Lec 2	User interface applications	2
Lec 3	Traditional interaction styles	2
Lec 4	New interaction styles	2
Lec 5	Interactive systems user modeling	2
Lec 6	Rules of the user interaction	2
Lec 7	Usability of interactive systems	2
Lec 8	Usability methods taxonomy	2
Lec 9	Tools for usability testing	2
Lec 10	Heuristic usability testing	2
Lec 11	Usability testing with users	2
Lec 12	Gaze-tracking in usability testing	2
Lec 13	Accessibility of web-based systems	2
Lec 14	Interactive systems design	2
Lec 15	Recommendation of user interfaces	2
	Total hours	30

Form of classes – class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		

	Total hours	

Form of classes – laboratory		Number of hours
Lab 1	Basics of Google Analytics	2
Lab 2	Google Analytics reports analysis	2
Lab 3	Deep analysis of Google Analytics reports	2
Lab 4	Web-based systems testing structural using Selenium	2
Lab 5	Application of different HTML codes validators	2
Lab 6	Application of different accessibility tools	2
Lab 7	Application of TUIO protocol	2
Lab 8	Implementation of specific gestures recognition procedures	2
Lab 9	Application of the web-cam in user-computer interaction	2
Lab 10	Gaze-tracking in user-computer interaction	2
Lab 11	Design of the natural user interface interactive system	2
Lab 12	Implementation of the logics of the natural user interface interactive system	2
Lab 13	Implementation of the interaction of the natural user interface interactive system	2
Lab 14	Usability testing of the implemented system	2
Lab 15	Implemented system demonstration	2
	Total hours	30

Form of classes – project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes – seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED

N1. Traditional lectures with slide-show
N2. One-to-one consultancy during stuff hours
N3. Literature self-study
N4. Laboratory task realization
N5. Student self-study in laboratory preparation
N6. Preparation of the laboratory reports

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect numer	Way of evaluating educational effect achievement
F - laboratory	PEK_U01-PEK_U03, PEK_K01-PEK_K03	Laboratory tasks completion and preparation of reports
C – lecture	PEK_W01-PEK_W03 PEK_K01-PEK_K02	Final test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] [1] Chapman N., Chapman J., *Digital media. Third edition*. Ontario: John Wiley & Sons Ltd., 2009.

[2] Marcin Sikorski, *Interakcja Człowiek-Komputer*. Wydawnictwo PJWSTK 2010.

[3] Janusz Sobecki, *Rekomendacja interfejsu użytkownika w adaptacyjnych webowych systemach informacyjnych*. *Wrocław* : Oficyna Wydawnicza Politechniki Wrocławskiej, 2009..

[4] Majaranta, P., Aoki, H., Donegan, M., Hansen, D. W., Hansen, J. P., Hyrskykari, A., & Räihä, K., *Gaze Interaction and Applications of Eye Tracking: Advances in Assistive Technologies*. IGI Global 2012.

SECONDARY LITERATURE:

[1] Mark Pearrow, *Funkcjonalność stron internetowych*. Gliwice: HELION 2002.

[2] Jakob Nielsen, *Projektowanie funkcjonalnych serwisów internetowych*. Gliwice: HELION 2003.

[3] Jef Raskin, *The Human Interface. New Directions for Designing Interactive Systems.* Boston: Addison-Wesley 2000.

[4] Jenny Preece i inni, *Human-Computer Interaction*. Harlow: Addison-Wesley 1996.

[5] Newman W.M., Lamming M.G., *Interactive System Design*. Harlow: Addison-Wesley 1996.

[6] Joel Spolsky, *Projektowanie interfejsu użytkownika. Poradnik programistów.* Warszawa: MIKOM 2001.

[7] van Setten M, *Supporting People in Finding Information. Hybrid Recommender Systems And Goal-Based Structuring*. Enschede, The Netherlands, 2005, Telematica Instituut Fundamental Research Series, No. 016. [1]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Janusz Sobecki, janusz.sobecki@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Human-Computer Interaction
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Computer Systems Design

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06S2PSI_W03	C1	Lec1-4, Lec14, Lec 15	N1-3
PEK_W02	K2INF_W06S2PSI_W04	C1	Lec5-7	N1-3
PEK_W03	K2INF_W06S2PSI_W04	C2	Lec7-13	N1-N3
PEK_U01 (skills)	K2INF_U08_S2PSI_U04, K2INF_U08_S2PSI_U06	C3	Lec1-4, Lec14, Lec 15 Lab7-Lab15	N1-N6
PEK_U02	K2INF_U08_S2PSI_U01, K2INF_U08_S2PSI_U02	C3	Lec14-15 Lab1-6 Lab9-12	N1-6
PEK_U03	K2INF_U08_S2PSI_U09	C4	Lec3,Lec9 Lab1-12	N1-6
PEK_K01 (competences)		C1-C4	Lec1-15 Lab1-15	N1-4
PEK_K02		C1-C4	Lec1-15 Lab1-15	N1-4
PEK_K03		C3-C4	Lec1,Lec14 Lab1-15	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Metodologia badań naukowych
Name in English Methodology of empirical sciences…….
Main field of study (if applicable): Informatics…….
Specialization (if applicable): ……..
Level and form of studies: 2nd* level, full-time /
Kind of subject: obligatory /
Subject code INZ003763……
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	0	0	0	0
Number of hours of total student workload (CNPS)	90	0	0	0	0
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3				
including number of ECTS points for practical (P) classes	0				
including number of ECTS points for direct teacher-student contact (BK) classes	1,8				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Competence in basic algebra
2. Competence in mathematical analysis
3. Differential equations

\

SUBJECT OBJECTIVES

C1 Knowledge on the methodological postulates
C2Competence in mathematical modeling on the base of methodology of empirical sciences
C3Competence in hypothesis testing
C4Competence in creation of homogeneous and invariant in relation to the system of units models

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01Knowledge on methodological postulates
PEK_W02Logical postulates of mathematical models construction (invariance and homogeneity)
PEK_WOO3Logical base of hypothesis testing

…
relating to skills:
PEK_U01Competence in mathematical modeling with accordance to methodological postulates
PEK_U02Competence in hypothesis and empirical models testing
…
relating to social competences:
PEK_K01Competence in the exactness of process description
PEK_K02Competence on ability of studying and reflection on experiment

PROGRAMME CONTENT

Form of classes - lecture		**Number of**
Lec 1Methods of scientific and technical project validation on the base of citation analysis	2	
Lec 2Methodological postulates of determinism, closed system, interconnectedness, simplicity and Popper's condition of falsification	2	
Lec 3Classical theory of measurements and the postulate of uniquenes	2	
Lec 4Dimensionally invariant description of a process, dimensional space	2	
Lec 5Theorem Pi of dimensional analysis and examples of its applications	2	
Lec 6Applications of theorem Pi in: models construction, experiment planning, identification Lec 7Theory of similarity Lec 8Invariance of models in relation to rotations group, tensors homogeneity Lec 9 Models testing and falsification of hypothesis Lec 10Identification of mathematical models Lec 11Multistage identification, models interpretability Lec 12Description of models construction Lec 13Models testing	2 2 2 2 2 2 2 2 2	
	Total hours26	Plus 2 colloqiums

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		

	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1.Literature N2.Examples analysis N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1P-1colloquium evaluation	WO1,WO2	Evaluation of students work
F2P-2colloquium evaluation	UO1,UO2	Evaluation of examples solving
F3		
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J.M. Bochenski The methods of contemporary thought. Harper Torchbooks, NY,1968
[2] W.Kasprzak, B. Lysik, M.Rybaczuk Measurements, Dimensions, Invariant Models and Fractals Spolom Wroclaw Lviv 2004
[3]
[4]

SECONDARY LITERATURE:

[1] K. R. Popper The logic of Scientific Discovery. Hutchinson Publ. Comp. 1959
[2]
[3]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Waclaw Kasprzak waclaw.kasprzak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Methodology of empirical sciences……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_WO1	Methodology basis	K1,K2,K3	N1,N2,P1
PEK_W02	K2INF_WO6	Models testing	K4,K13	P1
…				
…				
PEK_U01 (skills)	K2INF_UO6	Construction of models	K5,K6,K7	N1,N2,P2
PEK_U02	K2INF_UO8	Hyothesis testing	K8,K13	N1,N2,P2
…				
PEK_K01 (competences)	K_2SWD_KO1		K2	N1,N2
PEK_K02	K2_SWD_KO2		K13	N1,N2,P2
…				

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Metody inteligencji obliczeniowej
Name in English Computational Intelligence Methods
Main field of study (if applicable): computer science
Specialization (if applicable): Information System Design
Level and form of studies: 2nd* level, full-time
Kind of subject: obligatory
Subject code INZ003795
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	90		90		
Form of crediting	crediting with grade*		crediting with grade*		
For group of courses mark (X) final course					
Number of ECTS points	3		3		
including number of ECTS points for practical (P)	0		3		

classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,8		1,8		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of logic, rough and fuzzy sets, neural networks

\

SUBJECT OBJECTIVES

C1 Introduce the modern computational intelligence methods to students
C2 Gather knowledge for applying the nature-inspired algorithms to different optimization problems

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has a basic knowledge of various computational intelligence methods
PEK_W02 student knows and understands the concept of computational intelligence
PEK_W03 student is able to present various evolutionary algorithms

relating to skills:
PEK_U01 student is able to choose a proper method for solving an optimization problem
PEK_U02 student is able to choose proper methods of selection, crossing and mutation
PEK_U03 student is able to assess selected computational intelligence algorithms

relating to social competences:
PEK_K01 student is able to search and reuse the primary and secondary literature listed below and is able to gather the proper knowledge
PEK_K02 student understands the need for systematic and individual work in order to cover the scope of the course

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction-what is a computational intelligence?	2
Lec 2	Evolutionary Algorithms	2
Lec 3	Evolutionary Programming	2
Lec 4	Simple Genetic Algorithm	2
Lec 5	Genetic Programming	2
Lec 6	Ant Colony Algorithm	2
Lec 7	Swarm Algortihm	2
Lec 8	Immunological Algorithm	2
Lec 9	Probabilistic methods	2
Lec 10	Template-matching based methods	2
Lec 11	Decision trees	2
Lec 12	Multi-agent systems	2
Lec 13	Neuro-fuzzy systems	2
Lec 14	Other methods: rough sets, fuzzy sets, neural networks	2

Lec 15	Test	2
	Total hours	30

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1	Introduction.	2
Lab 2	Implementation of a simple program for solving a selected optimization problem using evolutionary algorithm.	8
Lab 3	Assessing the quality of the implemented algorithm using various methods of selection, crossing and mutation.	4
Lab 4	Implementation of a simple program for solving a selected optimization problem using another method introduced during the lecture.	8
Lab 5	Implementation of a simple program for simulating the neural network, rough or fuzzy reasoning.	8
	Total hours	30

Form of classes - project		Number of
Proj 1		
Proj 2		
Proj 3		
Proj 4		
...		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
...		
	Total hours	

TEACHING TOOLS USED

N1. Traditional lecture
N2. Labs
N3. One-to-one consultancy during stuff hours

N4. Student self-study

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P -laboratory	PEK_U01-PEK_U03, PEK_K01-PEK_K02	Evaluation of the prepared tasks during labs, oral test
P-lecture	PEK_W01-PEK_W03 PEK_K01-PEK_K02	Test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Leszek Rutkowski, *Metody i techniki sztucznej inteligencji*, Wydawnictwo Naukowe PWN, 2009

[2] Jarosław Arabas, *Wykłady z algorytmów ewolucyjnych*, Wydawnictwo Naukowo-Technicznе, 2004

SECONDARY LITERATURE:

[1] Robert Kosiński, *Sztuczne sieci neuronowe*, Wydawnictwo Naukowo-Techniczne, 2007

[2] Jacek Łęski, *Systemy neuronowo-rozmyte*, Wydawnictwo Naukowo-Techniczne, 2008

[3] M. Krzyśko, W. Wołyński, T. Górecki, M. Skorzybut*, Systemy Uczące się,* Wydawnictwo Naukowo-Techniczne, 2008

[4] Praca zbiorowa pod red. P. Kulczyckiego, O. Hryniewicza, J. Kacprzyka, *Techniki informacyjne w badaniach systemowych*, Wydawnictwo Naukowo-Techniczne, 2007

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Prof. dr hab. inż Ngoc Thanh Nguyen, Ngoc-Thanh.Nguyen@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Computational Intelligence Methods
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY computer science
AND SPECIALIZATION **Information System Design**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W02, K2INF_W06, K2INF_W06_S2PSI_W05	C1	Lec1-14 Lab2-5	N1-4
PEK_W02	K2INF_W02, K2INF_W06, K2INF_W06_S2PSI_W05	C1	Lec1	N1-4
PEK_W03	K2INF_W02, K2INF_W06, K2INF_W06_S2PSI_W05	C1	Lec2-8 Lab3	N1-4
PEK_U01	K2INF_U01, K2INF_W08, K2INF_U08_S2PSI_05, K2INF_U08_S2PSI_U07	C1,C2	Lec2-14 Lab2,4	N1-4
PEK_U02	K2INF_U01, K2INF_W08, K2INF_U08_S2PSI_05,K2INF_U08_S2PSI_U07	C1, C2,	Lec2-5 Lab3	N1-4
PEK_U03	K2INF_U01, K2INF_W08, K2INF_U08_S2PSI_05, K2INF_U08_S2PSI_U07	C1,C2	Lec2-14 Lab2-5	N1-4
PEK_K01		C1, C2	Lec1-14 Lab1-5	N1-4
PEK_K02		C1, C2	Lec1-14 Lab1-5	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: Informatics and Management

SUBJECT CARD

Name in Polish: Modelowanie i analiza biznesowa
Name in English: Modeling and business analysis
Main field of study (if applicable): Informatics
Specialization (if applicable): Computer Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ3760
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	30			
Number of hours of total student workload (CNPS)	60	90			
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2	3			
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	1,8			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

14. Practice in object-oriented programming.
15. Basic knowledge of software engineering.

\

SUBJECT OBJECTIVES

C1. Basic knowledge in the area of software system modeling with the stress on business modeling as the initial phase of the software development process.
C2. Basic knowledge in the area of the requirements specification.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEK_W01: Students have basic knowledge on business modeling.
PEK_W02: Students know and understand the role of specification requirements.
PEK_W03: Students have basic knowledge on selected modeling languages.

Relating to skills:
PEK_U01: Students, in cooperation with domain experts, can construct and analyze business models.
PEK_U02: Students can build models of system requirements.

Relating to social competences:
PEK_K01: Students are able to cooperate with representatives of application domain.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Basic notions for software development cycle. Survey of modeling languages – UML and BPMN.	2
Lec 2	Class diagrams – classes, associations, generalizations.	2
Lec 3	Validation and verification.	1
Lec 4	Object Constraint Language.	2
Lec 5	UML activity diagrams.	2
Lec 6	BPMN process diagrams.	2
Lec 7	UML statechart diagrams.	2
Lec 8	System requirements; use case diagrams.	2
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Construction and analysis of simple class diagrams.	2
Cl 2	Construction and analysis of advanced class diagrams.	2
Cl 3	Analysis of textual descriptions of exemplary application domains – structural aspect (1).	2
Cl 4	Analysis of textual descriptions of exemplary application domains – structural aspect (2).	2
Cl 5	Case study – an example of structural modeling.	2
Cl 6	Construction and analysis of OCL constraints imposed on diagrams.	2
Cl 7	Test 1.	2
Cl 8	Analysis of textual descriptions of exemplary application domains – structural and behavior aspect.	2
Cl 9	Analysis of simple BPMN diagrams.	2
Cl 10	Construction of simple BPMN diagrams.	2
Cl 11	Construction and analysis of advanced BPMN diagrams.	2
Cl 12	Construction and analysis of simple state diagrams.	2

Cl 12	Construction and analysis of advanced state diagrams..	2
Cl 13	Construction and analysis of use case diagrams.	2
Cl 14	Test 2.	2
Cl 15	Corrective test.	2
	Total hours	30

TEACHING TOOLS USED

N1. Lecturer's presentation at a blackboard, supported by a multimedia presentation using a laptop and a projector.
N2. Individual search and study of literature and Internet sources.
N3. Access to teaching materials published in the local area network.
N4. Individual consultations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 PEK_U01 PEK_K01	Each student gets 1 point for own solution of a problem from the list of problems for the given class.
F2	PEK_W01 PEK_W02 PEK_U01 PEK_U02 PEK_K01	Each student gets up to 10 points for own solution of problems for the given test (intermediate and final).
F3	PEK_W01 PEK_W02 PEK_W03 PEK_U01 PEK_U02 PEK_K01	The final evaluation for the classes is determined on the basis of total marks obtained by the student's activity for exercise (F1) and colloquia (F2). Positive mark is awarded to a student who has obtained at least 4 points for each of the symposia and has won a total of 10 points. If this condition is met, the number of points P is the basis for evaluation in accordance with the following table: P: 10 | 12 | 14 | 16 | 18 Mark: 3.0 | 3.5 | 4.0 | 4.5 | 5.0 Students who get at least a very good grade are exempt from the examination with the same mark as for the classes.

C: The final evaluation of the course is determined based on the results of the examination. The examination lasts two hours and consists of a set of tasks, the total number of 20 points. The condition for a positive assessment of the final exam is to get 10 points and a positive final evaluation of the exercise.
The final evaluation of the examination is determined in accordance with the following table:

Points	10	12	14	16	18
Mark	3.0	3.5	4.0	4.5	5.0

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[21] Rumbaugh J., Jacobson I., Booch G., *The Unified Modeling Language – Reference Manual*. Second edition, Addison-Wesley, 2005.

[22] Weilkiens T., Oestereich B., *UML 2 Certification Guide. Fundamental and Intermediate Exams*, Elsevier 2007.

[23] Maciaszek L. A., *Requirements Analysis and System Design*, Second edition, Pearson, Addison-Wesley, 2005.

[24] Adolph S., Bramble P., *Patterns for Effective Use Cases,* Addison-Wesley, 2003

[25] Gašević D., Djurić D., Devedžić V., *Model Driven Architecture and Ontology Development*, Springer, 2006.

SECONDARY LITERATURE:

[147] Graessle P., Baumann H., Baumann P., *UML 2.0 w akcji. Przewodnik oparty na projektach*, Helion, 2006.

[148] Object Management Group, Unified Modeling Language (available on the website: www.omg.com).

[149] Object Management Group, System Modeling Language SysML (available on the website: www.omg.com).

[150] Object Management Group, Business Process Modeling Notation BPMN (available on the website: www.omg.com).

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Zbigniew Huzar, zbigniew.huzar@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems Modeling and Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION
Computer Engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W02	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W03	K2INF_W03		Lec1-Lec8	N1, N2, N3, N4
PEK_U01 (skills)	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_U02	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_K01 (competences)	K2_SWD_K01	C1, C2	Lec1-Lec15 Cl1-Cl15	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from the table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa I
Name in English MSc Thesis I
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code INZ003818
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				60	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points				2	
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes				0,6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 2rd semester

\

SUBJECT OBJECTIVES

C1 Preparation of students to write a master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology, with special attention of all stages of writing a thesis.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Preparation of students to write a master thesis according the internal	

	requirements of Faculty of Computer Science and Management (Computer Science field of study), Wrocław University of Technology, with special attention of all stages of writing a thesis. Literature studies, selection and learning of systems, tools, methods and algorithms needed for the realization of the chosen subject of thesis. The preparation of an outline of work and schedule of future work. Basic work on the research, design and implementation. Familiarization with the research works carried out at the Institute of Informatics. Final results: the initial solution and / or the prototype of developed system, knowledge about the current state of art in the field of thesis, an outline of future work and timetable for further works documented in English and Polish languages.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED
N1. Literature study - analysis of publications (including websites) related to subject of thesis, including the research works of the Institute of Informatics. N2. Own work, independent research on the tasks defined in the master's thesis N3. Student consultation with the supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessment based on the final results achieved

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[151] Literature related to the scope of realized project selected by student and recommended by the teacher.

[152] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis I
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U03, K2INF_U08	C1	Pr1	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa II
Name in English MSc Thesis II
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005221
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				540	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points				18	
including number of ECTS points for practical (P) classes				18	
including number of ECTS points for direct teacher-student contact (BK) classes				6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 4th semester

\

SUBJECT OBJECTIVES

C1 Preparation of master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish language, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes – project		**Number of hours**
Proj 1	Subject is the main component of the process of realization the master thesis and involves the preparation by the student his master thesis. Master thesis is done under the direction of his supervisor, with whom student defines its scope, goals, tasks and timetable for implementation.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED

N1. Preparation of master thesis N2. The text of the master thesis N3. Thesis review prepared by the supervisor N4. Students consultation with supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of master thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessed is the final text of the diploma thesis. The assessment is carried out in the form of a review done by the promoter. The condition to pass the course is delivering the final text of master thesis before the defined deadline. The second review, which does not, however the condition for pass the course is done by the reviewer appointed by the Faculty Dean. Reviews are made according to the standard format. The student is admitted to the defense (final exam) if both reviews are positive

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[153] Literature related to the scope of realized project selected by student and recommended by the teacher.

[154] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis II
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K1INF_U03, K2INF_U08	C1	Proj1	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY …**Computer Science and Management**…… / DEPARTMENT……

SUBJECT CARD

Name in Polish … **Semantic Web** ……..
Name in English … **Semantic Web** ……..
Main field of study (if applicable): …**Computer Science** …….
Specialization (if applicable): …… Designing IT Systems (PSI) ……..
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part time~~*
Kind of subject: obligatory / ~~optional / university-wide~~*
Subject code … INZ003791……
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		15
Number of hours of total student workload (CNPS)	120		90		60
Form of crediting	Examination / ~~crediting~~ with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	**4**		**3**		**2**
including number of ECTS points for practical (P) classes			3		
including number of ECTS points for direct teacher-student contact (BK) classes	2,4		1,8		1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Having a knowledge concerning database systems, Artificial Intelligence and Expert Systems.
.

\

SUBJECT OBJECTIVES

C1. To familiarize students with information systems that use various methods of representation, processing, integration, searching and sharing the knowledge in the Web environment.
C2. Gaining knowledge concerning the technologies that use artificial intelligence (AI) to capture, process and share the knowledge in information systems operating on the Web.
C3. Acquiring the ability to design and develop an information system component performing the tasks of processing knowledge in the Web environment.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 The student knows and understands concepts of representation, searching, processing and sharing the information and knowledge at information systems operating on the Web.
PEK_W02 The student has systematized knowledge on methods, tools and standards that are used for the representation, searching, processing and sharing the information and knowledge at information systems.
PEK_W03 The student can name and describe available technologies that are used for information systems operating on the Web.

relating to skills:

PEK_U01 The student independently can choose the method and standard to solve the problem of representation, search, acquisition, processing and sharing the information and knowledge in the Semantic Web.
PEK_U02 The student is able to properly design and evaluate an information system component performing the tasks of processing the information and knowledge and operating on the Semantic Web.
PEK_U03 The student can choose tools which help solving the problems of representation and processing the information and knowledge for the Semantic Web.

relating to social competences:

PEK_K01 The student can find and use the recommended reading for the course and acquire the knowledge independently.
PEK_K02 The student understands the need to systematic and independent work on mastery of course material.
PEK_K03 The student is able to work in a team pursuing the task of programming.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	The Semantic Web – the concept, architecture, assumptions.	2
Lec 2	Ontology vs. ontologies – the concept, definitions, problems.	2
Lec 3	Ontologies engineering for the Semantic Web.	2
Lec 4	Ontologies engineering – methodologies of ontologies constructing.	2
Lec 5	Ontologies engineering – application of ontologies.	2
Lec 6	XML and other markup languages – the basis of the Semantic Web infrastructure	2
Lec 7	Resource Description Framework (RDF) – metadata description standard.	2

Lec 8	RDF Schema – defining and processing RDF structures.	2
Lec 9	Web ontologies representation markup languages – OWL	2
Lec 10	Web ontologies representation markup languages – DAML.	2
Lec 11	Ontology based communication. Inference techniques	2
Lec 12	Ontology evolution. The alignment and the control algorithms	2
Lec 13	Metadata structures generating using network resources. Web Mining.	2
Lec 14	Web Intelligence – AI methods and techniques in web systems	2
Lec 15	Development perspectives for Semantic Web technologies	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Introduction to the course. Overview of the laboratory.	2
Lab 2	Specialized software environment Protégé.	6
Lab 3	Design and programming of web ontology using the software environment Protégé.	6
Lab 4	Ontology alignment.	6
Lab 5	Specialized software environment Snoop.	4
Lab 6	The application of an ontology within the Web-based information system.	6
	Total hours	30

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1	Introduction to the course. Selection of topics.	1
Sem 2	Tools supporting the ontology creation.	3
Sem 3	Web services for the Semantic Web.	2

Sem 4	Agent-based technologies for the Semantic Web.	3
Sem 5	Semantic information retrieval.	3
Sem 6	Applications of Semantic Web exploiting technologies for knowledge acquisition and knowledge management.	3
	Total hours	15

TEACHING TOOLS USED

N1. Lectures with a slide show.
N2. Laboratory exercises in a computer lab.
N3. The lecturer consultation.
N4. Student's own work - preparation for the laboratory.
N5. Topic discussion and presentation at the seminar.
N6. Multimedia presentation at the seminar

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P - lecture	PEK_W01 – PEK_W03 PEK_K01 – PEK_K03	Exam
F - labolatory	PEK_U01 – PEK_U03 PEK_K01 - PEK_K03	implementation of the laboratory tasks, assessment of the completed tasks
F - seminar	PEK_W01 - PEK_W03 PEK_K01 - PEK_K03	presentation assessment prepared on a given topic

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] John Davies, Dieter Fensel & Frank van Harmelen:, "*Towards the Semantic WEB – Ontology Driven Knowledge Management*", John Wiley & Sons, 2003.
[2] Michael C. Daconta, Leo J. Obrst, Kevin T. Smith: "*The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management*", Wiley Publishing, 2003.
[3] Marc Ehrig: "*Ontology Alignment: Bridging the Semantic Gap*", Springer Verlag, 2007.
[4] Ambroszkiewicz S., Mikułowski D.: „Web serwisy i Semantic Web – idee i technologie", Akademicka Oficyna Wyd. EXIT, 2006.
[5] Materiały *WWW Consortium* - www.w3.com

SECONDARY LITERATURE:

[1] Ian Horrocks, Peter F. Patel-Schneider, and Frank van Harmelen. From SHIQ and RDF to OWL: The making of a web ontology language. Journal of Web Semantics, 2003.

[2] Dieter Fensel: "*Ontologies: A Silver Bullet for Knowledge Management and Electronic Commerce*", Springer Verlag, 2001.
[3] Dieter Fensel, Wolfgang Wahlster, Henry Lieberman, James Hendler (Eds.): "*Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential",* MIT Press, 2002.
[4] Johan Hjelm, "*Creating the Semantic Web with RDF*", John Wiley, 2001.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Agnieszka Indyka-Piasecka PhD. MSc., agnieszka.indyka-piasecka@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

…… Semantic Web ……

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

……..**Computer Science**…...

AND SPECIALIZATION … **Designing IT Systems (PSI)**……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2PS I_W02	C1	Lec1-Lec10 Lab1-Lab6 Sem2	N1-N6
PEK_W02	K2INF_W06_S2PSI_W03	C2	Lec1-Lec10 Sem3-Sem5	N1, N3-N6
PEK_W03	K2INF_W06_S2PS_W03	C2	Lec11-Lec15 Lab1-Lab6 Sem6	N1-N6
PEK_U01 (skills)	K2INF_W06_S2PS_U03	C1, C2	Lec2-Lec15 Lab2, Lab3, Lab5 Sem3-Sem6	N1-N6
PEK_U02	K2INF_W06_S2PS_U04	C2,C3	Lec2-Lec14 Lab3, Lab4, Lab6	N1-N5
PEK_U03	K2INF_W06_S2PS_U04	C2,C3	Lec2-Lec15 Lab2-Lab6 Sem2-Sem6	N1-N6
PEK_K01 (competences)		C1,C2,C3	Lec1-15 Lab1-Lab6 Sem2-Sem6	N1-N6
PEK_K02		C1,C2,C3	Lab1-Lab6 Sem1-Sem6	N1-N6
PEK_K03		C3	Lab2-Lab6	N1-N6

** - enter symbols for main-field-of-study/specialization educational effects

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Seminarium dyplomowe

Name in English Diploma seminar

Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005220
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					90
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points					2
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes					1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge, skills and competences acquired at Informatics field at second level of study until 3th semester

\

SUBJECT OBJECTIVES

C1 Preparing students to write a master thesis according the internal requirements in Informatics field at Faculty of Computer Science and Management, Wrocław University of Technology,
C2 Providing students with basic skills related to preparation and presentation of scientific texts, beginning from the choice of topic, selection of tasks to be performed, use of literature to interpretation of the results.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
…
relating to skills:
PEK_U01 He is able to acquire information from literature, databases and other sources, also in English or other language used for communication in Informatics field, is able to integrate the information obtained, interpret them, make critical evaluation and also draw conclusions and formulate and justify opinions related to prepared master thesis.
PEK_U02 He can communicate using a variety of techniques in his professional environment and in other environments, also in English or other foreign language used for communication in Informatics field and also to present the results of his master thesis

relating to social competences: …

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1	Familiarization with the principles of master thesis realization at Informatics field. Rules related to student presentations. Determining the schedule of student presentations.	2
Sem 2	Review of basic skills related to preparation and presentation of scientific texts by students, beginning from the choice of topic, selection of tasks to be performed, use of literature and also how to write thesis and how obtained results should be interpret.	2
Sem 3 – Sem15	During semester each student has 2 presentations. The first presentation is related to the general view of the thesis topic, its placement in the literature and in the Informatics field. The student should present the primary aim of thesis, the state of art related to thesis topic, the concept of solution, the initial structure of thesis and timetable for further work. The purpose of the second presentation is preparation to defense and demonstrate presentation skills in English. The second presentation consists of two parts, namely, discussion of the results of the work	26

	in English and a short presentation in Polish devoted to the results of the thesis.	
	Total hours	30

TEACHING TOOLS USED

N1. Multimedia presentations
N2. Examples of scientific papers and reports from the field of computer science.
N3. E-Learning System used to publish teaching materials and announcements, also used for collection and evaluation of student work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01 PEK_U02	Evaluation of the presentation of the work at the seminar and prepared documentation from the presentation. The evaluation shall be subject to the fulfillment of the requirements for the presentation, including its substantive scope, structure and organization of presentation, techniques of conversation, a form of presentation, compactness of presentation and conclusions reached. Participation in the discussions after presentation is also evaluated. In addition, the seminar leader is able to control the cooperation between supervisors and graduate students.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[155] Literature related to the scope of realized project selected by student and recommended by the teacher.

[156] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. inż. Leszek Borzemski, prof. PWr, leszek.borzemski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Diploma seminar
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
AND SPECIALIZATION **every specjalization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3
PEK_U02	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT…

SUBJECT CARD

Name in Polish Systemy informacyjne
Name in English Information systems
Main field of study (if applicable): Informatics
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code INZ3762
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				30
Number of hours of total student workload (CNPS)	60				60
Form of crediting	crediting with grade	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	crediting with grade
For group of courses mark (X) final course					
Number of ECTS points	2				2
including number of ECTS points for practical (P) classes	0				0
including number of ECTS points for direct teacher-student contact (BK) classes	1,2				1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic mathematical knowledge for 1st level of studies.

2. Informatics knowledge background.
3. Algorithms knowledge background.

\

SUBJECT OBJECTIVES

C1 Acquiring knowledge about functions and significance of information systems in contemporary organizations
C2 Acquainting with the functions and development of information systems in information society
C3 Acquainting with the different methods of information retrieval by surfing the Web
C4 Recognizing the problems of passing of contemporary organizations to Internet space
C5 Obtainment of skills to analyze the literature from information systems area and to synthesize the contents from different sources
C6 Application of the obtained knowledge to presentation the problems from information systems area by means of using adequate tools

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Familiarity with basic models of information systems
PEK_W02 Basic knowledge about Web information systems
PEK_W03 Familiarity with common multimedia technologies
PEK_W04 Understanding of the measures of information retrieval efficiency

relating to skills:
PEK_U01 Student can to build information query for different types of information needs
PEK_U02 Can to determine basic features of information system for given organization
PEK_U03Student be able to evaluate the precision of retrieved information
PEK_U04 Can to present basic features of given information system

relating to social competences:
PEK_K01 Can individually to use literature of the subject and to select useful information
PEK_K02 Student is convinced above positive role of information systems in stimulation of the civilization development

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	History of information systems development. Information processing. Theoretical basis of information systems.	2
Lec 2	Main information systems' models. Automation of information flow in organization.	2
Lec 3	Information retrieval on Internet – fundamentals.	2
Lec 4	Web information systems.	2
Lec 5	Multimedia. Importance of multimedia technologies in information systems development.	2
Lec 6	How societies embrace information technology. Digital libraries.	2
Lec 7	Efficiency of information systems. Case study of chosen information system.	2
Lec 8	Test	1
	Total hours	15

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Introductory seminar.	2
Sem 2	Information systems – definitions, types, features, examples.	2
Sem 3	Information retrieval fundamentals – models, dictionaries, indexes.	2
Sem 4	Evaluation of information systems' efficiency.	2
Sem 5	Analytical retrieval of information.	2
Sem 6	Information retrieval on Internet.	2
Sem 7	ERP class systems.	2
Sem 8	Mobile information systems.	2
Sem 9	Multimedia information systems.	2
Sem 10	Information systems for teleworking.	2
Sem 11	How societies embrace information technology.	2
Sem 12	CRM systems.	2
Sem 13	Knowledge management systems.	2
Sem 14	Information society: e-business, e-administration, e-commerce, e-health	2

Sem 15	Seminar summation and credit.	2
	Total hours	30

TEACHING TOOLS USED

N1. Computerized presentation at the lectures.
N2. Presentation with visualization and using Internet resources during the seminar.
N3. Consultations.
N4. Students' homework with using software packages.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 PEK_U04 PEK_K02	Grade of presentation (quality of slides, oral presentation, relevance, duration), presence and activity.
F2	PEK_K01	Report's grade
P-seminar	PEK_U02	Grade result from F1 and F2
P-lecture	PEK_W01-PEKW04 PEK_U03	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Manning C. D., Raghavan P., Schutze H.: *Introduction to Information Retrieval*, Cambridge University Press, New York, 2009, dostępne także bezpłatnie: www.cambridge.org

[2] Kłopotek M. A.: *Inteligentne wyszukiwarki internetowe* , Akademicka Oficyna Wydawnicza EXIT, Warszawa, 2001.

[3] Wrycza S. (red.): *Informatyka ekonomiczna. Podręcznik akademicki*, PWE, Warszawa, 2010.

[4] Cortada J. W. : How Societies Embrace Information Technology, WILEY-IEEE, NY, 2009.

[5] Baeza-Yates R., Ribeiro-Neto B.: *Modern Information Retrieval*, ACM Press, Adison-Wesley, New York, 1999.

SECONDARY LITERATURE:

[1] Zgrzywa A., Choroś K., Siemiński A.(Eds.): *Multimedia and Internet Systems: Theory and Practice,* Spriger Verlag, Berlin, 2013.

[2] Nguyen N.T., Zgrzywa A., Czyżewski A.(Eds.): *Advances in Multimedia and Network Information System Technology,* Spriger Verlag, Berlin, 2010.

[3] Zawiła-Niedźwiecki J. : *Informatyka gospodarcza*, Wyd. C. H. Beck, 2010.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Aleksander Zgrzywa, Aleksander.Zgrzywa@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INFW03, K2INF_W06	C1	Lec1, Lec 6 Sem 2,Sem 14	N1-4
PEK_W02	K2INF_W04, K2INF_W06	C3,C4	Lec 3, Lec 4 Sem 6,Sem 7, Sem 11	N1-4
PEK_W03	K2INF_W02, K2INF_W06	C2	Lec 5, Lec 6 Sem 13,Sem 14	N1-4
PEK_W04	K2INF_W03	C3	Lec 3, Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U01	K2INF_U01, K2INF_U08	C3	Lec 3,Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U02	K2INF_U05, K2INF_U08	C4	Lec 2,Lec 7 Sem 7,Sem 8,Sem 12,Sem 13	N1-4
PEK_U03	K2INF_U05, K2INF_U08	C3	Lec 2, Lec 5 Sem 3, Sem 5, Se6,Se9	N1-4
PEK_U04	K2INF_U02, K2INF_U03	C5, C6	Lec 5, Lec 6 Sem 3, Sem 5, Sem 6, Sem 9, Sem 10	N1-4

PEK_K01	K2INF_K01, K2INF_U02	C5	Lec 5, Lec 6 Sem 9, Sem 10	N1-4
PEK_K02	K2INF_K02	C1	Lec 1, Lec 6 Sem 2, Sem 14	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: Systemy wspomagania decyzji
Name in English: Decision Support Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Decision Support Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / university-wide*
Subject code: INZ003761
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	15		15	
Number of hours of total student workload (CNPS)	60	30		60	
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / ~~crediting with grade~~*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2	1		2	
including number of ECTS points for practical (P) classes				2	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	0,6		1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None.

\

SUBJECT OBJECTIVES

C1 Getting to know foundations of designing computer science decision support systems using general systemic methods which make it possible to apply unified approaches for analysis and decision making for decision support systems of different nature.
C2 Acquisition of skills to represent in the form of mathematical formulas of decision making plants treated as input-output plants.
C3 Acquisition of skills to analyze of decision making plants treated as input-output plants.
C4 Getting acquainted with methods and algorithms of multi-stage decision making.
C5 Acquisition of skills to apply dynamic programming method.
C6 Getting to know metods and algorithms of multi-criteria decision making.
C7 Acquisition of skills to use AHP method.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Student knows foundations of designing of decision support systems for any kind of plants.
PEK_W02 Student knows foundations of analysis and decision making for input-output plants with logic knowledge representation.
PEK_W03 Student knows selected method of multi-stage and multi-criteria decision making.
relating to skills:
PEK_U01 Student is able to elaborate a mathematical model for an input-output decision making plant in discrete state space as well as with logic knowledge representation.
PEK_U02 Student can solve analysis and decision making tasks for elementary plants with logic knowledge representation.
PEK_U03 Student is able to solve multi-stage decision making problem using Bellman's Principle and dynamic programming.
PEK_U04 Student can use AHP algorithm for the solution od multi-criteria decision making problem
relating to social competences:
PEK_K01 Student can take advantage of professional literature by oneself and can perform the critical analysis of information mined.
PEK_K02 Student can think creatively.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Decision support systems – definitions, structures, problems.	1
Lec 2	Application of discrete state equations and logic expressions for representation of decision making plants.	2
Lec 3	Analysis of decision making plants, in particular logic-algebraic method.	2
Lec 4	Decision making – definition, typology, logic-algebraic plant.	2
Lec 5	Bellman's Principle and multi-stage decision making.	3
Lec 6	Multi-criteria decision making, Pareto sets, AHP method.	3
Lec 7	Examples of computer decision support systems.	2
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Solution of numerical exercises concerning difference equations.	1
Cl 2	Solution of numerical exercises concerning differential equations as well as propositional calculus.	2

Cl 3	Solution of numerical exercises concerning mathematical representations of input-output plants.	2
Cl 4	Solution of numerical exercises concerning analysis using logic-algebraic method.	2
Cl 5	Solution of numerical exercises concerning decision making using logic-algebraic method.	2
Cl 6	Solution of numerical exercises concerning dynamic programming.	2
Cl 7	Solution of numerical exercises concerning AHP method.	2
Cl 8	Final test.	2
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Collecting of indispensable information about selected plant being the decision making plant.	2
Proj 2	Determination of mathematical model of selected decision making plant and decision making problem formulation.	2
Proj 3	Analysis of decision making plant using its mathematical model.	2
Proj 4	Choice of decision making method for further usage as well as elaboration of decision making algorithm.	3
Proj 5	Implementation and alalysis of decision making algorithm.	4
Proj 6	Elaboration of conclusions and written report of the project performed.	2
	Total hours	15

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1 Lecture – traditional method. N2 Classes – traditional method. N3 Consultation. N4 Individual discussion with student. N5 Short test (10 mins.). N6 Self-contained work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Short tests during the classes.
F2	PEK_K01– PEK_K02	Individual discussion with student during the project.
P (Classes)	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Test.
P (Project)	PEK_U01–PEK_U04; PEK_K01–PEK_K02	Evaluation of written report of the project.
P (Lecture)	PEK_W01–PEK_W03; PEK_K02	Exam.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[157] [1] Józefczyk J., Wybrane problemy podejmowania decyzji w kompleksach operacji, Oficyna Wydawnicza PWr, Wrocław 2001.

[158] Bubnicki Z., Podstawy informatycznych systemów zarządzania, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1993.

[159] Roy B., Wielokryterialne podejmowanie decyzji, WNT, Warszawa 1990.

SECONDARY LITERATURE:

[1] Techniki informacyjne w badaniach systemowych, P. Kulczycki, O. Hryniewicz, J. Kacprzyk (red.), WNT, Warszawa 2007.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Jerzy Józefczyk, Jerzy.Jozefczyk@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Decision Support systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Decision Support systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1	Lec1, Lec 2, Lec 7, Cl1, Cl 2, Pr1	N1, N3, N6
PEK_W02	K2INF_W02	C1	Lec3, Lec4	N1, N3, N6
PEK_W03	K2INF_W02	C4, C6	Lec5, Lec6	N1, N3, N6
PEK_U01 (skills)	K2INF_U05; K2INF_U06	C2	Lec2, Cl 3, Proj2	N2–N6
PEK_U02	K2INF_U05; K2INF_U06	C3	Cl 4, Cl 5, Proj3, Pro4	N2–N6
PEK_U03	K2INF_U05; K2INF_U06	C5	Cl 6, Proj4	N2–N6
PEK_U04	K2INF_U05; K2INF_U06	C7	Cl 7, Proj4	N2–N6
PEK_K01 (competences)	K2INF_K01	C1, C4, C6	Lec1– Lec7, Proj1, Proj4	N2–N6
PEK_K02	K2INF_K01	C1–C7	Proj1–Proj6	N2–N6

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

Faculty of Computer Science and Management/ DEPARTMENT……

SUBJECT CARD

Name in Polish Techniki implementacji systemów informatycznych
Name in English Techniques technologies in information systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Information System Design
Level and form of studies: 2nd* level, full-time *
Kind of subject: obligatory / optional / university-wide*
Subject code INZ003789
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	90		90		
Form of crediting	crediting with grade*		crediting with grade*		
For group of courses mark (X) final course					
Number of ECTS points	3		3		
including number of ECTS points for practical (P) classes	0		3		
including number of ECTS points for direct	1.8		1.8		

teacher-student contact (BK) classes					

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Knowledge of databases, object-oriented programming, computer systems and networks

\

SUBJECT OBJECTIVES

C1 To acquaint students with modern technologies implementation of information systems.
C2 Gaining knowledge about the techniques of implementation of information systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has a basic understanding of the implementation of information systems
PEK_W02 student knows and understands the concept of implementation of information systems
PEK_W03 student is able to present the available technology to implement information system

relating to skills:
PEK_U01 student can freely select the method, tools and standards to address the problem of representation, search, information processing, information systems
PEK_U02 student is able to properly design and verify component system
PEK_U03 student is able to assess the usefulness of information systems interface

relating to social competences:
PEK_K01 student is able to find and use the recommended literature course and independently acquire knowledge
PEK_K02 student understands the need for systematic and independent work on mastery of course material

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction, basic terms, concepts and architecture	2
Lec 2	Web applications	2
Lec 3	Java EE	2
Lec 4	.NET	2
Lec 5	Web Services	2
Lec 6	Message-Oriented Middleware	2
Lec 7	Data Integration	2
Lec 8	CORBA - communication in heterogeneous systems	2
Lec 9	BPEL - the language to define business processes based on Web services	2
Lec 10	IT Infrastructure	2

Lec 11	Communications and Networking	2
Lec 12	Database systems	2
Lec 13	Security in Information Systems	2
Lec 14	Ethical and social issues of information systems technology implementation	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Web applications	4
Lab 2	Java EE	5
Lab 3	Java Servlets, JSP, JSF	4
Lab 4	.NET Framework and C#	5
Lab 5	Web Services	4
Lab 6	Enterprise JavaBeans	4
Lab 7	CORBA	4
	Total hours	**30**

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		

…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Traditional lecture N2. Laboratory N3. Consultation N4. Student self-preparation laboratory

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
laboratory	PEK_U01-PEK_U03, PEK_K01-PEK_K02	Verbal response, assessment tasks performed during laboratory
lecture	PEK_W01-PEK_W03 PEK_K01-PEK_K02	Final test
F3		
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Papadopoulos, G.A.; Wojtkowski, W.; Wojtkowski, G.; Wrycza, S.; Zupancic, J. (Eds.), Information Systems Development, Springer 2010

[2] Laudon K. C. and Laudon J. P., Essentials of Management Information Systems, 8th Edition, Pearson, 2008

[3] O'Brien J. A. and Marakas G. M., Introduction to Information Systems, 14th Edition, McGraw-Hill Irwin, 2008

SECONDARY LITERATURE:

[1] Geary D., Horstmann C.: Core JavaServer Faces. 3rd Edition. Prentice Hall 2010

[2] Burns E., Schalk C.: JavaServer Faces 2.0. McGrawHill 2010.

[3] Sriganesh R. P., Brose G., Silverman, M.: Mastering Enterprise JavaBeans 3.0. Fourth Edition. Wiley

2006.

[4] Westphal R., Weyer C.: .NET 3.0 kompakt. Spektrum 2007

[5] Juric M. B. et al.: Business Process Execution Language for Web Services. 2nd Edition. PACKT Publishing 2006

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

dr inż. Zbigniew Telec, zbigniew.telec@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

……

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..

AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02, K2INF_W06, K2INF_W06_ S2PSI_W11	C1	Lec1-14 Lab1-7	N1-4
PEK_W02	K2INF_W02, K2INF_W06, K2INF_W06_S2PSI_W11	C1	Lec1	N1-4
PEK_W03	K2INF_W02, K2INF_W06, K2INF_W06_S2PSI_W11	C1	Lec2-8 Lab1-7	N1-4
PEK_U01 (skills)	K2INF_U01, K2INF_W08, K2INF_U08_S2PSI_U03, K2INF_U08_S2PSI_U04	C1,C2	Lec2-14 Lab1-7	N1-4
PEK_U02	K2INF_U01, K2INF_W08, K2INF_U08_S2PSI_U03,K2INF_U08_S2PSI_U04	C1, C2,	Lec2-5 Lab1-7	N1-4
PEK_U03	K2INF_U01, K2INF_W08, K2INF_U08_S2PSI_U04, K2INF_U08_S2PSI_U09	C1,C2	Lec1-14 Lab1-7	N1-4
PEK_K01 (competences)		C1, C2	Lec1-14 Lab1-7	N1-4
PEK_K02		C1, C2	Lec1-14 Lab1-7	N1-4
…				

** - enter symbols for main-field-of-study/specialization educational effects

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: Teoria i inżynieria ruchu teleinformatycznego

Name in English: Theory and engineering of teletraffic

Main field of study (if applicable): Computer science

Specialization (if applicable): Teleinformatics

Level and form of studies: 2nd level, full-time

Kind of subject: obligatory

Subject code INZ3759

Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload (CNPS)	30			90	
Form of crediting	Crediting with grade			Crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	1			3	
including number of ECTS points for practical (P) classes				3	
including number of ECTS points for direct teacher-student contact (BK) classes	0,6			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

25. Has a basic knowledge of ICT systems and computer communication networks (K1INF_W11).
26. Knows the basic methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_W16)
27. Can use the right tools to build a simple model of the process (the object), to formulate specific task analysis and decision making (K1INF_U15)
28. Can effectively use the methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_U16)
29. It has the ability to self-education, including in order to improve the professional competence (K1INF_U05)
30. Understands the need and knows the possibility of lifelong learning and to improve their professional and social competences (K1INF_K01)

SUBJECT OBJECTIVES

C1. Ordered, underpinned by theoretical knowledge of methods and techniques for transmitting signals using different modulation techniques, methods and techniques of information transmission, methods of organization and management of data communications traffic in the tasks of design and analysis of communication systems, methods of delivering service quality of ICT systems, analysis of quantitative and qualitative requirements and methods for sizing of distributed IT systems.

C2. Skills about the differences and benefits of the use of analog and digital data transmission techniques, the differences and benefits of the use of wired and wireless signal transmission techniques, developing the concept of using wired and wireless technologies in the basic applications of ICT systems, defining the qualitative and quantitative requirements of the user information and communication systems range of data, designing ICT solutions needed to achieve the qualitative and quantitative requirements of the user, using standards and solutions available on the market, estimating the cost of preparing and maintaining ICT solutions needed to achieve the qualitative and quantitative requirements, designing modernization of IT solutions needed to achieve the qualitative and quantitative requirements, identifying differences and similarities between solutions in a variety of applications (e-health, e-government and e-learning, in real-time systems, etc.).

C3. Skills for the design and analysis of complex, distributed ICT systems providing network services for distributed computer communication systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

K2INF_W02: Has a structured, theoretically founded essential knowledge of business modeling and requirements specification systems.

K2INF_W03: Has a structured, theoretically founded essential knowledge in the delivery of information distributed systems

K2INF_W06: Achieves results in the category of knowledge for specialty data communications

relating to skills:

K2INF_U05: Can - in formulating and solving engineering tasks - integrate knowledge of the fields of science and scientific disciplines relevant to the study being studied and applied a systemic approach, taking into account the non-technical aspects

K2INF_U06: Can solve the modeling, analysis and decision making for different types of objects

K2INF_U08: Achieves results and skills in areas of data exchange and computer communications systems

relating to social competences:

K2INF_K01: Can think and act in a creative and enterprising

K2INF_K02: Has aware of the social role of technical graduating, especially understands the need for the formulation and communication to the public, especially through the mass media, information and opinion on the achievements of technology and other aspects of engineering, shall endeavor to provide such information and opinions in a widely understood the reasons for the different points of view

PROGRAMME CONTENT	
Form of classes - lecture	**Number**

		of hours
Lec 1	Classification of ICT systems from different points of view. Quality of Experience (QoE) and Quality of Service (QoS) in ICT systems with elastic and streaming traffic.	2
Lec 2	Introduction to queuing. Open and close networks of queues.	2
Lec 3	Queuing models of circuit-switched and packet-switched computer communication systems. Burke's theorem and Kleinrock approximation.	2
Lec 4	Access control, flow control and routing tasks formulation and solution in distributed environments.	2
Lec 5	Requirements analysis	1
Lec 6	Models (Poisson, Markov modulated, self-similarity, etc) of teletraffic and its application in traffic engineering tasks.	2
Lec 7	QoS delivery concepts: best effort, integrated services and differentiated services	2
Lec 8	New concepts of systems and networks - NXGN (Next Generation Networks) i NWGN (New Generation Network). Summary.	2
	Total hours	15

PROGRAMME CONTENT		
Form of classes - project		**Number of hours**
Proj 1	Formulation design task based on the analysis of the literature, documentation, etc.	2
Proj 2	Justification for the choice task and purpose of the task design - an analysis of the expected benefits of the project task.	2
Proj 3	Quantitative requirements analysis for the communication system under design	2
Proj 4	Qualitative requirements analysis for the communication system under design	2
Proj 5	Analysis of state of the art on how to solve the task design	2
Proj 6	Analysis and selection of the task design methodology	2
Proj 7	Tools (methods, algorithms, procedures, software and hardware) analysis and selection required for the implementation of the project task	2
Proj 8	Implementation of prototype of modules solve the task	2
Proj 9	Prototype testing and evaluation	2
Proj 10	Modification of solutions using prototype test results	2
Proj 11	Integration of modules distinguished at the stages of requirements analysis and prototyping	2
Proj 12	Verification and testing of an integrated solution design task	2
Proj 13	Analysis of the possibility of extending the project tasks	2
Proj 14	Preparation of the presentation and documentation of the design task	2
Proj 15	Presentation of the results of the design task	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture supported by whole class multimedia presentations based on literature and open access and commercial sources.
N2. Student's own works – solving experiments and tasks in laboratory as well as homework.
N3. Student's own works – literature and open access sources studies.
N5. Collective works in laboratory
N5. Student's own works – preparation of presentations and technical documentations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	Observation and verification of student activity. Solving the sample jobs.
F1 – F15 (project)	K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and assessment of student autonomy.
P (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	Colloquium (course credit) in the evaluation of forming F1 (lecture)
P (project)	K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Total weighted ratings F1 - F15 (project) and the assessment for the presentation of the final results of the project.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[160] A.S. Tanenbaum, „Computer networks”, Prentice Hall; 1996
[161] G. Pujolle, D. Seret, D. Dromard, E. Horlait, „Integrated Digital Communication Networks”, J. Wiley & Sons
[162] B. Russell, „The art of computer networks”, Prentice Hall; 2009
[163] V.S. Bagad, I.A. Dhotre, „Computer networks”, Technical Publications, 2009.
[164] M. Roden, „Analog and digital communication systems”, Prentice Hall
[165] http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

SECONDARY LITERATURE:

[62] S. Haykin, „Telecommunication systems”, Prentice Hall, 1999.
[63] MIT Free Open Course Materials (http://ocw.mit.edu/index.htm)
[64] CCNA Exploration Network Fundamentals, Cisco Academy, PWN, 2008

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Adam Grzech, adam.grzech@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Theory and engineering of teletraffic

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer science

AND SPECIALIZATION
Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1, C2, C3	Lec 1 – Lec 8	N1, N4
PEK_W02	K2INF_W03	C1	Lec 1 – Lec 8	N1,N2, N4
PEK_W03	K2INF_W06	C1	Lec 1 – Lec 8	N1, N4
PEK_U01 (skills)	K2INF_U05	C1, C2, C3	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_U02	K2INF_U06	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_U03	K2INF_U08	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_K01 (competences)	K2INF_K01	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_K02	K2INF_K02	C1, C2	Lec 1 – Lec 8	N1, N2, N3, N4, N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Zaawansowane metody i techniki analizy danych
Name in English Advanced Methods and Techniques of Data Analysis
Main field of study (if applicable): computer science
Specialization (if applicable): …….
Level and form of studies: 2nd* level, full-time
Kind of subject: obligatory
Subject code INZ003758
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	crediting with grade*		crediting with grade*		

For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes	0		4		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of mathematics and mathematical statistics

\

SUBJECT OBJECTIVES

C1 Introduce the methods and techniques of the statistical data analysis to students
C2 Gather knowledge for Knowledge Discovery (Data Mining)
C3 Applying the gathered knowledge to drawing conclusions based on data analysis

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has a basic knowledge of Knowledge Discovery (Data Mining)
PEK_W02 student has a basic knowledge of statistical data analysis
PEK_W03 student is able to present differences between parametric and non-parametric tests

relating to skills:
PEK_U01 student is able to choose a proper statistical test
PEK_U02 student is able to draw conclusion from data analysis
PEK_U03 student is able to select a proper data mining method

relating to social competences:
PEK_K01 student is able to search and reuse the primary and secondary literature listed below and is able to gather the proper knowledge
PEK_K02 student understands the need for systematic and individual work in order to cover the scope of the course

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to knowledge discovery	2
Lec 2	Classification and Data Clustering	2
Lec 3	Clustering Algorithms	2
Lec 4	Discovering association rules	2
Lec 5	Statistics - basic notions	2
Lec 6	The selected problems of estimation theory	2
Lec 7	Introduction to verification of statistical hypothesis	2
Lec 8	Parametric tests for one population	2
Lec 9	Non-parametric tests for one population	2
Lec 10	Parametric tests for two populations	2
Lec 11	Non-parametric tests for two populations	2

Lec 12	Parametric tests for more than 2 populations	2
Lec 13	Non-parametric tests for more than 2 population	2
Lec 14	Correlation and regression methods	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Introduction to WEKA	2
Lab 2	Knowledge discovery in WEKA	8
Lab 3	Introduction to MATLAB	2
Lab 4	Statistical data analysis in MATLAB	8
Lab 5	Introduction to R	2
Lab 6	Statistical data analysis in R	8
	Total hours	30

Form of classes - project		**Number of**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Traditional lecture N2. Labs N3. One-to-one consultancy during stuff hours

N4. Student self-study

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P -laboratory	PEK_U01-PEK_U03, PEK_K01-PEK_K02	Evaluation of the prepared tasks during labs, oral test
P-lecture	PEK_W01-PEK_W03 PEK_K01-PEK_K02	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[166] M. Sobczyk: Statystyka, Wydawnictwo Naukowe PWN, 2007

[167] W.Krysicki, J.Bartos, W. Dyczka, K. Królikowska, M. Wasilewski: Statystyka, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, cz. 2 Statystyka matematyczna, Wydawnictwo Naukowe PWN, 2007

[168] Marek Walesiak, Eugeniusz Gatnar (Red. nauk.) :Statystyczna analiza danych z wykorzystaniem programu R, Wydawnictwo Naukowe PWN, 2009

[169] M. Korzyński: Metodyka eksperymentu Planowanie realizacja i statystyczne opracowanie wyników eksperymentów technologicznych, Wydawnictwo Naukowo-Techniczne 2006

[170] Nong Ye, : The Handbook of Data Mining, Lawrence Erlbaum Associates, Publishers, 2003

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Prof. dr hab. inż Ngoc Thanh Nguyen, Ngoc-Thanh.Nguyen@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Advanced Methods and Techniques of Data Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY computer science
AND SPECIALIZATION **……**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C2	Lec1-4 Lab1-2	N1-4
PEK_W02	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_W03	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_U01	K2INF_U01, K2INF_W06, K2INF_W08	C1	Lec5-14 Lab3-6	N1-4
PEK_U02	K2INF_U01, K2INF_W06, K2INF_W08	C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_U03	K2INF_U01, K2INF_W06, K2INF_W08	C2	Lec1-4 Lab1-2	N1-4
PEK_K01		C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_K02		C1, C2, C3	Lec1-14 Lab1-6	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: **Zarządzanie projektem informatycznym**
Name in English: **Software Project Management**

Main field of study: Computer Science
Specialization: Designing IT Systems
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code: INZ003827
Group of courses: NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			30	
Number of hours of total student workload (CNPS)	120			90	
Form of crediting	Examination-/ ~~crediting with grade*~~	Examination / crediting with grade*	Examination-/ crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	4			3	
including number of ECTS points for practical (P) classes	0			3	
including number of ECTS points for direct teacher-student contact (BK) classes	2,4			1,8	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Completing courses in data base and/or information system design
2. Completing courses in programming web and/or mobile systems

SUBJECT OBJECTIVES

C1 Familiarize students with modern methods for software project management.
C2 Acquiring knowledge of risk management and project quality assurance.
C3 Acquiring knowledge of team management and communication in IT projects.
C4 Gaining skills in work breakdown, planning, scheduling, cost estimation, and monitoring in IT projects.
C5 Gaining skills in utilizing software tools supporting IT project management.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has a systematised knowledge concerning methods for software project management.
PEK_W02 student knows and understands the notions of risk and quality in IT project.
PEK_W03 student has a well-ordered and theoretically supported knowledge concerning team management and communication in IT project.

relating to skills:
PEK_U01 student can select and apply management methods appropriate for different phases of information system development.
PEK_U02 student is able to carry out work breakdown, allocate resources, work out schedule, estimate costs, monitor and report IT project accomplishment.
PEK_U03 student is able to select software supporting tools for software project management.

relating to social competences:
PEK_K01 student can retrieve and utilize information from recommended sources and acquire knowledge on his own.
PEK_K02 student understands the necessity of working systematically and creatively to accomplish the course
PEK_K03 student is able to manage a team accomplishing IT project

PROGRAMME CONTENT

Form of classes – lecture		**Number of hours**
Lec 1	Introduction. Basic notions	2
Lec 2	Requirement management	2
Lec 3	Work breakdown structure	2
Lec 4	Project planning	2
Lec 5	Earned value method	2
Lec 6	Risk management	2
Lec 7	Project size estimation	2
Lec 8	Project cost estimation	2
Lec 9	Project quality management	2
Lec 10	Team management	2
Lec 11	Agile project management	2
Lec 12	Communication in project team	2
Lec 13	Configuration and change management	2

Lec 14	Maintenance management	2
Lec 15	Typology of supporting tools	2
	Total hours	30

Form of classes – class		**Number of hours**
Cl 1		
Cl 2		
...		
	Total hours	

Form of classes – laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
…		
	Total hours	

Form of classes – project		**Number of hours**
Proj 1	Introduction. Division into project teams. Selecting IT projects to be managed.	2
Proj 2-3	Working out feasibility study.	4
Proj 4-5	Working out requirement specification.	4
Proj 6	Working out Work Breakdown Structure .	2
Proj 7	Planning and scheduling: Gantt and PERT chart construction.	2
Proj 8	Workload optimization.	2
Proj 9	Project duration shortening.	2
Proj 10-13	Project monitoring: earned value method. Project completion simulation.	8
Proj 14	Project reporting, assessment of techniques used and supporting software.	2
Proj 15	Working out final report.	2
	Total hours	30

Form of classes – seminar		**Number of hours**
Sem 1		
Sem 2		
…		
	Total hours	

TEACHING TOOLS USED
N1. Lecture (delivered with slides) N2. Laboratory (using supporting software tools) N3. Consultations N4. Student's own work

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P –	Educational effect number	Way of evaluating educational effect achievement

concluding (at semester end)		
F1 -project	PEK_U01-PEK_U03, PEK_K01-PEK_K03	Assessment of tasks accomplished during project and interim reports
P1 - lecture	PEK_W01, PEK_W02, PEK_W03 PEK_K01, PEK_K02, PEK_K03	Examintion
P2 -project	PEK_U01-PEK_U03, PEK_K01-PEK_K03	Presentation of completed project and final report

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Koszlajda Adam: Zarządzanie projektami IT : przewodnik po metodykach. Helion 2010
[2] Phillips Joseph: Zarządzanie projektami IT. Helion 2011.
[3] Sommerville Ian: Inżynieria oprogramowania. WNT 2003
[4] Chatfield Carl, Johnson Timothy: Microsoft Project 2013 Krok po kroku. Promise, 2013
[5] Wróblewski Piotr: Zarządzanie projektami informatycznymi dla praktyków. Helion 2005

SECONDARY LITERATURE:

[1] Szyjewski Zdzisław: Metodyki zarządzania projektami informatycznymi. Placet 2004
[2] Flasiński Mariusz: Zarządzanie projektami informatycznymi. PWN 2006
[3] Leffingwell Dean, Widrig Don: Zarządzanie wymaganiami. WNT 2003
[4] Korczowski Adam: Zarządzanie ryzykiem w projektach informatycznych. Teoria i praktyka. Helion 2010
[5] Pressman Roger S.: Praktyczne podejście do inżynierii oprogramowania. WNT 2004
[6] Wilczewski Sebastian: MS Project 2010 i MS Project Server 2010. Efektywne zarządzanie projektem i portfelem projektów. Helion 2011

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

dr inż. Bogdan Trawiński, bogdan.trawinski@pwr.edu.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Software Project Management
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION **Designing IT Systems**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W03, K2INF_W06_S2PSI_W01	C1	Lec1-15 Proj1-15	N1-4
PEK_W02	K2INF_W03, K2INF_W06_S2PSI_W01	C2	Lec6, Lec9 Proj1-15	N1-4
PEK_W03	K2INF_W03, K2INF_W06_S2PSI_W01	C3	Lec10, Lec11, Lec12 Proj1-15	N1-4
PEK_U01 (skills)	K2INF_U01, K2INF_U08_S2PSI_U01	C4,C5	Lec1-15 Proj1-15	N1-4
PEK_U02	K2INF_U01, K2INF_U08_S2PSI_U01	C4,C5	Lec1-15 Proj1-15	N1-4
PEK_U03	K2INF_U01, K2INF_U08_S2PSI_U01	C4,C5	Lec15 Proj1-15	N1-4
PEK_K01 (competences)		C1-5	Lec1-15 Proj1-15	N1-4
PEK_K02		C1-5	Lec1-15 Proj1-15	N1-4
PEK_K03		C1-5	Lec1-15 Proj1-15	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Bezpieczeństwo baz danych

Name in English Database Security

Main field of study (if applicable): Computer Science

Specialization (if applicable): Database Systems

Level and form of studies~~: 1st~~/ 2nd* level, full-~~time / part-time*~~

Kind of subject: obligatory ~~/ optional / university-wide*~~

Subject code INZ003788

Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			15	
Number of hours of total student workload (CNPS)	120			60	
Form of crediting	Examination / ~~crediting with grade*~~	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	4			2	
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	2,4			1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Student has competence from the scope of bases of the computer science and bases of databases. Student has a knowledge in the scope of the designing and producing the software.

\

SUBJECT OBJECTIVES

C1 Educating the abilities of solving and understanding problems connected to all levels of data and database protection.
C2 Providing the knowledge of the evaluation and applying the cryptographic protection of databases and applying high technologies of the access and management policy with use confidence.
C3 Providing the knowledge of safety of the data warehouse and stream data systems
C4 Educating the abilities from the scope of particular methods of the protection of sensitive databases and the privacy protection.
C5 Educating the ability of assuring safety in statistical databases and databases in mobile systems
C6 Providing the knowledge in the scope of the systems design of databases assuring safety
C7 Providing the competences of implementation of algorithms and protection systems of databases

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student has a knowledge about designing and implementing the protection of databases on the different level of the model of the data protection

PEK_W02 Student has competence in of cryptographic methods applied in the data protection and databases,

PEK_W03 Student knows contemporary methods in assuring safety at data warehouses and in flow systems

PEK_W04 Student has the knowledge in the scope of the privacy protection and protections of sensitive databases

PEK_W05 Student knows principles of protection and algorithms applied in statistical databases and mobile data systems

PEK_W06 Student has an ability of designing safe databases,

relating to skills:

PEK_U01 Student is possessing skills of the evaluation of the state of the safety of the database

PEK_U02 Student has the abilities of noticing threats and applying suitable methods of the data protection

PEK_U03 Student is able to apply principles of protection of flow and mobile databases in practice

PEK_U04 Student is able to apply the safe data storage and the data recovery methods

PEK_U05 Student is possessing a skill of analysis, the design and the implementation of security systems in databases,

relating to social competences:

PEK_K01 Student is able to cooperate in team during the realization of protection systems of databases.

PEK_K02 Student is able to notice social and legal problems of applying methods of the protection of databases.

PEK_K03 Student has a skill of the independent and creative thinking with the respect for the law and of professional ethics.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction. Basic definitions. Information security, data security, safety of databases.	2
Lec 2	Basic model of the safety of databases. Physical security, politics of the protection, computer protection.	2
Lec 3	Databases and cryptographic methods. Cryptographic schemes used in protecting databases.	2
Lec 4	Advanced classical cryptographic schemes. Cryptographic protocols and the data security.	2
Lec 5	An electronic signatures and systems of authenticating.	2
Lec 6	Models of the access control. The access policy and its realization.	2
Lec 7	Managing the confidence and the negotiation of the confidence.	2
Lec 8	Structures of authentication indices in the outsourcing of databases. Safe and trusted databases.	2
Lec 9	The management and encoded enquiries. The safety of the data warehouse and OLAP systems.	2
Lec 10	Safety of flow systems. Safe semantic Web networks. Safety of spatial databases.	2
Lec 11	Concepts and techniques reengineering of safety. Watermarks of data and databases. Trusted retentions of records.	2
Lec 12	Damaging and recovering databases. Systems of the storage and the data security.	2
Lec 13	Medical databases and their safety. Ensuring the privacy and the safeguard against systems of the data mining.	2
Lec 14	The privacy and the publication of data. Statistical databases. Anonymizing.	2
Lec 15	Data security and of databases in mobile systems.	2

	Total hours	30

Form of classes - class		Number of hours
Cw 1		
Cw 2		
Cw 3		
Cw 4		
Cw 5		
Cw 6		
Cw 7		
Cw 8		

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
...		
	Total hours	

Form of classes - project		Number of hours
Proj 1	Introduction into the project implementation. Determining preliminary requirements.	1
Proj 2	Analysis of requirements for the designed security system. Works on the model.	2
Proj 3	Formal design specification.	2
Proj 4	Implementation of the first step.	2
Proj 5	Implementation of the second step.	2
Proj 6	Testing. Tests of the safety.	2
Proj 7	Model tests and the audit.	2
Proj 8	Presentation of tasks carried out and findings.	2
	Total hours	15

Form of classes - seminar		Number of hours
	Total hours	

TEACHING TOOLS USED

N1. Multimedia presentations N2. The course Web page N3. Electronics and paper books and library references

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01÷PEK_U05 PEK_K01÷PEK_K03	Evaluation of presentation, discussion and activity
F2	PEK_W01÷PEK_W07 PEK_U01÷PEK_U05 PEK_K01÷PEK_K03	Final exam
C=F1+F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[171] Gertz M., Jajodia S., Handbook of database security. Springer. 2008.
[172] Natan R.B., Implementing Database Security and Auditing, Elsevier 2007.
[173] Wayner P., Translucent Database. CreateSpace Independent Publishing Paltform 2009.
[174] Liber A., Wprowadzenie do bezpieczeństwa baz danych. Wrocław 2012 (w druku).

SECONDARY LITERATURE:

[65] Nisbet R., Elder J., Miner G., Handbook of Statistical Analysis and Data Mining Applications. Academic Press. 2009.
[66] www.ii.pwr.wroc.pl/~liber

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Arkadiusz Liber, arkadiusz.liber@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

……

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..

AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006,	C1	Lec1,Lec2,Lec3	N1,N2,N3
PEK_W02	K2INF_U08_S2SBD_U006, K2INF_U08_S2SBD_U004	C2	Lec4,Lec5,Lec6,Lec7, Lec8	N1,N2,N3
PEK_W03,	K2INF_U08_S2SBD_U004	C2, C3	Lec9,Lec10,Lec11	N1,N2
PEK_W04	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006	C4	Lec12	N1,N2,N3
PEK_W05	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006	C5	Lec13	N1,N2,N3
PEK_W06	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006, K2INF_U08_S2SBD_U004	C6	Lec14,Lec15	N1,N2,N3
PEK_U01, PEK_U02	K2INF_U08_S2SBD_U004	C1,C6,C7	Lec1,Lec2,Lec3, Lec4,Lec5,Lec6,Lec7, Lec8, Lec9	N1,N2,N3
PEK_U03	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006, K2INF_U08_S2SBD_U004		Lec10	N1
PEK_U04	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006, K2INF_U08_S2SBD_U004	C1,C3,C4,C5,C7	Lec11,Lec12,Lec13,Lec14,Lec15	N1,N2,N3
PEK_U05	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006, K2INF_U08_S2SBD_U004	C1,C3,C4,C5	Pr1,Pr2,Pr3,Pr4,Pr5,Pr6,Pr7,Pr8	N1,N2,N3

PEK_K01	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006, K2INF_U08_S2SBD_U004	C1-C7	Lec1-W15,Pr1-Pr8	N1-N3
PEK_K02, PEK_K02	K2INF_U08_S2SBD_U004	C1-C7	Lec1-W15,Pr1-Pr8Lec1,Lec4,Lec7, Lec8,Lec9Lec10,Lec11,Lec12,Lec13,Lec14, Lec15	N1-N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Dedukcyjne bazy danych
Name in English *Deductive databases*
Main field of study (if applicable): Computer Science
Specialization (if applicable): Database systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part time~~*
Kind of subject: obligatory ~~/ optional / university wide~~*
Subject code INZ003787
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			30	
Number of hours of total student workload (CNPS)	120			120	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	4			4	
including number of ECTS points for practical (P) classes	0			4	
including number of ECTS points for direct teacher-student contact (BK) classes	2,4			2,4	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of relational data model
2. Is able to develop database application with SQL language

3. Knowledge of mathematical logic (propositional, predicate calculus)

\

SUBJECT OBJECTIVES

C1 The development of students skills in building logical models
C2 To enhance students' knowledge about deduction methods used in deductive databases
C2 To learn how to practically apply best practices in deductive database design with Datalog language.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Is familiar with Datalog language
PEK_W02 Is able to present and compare usages of deduction methods used in deductive databases
PEK_W03 Knows methods of Datalog queries processing and optimization

relating to skills:
PEK_U01Is able to develop models of real world with Datalog language
PEK_U02 Is able to evaluate and eventually improve efficiency of Datalog queries.

relating to social competences:
PEK_K01Is able to work in and manager a small software development team

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to deductive databases	2
Lec 2	Classification of clauses	2
Lec 3	Principle of resolution	2
Lec 4	Logic programming (Prolog)	2
Lec 5	Prolog inference engine	2
Lec 6	Prolog and the relation algebra	2
Lec 7	Introduction to Datalog	2
Lec 8	Datalog language	2
Lec 9	Datalog queries processing	2
Lec 10	Datalog optimization methods	2
Lec 11	Magic sets	2
Lec 12	Integrity constrains	2
Lec 13	Design of knowledge base	2
Lec 14	The quality of knowledge base	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		

Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1	Introduction, Building of projects teams.	2
Proj 2	Preparing of development environment. DES installation. Developer guide studies. Demonstration of available samples and tutorials.	4
Proj 3	Enhancement of chosen sample project shipped with DES distribution.	4
Proj 4	Implementing of assigned project based on its specification.	4
Proj 5	Enhancement of assigned project with simple additional rules.	4
Proj 6	Enhancement of assigned project with complex additional rules.	4
Proj 7	Preparing the specification of self developed project.	4
Proj 8	Implementing of self developed project.	4
	Total hours	30

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Lecture N2. Individual consultations N3. The course web page with references to literature N4. Software development tools N5. DES System N6. Sample deductive database

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P –	Educational effect number	Way of evaluating educational effect achievement

concluding (at semester end)		
F1	PEK_U01-02, PEK_K01	Evaluation of the 3th project assignment[20 points] (Proj3)
F2	PEK_U01-02, PEK_K01	Evaluation of the 4th project assignment[20 points] (Proj4)
F3	PEK_U01-02, PEK_K01	Evaluation of the 5th project assignment[20 points] (Proj5)
F4	PEK_U01-02, PEK_K01	Evaluation of the 6th project assignment[20 points] (Proj6)
F5	PEK_U01-02, PEK_K01	Evaluation of the 8th project assignment[40 points] (Proj8)
P1	PEK_U01-02, PEK_K01	P1 is based on the sum of the points from F1…F5. At least 50% of points is required.
P2	PEK_W01-03	P2 is based on the result of a written test covering material presented during lectures. At least 50% of points is required to pass the test.
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] R. Colomb, Deductive Databases and Their Applications, CRC Press, 1998

SECONDARY LITERATURE:

[1] S. Ceri, G. Gottlob, L. Tanca, Logic Programming and Databases, Surveys in Computer Science, Springer, 1990
[2] S.K. Das, Deductive Databases and Logic Programming, Addison-Wesley, 1992
[3] J. Ullman: Principles of Database and Knowledge-Base Systems Volume II: The New Technologies,W.H. Freeman & Co., 1989

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Artur Wilczek,
Artur.wilczek@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Deductive databases
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	**Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)****	**Subject objectives*****	**Programme content*****	**Teaching tool number*****
PEK_W01 (knowledge)	K2INF_W06_S2SBD_W04	C1 - C3	Lec1-Lec14	N1-N3
PEK_W02	K2INF_W06_S2SBD_W04	C1 - C3	Lec1-Lec14	N1-N3
PEK_W03	K2INF_W06_S2SBD_W04	C1 - C3	Lec1-Lec14	N1-N3
PEK_U01 (skills)	K2INF_W06_S2SBD_W04, K2INF_U08_S2SBD_U05	C1 – C3	Lec1-Lec14, Proj2-Proj8	N1-N6
PEK_U02	K2INF_W06_S2SBD_W04, K2INF_U08_S2SBD_U05	C1 – C3	Lec1-Lec14, Proj2-Proj8	N1-N6
PEK_K01 (competences)	K2INF_U08_S2SBD_U05	C1	Proj2-Proj8	N1-N6

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: *Implementacja systemów baz danych*
Name in English: *Implementation of database systems*
Main field of study (if applicable): Computer Science
Specialization (if applicable): Database systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide~~*
Subject code INZ003792
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			15	
Number of hours of total student workload (CNPS)	90			30	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3			1	
including number of					

ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,8			0,6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Elementary knowledge of classical data models and database design methods
2. Elementary knowledge of chosen Database Management Systems (Oracle, DB2, MSSQL)

\

SUBJECT OBJECTIVES

C1 To enhance students knowledge about data storage and indexing methods.
C2 To enhance students knowledge about transactions management, data protection methods used in databases.
C3 To get familiarity of query processing and optimization methods.
C4 To obtain by students the ability of effective usage of features offered by modern Database Management Systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Is familiar with functions of components of DBMS and general DBMS architecture
PEK_W02 Is able to present and compare data storage, indexing, queries and transactions processing and optimization methods used in databases
PEK_W03 Is able to evaluate the possibility of usage BMDS features in particular application

relating to skills:
PEK_U01Is able to chose data storage and access methods appropriate for certain requirements.
PEK_U02 Is able to evaluate and eventually improve efficiency of database queries and transactions.

relating to social competences:
PEK_K01Is able to work in and manager a small software development team.
PEK_K02Is able to conduct proof-of concept, test and evaluate database systems available on the market.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction, DMBS architecture	2
Lec 2	External memory (devices, access time characteristics)	2
Lec 3	Storage methods for files of records	1
Lec 4	Data storage techniques 1. Heap files 2. Ordered files 3. Hashed files	6
Lec 5	Indexing 1. Index classification 2. Multilayered indexes (B-trees)	6

	3. Bitmap indexes	
Lec 6	Query processing and optimization 1. Query processing 2. Join algorithms (nested-loop, merge-join, hash-join) 3. Query optimization	6
Lec 7	Transactions management and data protection 1. Transaction serializability 2. Concurrent transactions execution 3. Transaction logs	6
Lec 8	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Introduction, Building of projects teams.	2
Proj 2	Preparing of workload for self chosen database schema and DBMS tests environment	4
Proj 3	Evaluation of database indexing methods	3
Proj 4	Evaluation of database partitioning methods	3
Proj 5	Evaluation of query optimization technics	3
	Total hours	15

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Lecture N2. Individual consultations N3. The course web page with references to literature N4. Software development tools N5. DBMS System N6. DBMS testing tools

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01-02, PEK_K01	Evaluation of the 2th project assignment[20 points] (Proj2)
F2	PEK_U01-02, PEK_K01	Evaluation of the 3th project assignment[20 points] (Proj3)
F3	PEK_U01-02, PEK_K01	Evaluation of the 4th project assignment[20 points] (Proj4)
F4	PEK_U01-02, PEK_K01	Evaluation of the 5th project assignment[20 points] (Proj5)
P1	PEK_U01-02, PEK_K01	P1 is based on the sum of the points from F1…F4. At least 50% of points is required.
P2	PEK_W01-03	P2 is based on the result of a written test covering material presented during lectures. At least 50% of points is required to pass the test.
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] R. Elmasri, S. B. Navathe, Fundamentals of Database Systems , Fourth Edition, Addison-Wesley, 2003
[2] R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw-Hill, 2000

SECONDARY LITERATURE:

[1] C.J. Date, Date on Database, Writings 2000-2006, Apress, 2006

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Artur Wilczek,
Artur.wilczek@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Implementation of database systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2SBD_W02	C1 - C3	Lec1-Lec7	N1-N3
PEK_W02	K2INF_W06_S2SBD_W02	C1 - C3	Lec1-Lec7	N1-N3
PEK_W03	K2INF_W06_S2SBD_W02	C1 - C3	Lec1-Lec7	N1-N3
PEK_U01 (skills)	K2INF_W06_S2SBD_W02, K2INF_U08_S2SBD_U02, K2INF_U08_S2SBD_U06	C1 – C4	Lec1-Lec7, Proj2-Proj5	N1-N6
PEK_U02	K2INF_W06_S2SBD_W02, K2INF_U08_S2SBD_U02, K2INF_U08_S2SBD_U06	C1 – C4	Lec1-Lec7, Proj2-Proj5	N1-N6
PEK_K01 (competences)	K2INF_U08_S2SBD_U02	C4	Proj2-Proj5	N1-N6
PEK_K02	K2INF_U08_S2SBD_U02	C4	Proj2-Proj5	N1-N6

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Metodologia badań naukowych
Name in English Methodology of empirical sciences…….
Main field of study (if applicable): Informatics…….
Specialization (if applicable): ……..
Level and form of studies: 2nd* level, full-time /
Kind of subject: obligatory /
Subject code INZ003763……
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	0	0	0	0
Number of hours of total student workload (CNPS)	90	0	0	0	0
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*

For group of courses mark (X) final course					
Number of ECTS points	3				
including number of ECTS points for practical (P) classes	0				
including number of ECTS points for direct teacher-student contact (BK) classes	1,8				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Competence in basic algebra
2. Competence in mathematical analysis
3. Differential equations

\

SUBJECT OBJECTIVES

C1 Knowledge on the methodological postulates
C2Competence in mathematical modeling on the base of methodology of empirical sciences
C3Competence in hypothesis testing
C4Competence in creation of homogeneous and invariant in relation to the system of units models

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01Knowledge on methodological postulates
PEK_W02Logical postulates of mathematical models construction (invariance and homogeneity)
PEK_WOO3Logical base of hypothesis testing

…
relating to skills:
PEK_U01Competence in mathematical modeling with accordance to methodological postulates
PEK_U02Competence in hypothesis and empirical models testing
…
relating to social competences:
PEK_K01Competence in the exactness of process description
PEK_K02Competence on ability of studying and reflection on experiment

PROGRAMME CONTENT

Form of classes - lecture		**Number of**
Lec 1Methods of scientific and technical project validation on the base of citation analysis	2	
Lec 2Methodological postulates of determinism, closed system, interconnectedness, simplicity and Popper's condition of falsification	2	
Lec 3Classical theory of measurements and the postulate of uniquenes	2	
Lec 4Dimensionally invariant description of a process, dimensional space	2	

Lec 5Theorem Pi of dimensional analysis and examples of its applications	2	
Lec 6Applications of theorem Pi in: models construction, experiment planning, identification Lec 7Theory of similarity Lec 8Invariance of models in relation to rotations group, tensors homogeneity Lec 9 Models testing and falsification of hypothesis Lec 10Identification of mathematical models Lec 11Multistage identification, models interpretability Lec 12Description of models construction Lec 13Models testing	2 2 2 2 2 2 2 2 2 2	
	Total hours26	Plus 2 colloqiums

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		

Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1.Literature N2.Examples analysis N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1P-1colloquium evaluation	WO1,WO2	Evaluation of students work
F2P-2colloquium evaluation	UO1,UO2	Evaluation of examples solving
F3		
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J.M. Bochenski The methods of contemporary thought. Harper Torchbooks, NY,1968
[2] W.Kasprzak, B. Lysik, M.Rybaczuk Measurements, Dimensions, Invariant Models and Fractals Spolom Wroclaw Lviv 2004
[3]
[4]

SECONDARY LITERATURE:

[1] K. R. Popper The logic of Scientific Discovery. Hutchinson Publ. Comp. 1959
[2]
[3]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Waclaw Kasprzak waclaw.kasprzak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Methodology of empirical sciences……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_WO1	Methodology basis	K1,K2,K3	N1,N2,P1
PEK_W02	K2INF_WO6	Models testing	K4,K13	P1
…				
…				
PEK_U01 (skills)	K2INF_UO6	Construction of models	K5,K6,K7	N1,N2,P2
PEK_U02	K2INF_UO8	Hyothesis testing	K8,K13	N1,N2,P2
…				
PEK_K01 (competences)	K_2SWD_KO1		K2	N1,N2
PEK_K02	K2_SWD_KO2		K13	N1,N2,P2
…				

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: Informatics and Management

SUBJECT CARD

Name in Polish: Modelowanie i analiza biznesowa
Name in English: Modeling and business analysis
Main field of study (if applicable): Informatics
Specialization (if applicable): Computer Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ3760
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	30			
Number of hours of total student workload (CNPS)	60	90			
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points	2	3			
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	1,8			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

16. Practice in object-oriented programming.
17. Basic knowledge of software engineering.

\

SUBJECT OBJECTIVES

C1. Basic knowledge in the area of software system modeling with the stress on business modeling as the initial phase of the software development process.
C2. Basic knowledge in the area of the requirements specification.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEK_W01: Students have basic knowledge on business modeling.
PEK_W02: Students know and understand the role of specification requirements.
PEK_W03: Students have basic knowledge on selected modeling languages.

Relating to skills:
PEK_U01: Students, in cooperation with domain experts, can construct and analyze business models.
PEK_U02: Students can build models of system requirements.

Relating to social competences:
PEK_K01: Students are able to cooperate with representatives of application domain.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Basic notions for software development cycle. Survey of modeling languages – UML and BPMN.	2
Lec 2	Class diagrams – classes, associations, generalizations.	2
Lec 3	Validation and verification.	1
Lec 4	Object Constraint Language.	2
Lec 5	UML activity diagrams.	2
Lec 6	BPMN process diagrams.	2
Lec 7	UML statechart diagrams.	2
Lec 8	System requirements; use case diagrams.	2

	Total hours	15

Form of classes - class		Number of hours
Cl 1	Construction and analysis of simple class diagrams.	2
Cl 2	Construction and analysis of advanced class diagrams.	2
Cl 3	Analysis of textual descriptions of exemplary application domains – structural aspect (1).	2
Cl 4	Analysis of textual descriptions of exemplary application domains – structural aspect (2).	2
Cl 5	Case study – an example of structural modeling.	2
Cl 6	Construction and analysis of OCL constraints imposed on diagrams.	2
Cl 7	Test 1.	2
Cl 8	Analysis of textual descriptions of exemplary application domains – structural and behavior aspect.	2
Cl 9	Analysis of simple BPMN diagrams.	2
Cl 10	Construction of simple BPMN diagrams.	2
Cl 11	Construction and analysis of advanced BPMN diagrams.	2
Cl 12	Construction and analysis of simple state diagrams.	2
Cl 12	Construction and analysis of advanced state diagrams..	2
Cl 13	Construction and analysis of use case diagrams.	2
Cl 14	Test 2.	2
Cl 15	Corrective test.	2
	Total hours	30

TEACHING TOOLS USED

N1. Lecturer's presentation at a blackboard, supported by a multimedia presentation using a laptop and a projector.
N2. Individual search and study of literature and Internet sources.
N3. Access to teaching materials published in the local area network.
N4. Individual consultations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 PEK_U01 PEK_K01	Each student gets 1 point for own solution of a problem from the list of problems for the given class.

<table>
<tr><td>F2</td><td>PEK_W01
PEK_W02
PEK_U01
PEK_U02
PEK_K01</td><td>Each student gets up to 10 points for own solution of problems for the given test (intermediate and final).</td></tr>
<tr><td>F3</td><td>PEK_W01
PEK_W02
PEK_W03
PEK_U01
PEK_U02
PEK_K01</td><td>The final evaluation for the classes is determined on the basis of total marks obtained by the student's activity for exercise (F1) and colloquia (F2). Positive mark is awarded to a student who has obtained at least 4 points for each of the symposia and has won a total of 10 points.
If this condition is met, the number of points P is the basis for evaluation in accordance with the following table:
<table>
<tr><td>P</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table>
Students who get at least a very good grade are exempt from the examination with the same mark as for the classes.</td></tr>
<tr><td colspan="3">C: The final evaluation of the course is determined based on the results of the examination. The examination lasts two hours and consists of a set of tasks, the total number of 20 points. The condition for a positive assessment of the final exam is to get 10 points and a positive final evaluation of the exercise.
The final evaluation of the examination is determined in accordance with the following table:
<table>
<tr><td>Points</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table></td></tr>
</table>

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[26] Rumbaugh J., Jacobson I., Booch G., *The Unified Modeling Language – Reference Manual*. Second edition, Addison-Wesley, 2005.

[27] Weilkiens T., Oestereich B., *UML 2 Certification Guide. Fundamental and Intermediate Exams*, Elsevier 2007.

[28] Maciaszek L. A., *Requirements Analysis and System Design*, Second edition, Pearson, Addison-Wesley, 2005.

[29] Adolph S., Bramble P., *Patterns for Effective Use Cases,* Addison-Wesley, 2003

[30] Gašević D., Djurić D., Devedžić V., *Model Driven Architecture and Ontology Development*, Springer, 2006.

SECONDARY LITERATURE:

[175] Graessle P., Baumann H., Baumann P., *UML 2.0 w akcji. Przewodnik oparty na projektach*, Helion, 2006.

[176] Object Management Group, Unified Modeling Language (available on the website: www.omg.com).

[177] Object Management Group, System Modeling Language SysML (available on the website: www.omg.com).

[178] Object Management Group, Business Process Modeling Notation BPMN (available on the website: www.omg.com).

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Zbigniew Huzar, zbigniew.huzar@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems Modeling and Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION
Computer Engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W02	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W03	K2INF_W03		Lec1-Lec8	N1, N2, N3, N4
PEK_U01 (skills)	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_U02	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_K01 (competences)	K2_SWD_K01	C1, C2	Lec1-Lec15 Cl1-Cl15	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from the table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Multimedialne bazy danych

Name in English Multimedia databases

Main field of study (if applicable): Computer Science

Specialization (if applicable): Database Systems

Level and form of studies~~: 1st~~/ 2nd* level, full-time /~~ part-time*~~

Kind of subject: obligatory ~~/ optional / university-wide*~~

Subject code INZ003793

Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload (CNPS)	60			60	
Form of crediting	~~Examination /~~ crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination /~~ crediting with grade*	Examination / crediting with grade*

For group of courses mark (X) final course					
Number of ECTS points	2			2	
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2			1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Student has fundamental competence from the scope of the computer science and databases. Student has a knowledge in the scope of the designing and producing the software.

\

SUBJECT OBJECTIVES

C1 Educating the abilities of classification and representatives of multimedia data and their special properties associated with the system of perceiving information.
C2 Providing the knowledge of the multimedia data processing with the SQL and SQL/MM languages.
C3 Providing the knowledge of the modelling metadata and multimedia databases.
C4 Educating the abilities from the scope of architecture and productivities of multimedia databases.
C5 Educating the ability of text, graphical abilities of the data processing and the video in multimedia databases
C6 Providing the knowledge of the design multimedia databases
C7 Providing the competences of of the implementation algorithms and systems of multimedia databases.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Student has a knowledge about connected issues from classification and multimedia data representation
PEK_W02 Student has competence in the multimedia data processing with using the SQL and SQL/MM languages,
PEK_W03 Student knows contemporary models of multimedia databases,
PEK_W04 Student has the knowledge about the structure of multimedia databases and about ways of providing multimedia data for the conversion efficiency
PEK_W05 Student knows principles and algorithms of the text, graphical and video data processing in multimedia databases
PEK_W06 Student has an ability of designing safe multimedia databases,
relating to skills:
PEK_U01 Student is possessing skills of classification and multimedia data representations
PEK_U02 Student has the abilities of processing multimedia databases with using the SQL and SQL/MM languages
PEK_U03 Student knows and is able to apply models of multimedia databases,
PEK_U04 Student is able to assess the productivity of data processing in the multimedia database with the optimization and the productivity
PEK_U05 Student is possessing a skill of analysis, the design and the implementation of algorithms and systems of multimedia databases,
relating to social competences:
PEK_K01 Student is able to cooperate in team during the designing and implementing of multimedia databases.
PEK_K02 Student is able to notice social and legal problems of applying methods of the multimedia databases.
PEK_K03 Student has a skill of the independent and creative thinking with the respect for the law and of professional ethics.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction into multimedia databases. Basic definitions.	1
Lec 2	Multimedia data and the human receptor system.	2
Lec 3	Introduction into SQL queries in multimedia bases. Special ownerships of multimedia data and the specificity of processing them.	2
Lec 4	Modelling of multimedia bases. Using multimedia metadata.	2
Lec 5	Architecture and the productivity of multimedia databases.	2
Lec 6	Internet MRDBMS.	2
Lec 7	Text data in multimedia databases. Introduction into the image processing in multimedia databases.	2
Lec 8	Advanced image and video processing in multimedia databases. Final test	2
	Total hours	15

Form of classes - class		Number of hours
Cw 1		
Cw 2		
Cw 3		
Cw 4		
Cw 5		
Cw 6		
Cw 7		
Cw 8		

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
...		
	Total hours	

Form of classes - project		Number of hours
Proj 1	Introduction into the project implementation. Determining preliminary requirements.	2
Proj 2	Analysis of requirements for the designed multimedia database system. Works on the model.	4
Proj 3	Formal design specification.	4
Proj 4	Implementation of the first step.	4
Proj 5	Implementation of the second step.	4
Proj 6	Testing. Tests of the safety.	4
Proj 7	Model tests and the audit.	4
Proj 8	Presentation of tasks carried out and findings.	4
	Total hours	30

Form of classes - seminar		Number of hours
	Total hours	

TEACHING TOOLS USED
N1. Multimedia presentations N2. The course Web page N3. Electronics and paper books and library references

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01÷PEK_U05 PEK_K01÷PEK_K03	Evaluation of presentation, discussion and activity
F2	PEK_W01÷PEK_W07 PEK_U01÷PEK_U05 PEK_K01÷PEK_K03	Final test
C=F1+F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[179] Duckley L.., Multimedia databases. Addison-Wesley. 2008.
[180] Natan R.B., the Semantics Multimedia: Metadata, Analysis and Interaction, Wiley-Blackwell 2011.
[181] Candan K., Sapino M., Date Management for Retrieval Multimedia, University Cambridge Press 2010.

SECONDARY LITERATURE:

[67] Nisbet R., Elder J., Miner G., Handbook of Statistical Analysis and Data Mining Applications. Academic Press. 2009.
[68] www.ii.pwr.wroc.pl/~liber

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Arkadiusz Liber, arkadiusz.liber@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W06_S2SBD_W001, K2INF_U08_S2SBD_U007	C1	Lec1,Lec2	N1,N2,N3
PEK_W02	K2INF_W06_S2SBD_W002	C2	Lec3	N1,N2,N3
PEK_W03,	K2INF_U08_S2SBD_U007	C3	Lec4	N1,N2,N3
PEK_W04	K2INF_W06_S2SBD_W001, K2INF_U08_S2SBD_U007, K2INF_W06_S2SBD_W002	C4	Lec5,Lec6	N1
PEK_W05, PEK_W06	K2INF_W06_S2SBD_W001	C5,C6	Lec7, Lec8	N1,N2,N3
PEK_U01, PEK_U02	K2INF_W06_S2SBD_W001, K2INF_U08_S2SBD_U007, K2INF_W06_S2SBD_W002	C1,C2,C6	Pr1-Pr8	N1,N2,N3
PEK_U03	K2INF_W06_S2SBD_W001, K2INF_U08_S2SBD_U007, K2INF_W06_S2SBD_W002	C3	Pr1-Pr8	N1
PEK_U04	K2INF_U08_S2SBD_U007	C4	Pr1-Pr8	N1,N2,N3
PEK_U05	K2INF_W06_S2SBD_W002	C5	Pr1-Pr8	N1,N2,N3
PEK_K01	K2INF_W06_S2SBD_W001	C1-C6	Lec1-8,Pr1-Pr8	N1-N3
PEK_K02, PEK_K02	K2INF_W06_S2SBD_W002	C1-C6	Lec1-8,Pr1-Pr8	N1-N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish *Nowe Technologie Baz Danych*
Name in English *New database technologies*
Main field of study (if applicable): Computer Science
Specialization (if applicable): Database Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide~~*
Subject code INZ003796
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		30		15
Number of hours of total student workload (CNPS)	60		90		30
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2		3		1
including number of ECTS points for practical (P) classes	0		3		0
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		1,8		0,6

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Elementary knowledge of classical data models and database design methods
2. Knowledge object programming language
3. Knowledge object-oriented software design methods

\

SUBJECT OBJECTIVES

C1 To enhance students knowledge about modern database development trends and emerging new data models
C2 To learn how to practically apply object enhancements of relational databases and/or pure object-oriented databases
C3 To get familiarity with object-relational mapping tools (ORM).

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Has a basic knowledge about emerging database trends.
PEK_W02 Is able to discuss the most important achievements in the area of modern database .

relating to skills:
PEK_U01Is able to choose and customise database implementation tools appropriate for certain requirements.
PEK_U02 Is able to design and implement pure object or object–relational database.

relating to social competences:
PEK_K01Is able to work in and manager a small software development team.
PEK_K02Is able to prepare and present speech based on self studies.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction, modern database trends	2
Lec 2	ORM tools	4
Lec 3	Object enhancements of relation databases	2
Lec 4	Object databases	2
Lec 5	Columnar databases	2
Lec 6	Big Data and noSQL	2
Lec 7	Test	1
	Total hours	15

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1	Introduction to assigned ORM environment	2
Lab 2	Configuration of ORM environment and modification of sample project	2
Lab 3	Developing of simple object-oriented queries for sample project	2
Lab 4	Developing of complex, aggregating queries for sample project	2
Lab 5	Introducing of simple changes in mapping descriptor and database schema	2
Lab 6	Introducing of complex changes in mapping descriptor and database schema	2
Lab 7	Introducing generalization relation in mapping descriptor and database schema	2
Lab 8	Developing of transactions over sample schema	2
Lab 9	Design of individual database application with ORM layer	2
Lab 10	Development of individual database application with ORM layer	4

Lab 11	Introduction to object enhancements of chosen relational DBMS	2
Lab 12	Development of individual database application with object-relational extensions	4
Lab 13	Efficiency comparing of application build with ORM and object-relational extensions.	2
	Total hours	30

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
Proj 5		
...		
	Total hours	30

Form of classes - seminar		**Number of hours**
Sem 1	Introduction, Subject and term assignment	2
Sem 2-Sem 8	Individual presentations prepared by students on topics related to ORM, XML, CEP, in-memory and columnar databases	13
	Total hours	15

TEACHING TOOLS USED
N1. Lecture N2. Individual consultations N3. The course web page with references to literature N4. Software development tools N5. Sample ORM application N6. Sample ORM layer configuration

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01-02, PEK_K01	Evaluation of the simply ORM enhancements [30 points] (Lab3-5)
F2	PEK_U01-02, PEK_K01	Evaluation of the complex ORM enhancements [30 points] (Lab6-8)
F3	PEK_U01-02, PEK_K01	Evaluation of the individual project with ORM [30 points] (Lab9-10)
F4	PEK_U01-02, PEK_K01	Evaluation of the individual project with ORDBMS [30 points] (Lab12-13)
P1	PEK_U01-02, PEK_K01	P1 is based on the sum of the points from F1…F4. At least 50% of points is required.
P2	PEK_U01	P2 is based on quality of seminar presentation.

P3	PEK_W01-02	P3 is based on the result of a written test covering material presented during lectures. At least 50% of points is required to pass the test.
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw-Hill, 2000
[2] R. Elmasri, S. B. Navathe, Fundamentals of Database Systems , Fourth Edition, Addison-Wesley, 2003

SECONDARY LITERATURE:

[1] Robin M. Roos, Java Data Objects, Addison-Wesley, London, 2003
[2] Hadoop The Definitive Guide 2nd Edition, Tom White, O'Reilly, 2011
[3] Oracle Information Architecture: An Architect's Guide to Big Data, An Oracle White Paper in Enterprise Architectur, 201

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Artur Wilczek,
Artur.wilczek@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
New database technologies
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2SBD_W01	C1, C3	Lec1-Lec6	N1-N4
PEK_W02	K2INF_W06_S2SBD_W01	C1, C3	Lec1-Lec6	N1-N4
PEK_U01 (skills)	K2INF_W06_S2SBD_W01, K2INF_U08_S2SBD_U01	C2,C3	Lec1-Lec4, Lab1-Lab13	N1-N6
PEK_U02	K2INF_U08_S2SBD_U03, K2INF_U08_S2SBD_U01	C2	Lec1-Lec4, Lab1-Lab13	N1-N6
PEK_K01 (competences)	K2INF_U08_S2SBD_U03	C1,C3	Lec1-Lec6	N1-N4
PEK_K02		C1	Sem2 – Sem8	N1-N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa I
Name in English MSc Thesis I
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part time~~*
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code INZ003818
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				60	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points				2	

including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes				0,6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 2rd semester

\

SUBJECT OBJECTIVES

C1 Preparation of students to write a master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology, with special attention of all stages of writing a thesis.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Preparation of students to write a master thesis according the internal requirements of Faculty of Computer Science and Management (Computer Science field of study), Wrocław University of Technology, with special attention of all stages of writing a thesis. Literature studies, selection and	

	learning of systems, tools, methods and algorithms needed for the realization of the chosen subject of thesis. The preparation of an outline of work and schedule of future work. Basic work on the research, design and implementation. Familiarization with the research works carried out at the Institute of Informatics. Final results: the initial solution and / or the prototype of developed system, knowledge about the current state of art in the field of thesis, an outline of future work and timetable for further works documented in English and Polish languages.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED

N1. Literature study - analysis of publications (including websites) related to subject of thesis, including the research works of the Institute of Informatics.
N2. Own work, independent research on the tasks defined in the master's thesis
N3. Student consultation with the supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessment based on the final results achieved

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[182] Literature related to the scope of realized project selected by student and recommended by the teacher.
[183] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis I
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U03, K2INF_U08	C1	Pr1	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa II
Name in English MSc Thesis II
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005221
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				540	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points				18	
including number of ECTS points for practical (P) classes				18	
including number of ECTS points for direct teacher-student contact (BK) classes				6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 4th semester

\

SUBJECT OBJECTIVES

C1 Preparation of master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish language, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes – project		**Number of hours**
Proj 1	Subject is the main component of the process of realization the master thesis and involves the preparation by the student his master thesis. Master thesis is done under the direction of his supervisor, with whom student defines its scope, goals, tasks and timetable for implementation.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED

N1. Preparation of master thesis N2. The text of the master thesis N3. Thesis review prepared by the supervisor N4. Students consultation with supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of master thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessed is the final text of the diploma thesis. The assessment is carried out in the form of a review done by the promoter. The condition to pass the course is delivering the final text of master thesis before the defined deadline. The second review, which does not, however the condition for pass the course is done by the reviewer appointed by the Faculty Dean. Reviews are made according to the standard format. The student is admitted to the defense (final exam) if both reviews are positive

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[184] Literature related to the scope of realized project selected by student and recommended by the teacher.

[185] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis II
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K1INF_U03, K2INF_U08	C1	Proj1	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Seminarium dyplomowe
Name in English Diploma seminar
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005220
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					90
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points					2
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes					1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge, skills and competences acquired at Informatics field at second level of study until 3th semester

\

SUBJECT OBJECTIVES

C1 Preparing students to write a master thesis according the internal requirements in Informatics field at Faculty of Computer Science and Management, Wrocław University of Technology,

C2 Providing students with basic skills related to preparation and presentation of scientific texts, beginning from the choice of topic, selection of tasks to be performed, use of literature to interpretation of the results.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He is able to acquire information from literature, databases and other sources, also in English or other language used for communication in Informatics field, is able to integrate the information obtained, interpret them, make critical evaluation and also draw conclusions and formulate and justify opinions related to prepared master thesis.

PEK_U02 He can communicate using a variety of techniques in his professional environment and in other environments, also in English or other foreign language used for communication in Informatics field and also to present the results of his master thesis

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
	Total hours	

Form of classes - seminar	**Number of hours**

Sem 1	Familiarization with the principles of master thesis realization at Informatics field. Rules related to student presentations. Determining the schedule of student presentations.	2
Sem 2	Review of basic skills related to preparation and presentation of scientific texts by students, beginning from the choice of topic, selection of tasks to be performed, use of literature and also how to write thesis and how obtained results should be interpret.	2
Sem 3 – Sem15	During semester each student has 2 presentations. The first presentation is related to the general view of the thesis topic, its placement in the literature and in the Informatics field. The student should present the primary aim of thesis, the state of art related to thesis topic, the concept of solution, the initial structure of thesis and timetable for further work. The purpose of the second presentation is preparation to defense and demonstrate presentation skills in English. The second presentation consists of two parts, namely, discussion of the results of the work in English and a short presentation in Polish devoted to the results of the thesis.	26
	Total hours	30

TEACHING TOOLS USED

N1. Multimedia presentations
N2. Examples of scientific papers and reports from the field of computer science.
N3. E-Learning System used to publish teaching materials and announcements, also used for collection and evaluation of student work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01 PEK_U02	Evaluation of the presentation of the work at the seminar and prepared documentation from the presentation. The evaluation shall be subject to the fulfillment of the requirements for the presentation, including its substantive scope, structure and organization of presentation, techniques of conversation, a form of presentation, compactness of presentation and conclusions reached. Participation in the discussions after presentation is also evaluated. In addition, the seminar leader is able to control the cooperation between supervisors and graduate students.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[186] Literature related to the scope of realized project selected by student and recommended by the teacher.

[187] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. inż. Leszek Borzemski, prof. PWr, leszek.borzemski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Diploma seminar
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
AND SPECIALIZATION **every specjalization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3
PEK_U02	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT…

SUBJECT CARD

Name in Polish Systemy informacyjne
Name in English Information systems
Main field of study (if applicable): Informatics
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code INZ3762
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				30
Number of hours of total student workload (CNPS)	60				60
Form of crediting	crediting with grade	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	crediting with grade
For group of courses mark (X) final course					
Number of ECTS points	2				2
including number of ECTS points for practical (P) classes	0				0
including number of ECTS points for direct teacher-student contact (BK) classes	1,2				1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic mathematical knowledge for 1st level of studies.

2. Informatics knowledge background.
3. Algorithms knowledge background.

\

SUBJECT OBJECTIVES

C1 Acquiring knowledge about functions and significance of information systems in contemporary organizations
C2 Acquainting with the functions and development of information systems in information society
C3 Acquainting with the different methods of information retrieval by surfing the Web
C4 Recognizing the problems of passing of contemporary organizations to Internet space
C5 Obtainment of skills to analyze the literature from information systems area and to synthesize the contents from different sources
C6 Application of the obtained knowledge to presentation the problems from information systems area by means of using adequate tools

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Familiarity with basic models of information systems
PEK_W02 Basic knowledge about Web information systems
PEK_W03 Familiarity with common multimedia technologies
PEK_W04 Understanding of the measures of information retrieval efficiency

relating to skills:
PEK_U01 Student can to build information query for different types of information needs
PEK_U02 Can to determine basic features of information system for given organization
PEK_U03Student be able to evaluate the precision of retrieved information
PEK_U04 Can to present basic features of given information system

relating to social competences:
PEK_K01 Can individually to use literature of the subject and to select useful information
PEK_K02 Student is convinced above positive role of information systems in stimulation of the civilization development

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	History of information systems development. Information processing. Theoretical basis of information systems.	2
Lec 2	Main information systems' models. Automation of information flow in organization.	2
Lec 3	Information retrieval on Internet – fundamentals.	2
Lec 4	Web information systems.	2
Lec 5	Multimedia. Importance of multimedia technologies in information systems development.	2
Lec 6	How societies embrace information technology. Digital libraries.	2
Lec 7	Efficiency of information systems. Case study of chosen information system.	2
Lec 8	Test	1
	Total hours	15

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Introductory seminar.	2
Sem 2	Information systems – definitions, types, features, examples.	2
Sem 3	Information retrieval fundamentals – models, dictionaries, indexes.	2
Sem 4	Evaluation of information systems' efficiency.	2
Sem 5	Analytical retrieval of information.	2
Sem 6	Information retrieval on Internet.	2
Sem 7	ERP class systems.	2
Sem 8	Mobile information systems.	2
Sem 9	Multimedia information systems.	2
Sem 10	Information systems for teleworking.	2
Sem 11	How societies embrace information technology.	2
Sem 12	CRM systems.	2
Sem 13	Knowledge management systems.	2
Sem 14	Information society: e-business, e-administration, e-commerce, e-health	2

Sem 15	Seminar summation and credit.	2
	Total hours	30

TEACHING TOOLS USED

N1. Computerized presentation at the lectures.
N2. Presentation with visualization and using Internet resources during the seminar.
N3. Consultations.
N4. Students' homework with using software packages.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 PEK_U04 PEK_K02	Grade of presentation (quality of slides, oral presentation, relevance, duration), presence and activity.
F2	PEK_K01	Report's grade
P-seminar	PEK_U02	Grade result from F1 and F2
P-lecture	PEK_W01-PEKW04 PEK_U03	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Manning C. D., Raghavan P., Schutze H.: *Introduction to Information Retrieval*, Cambridge University Press, New York, 2009, dostępne także bezpłatnie: www.cambridge.org

[2] Kłopotek M. A.: *Inteligentne wyszukiwarki internetowe* , Akademicka Oficyna Wydawnicza EXIT, Warszawa, 2001.

[3] Wrycza S. (red.): *Informatyka ekonomiczna. Podręcznik akademicki*, PWE, Warszawa, 2010.

[4] Cortada J. W. : How Societies Embrace Information Technology, WILEY-IEEE, NY, 2009.

[5] Baeza-Yates R., Ribeiro-Neto B.: *Modern Information Retrieval*, ACM Press, Adison-Wesley, New York, 1999.

SECONDARY LITERATURE:

[1] Zgrzywa A., Choroś K., Siemiński A.(Eds.): *Multimedia and Internet Systems: Theory and Practice,* Spriger Verlag, Berlin, 2013.

[2] Nguyen N.T., Zgrzywa A., Czyżewski A.(Eds.): *Advances in Multimedia and Network Information System Technology,* Spriger Verlag, Berlin, 2010.

[3] Zawiła-Niedźwiecki J. : *Informatyka gospodarcza*, Wyd. C. H. Beck, 2010.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Aleksander Zgrzywa, Aleksander.Zgrzywa@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INFW03, K2INF_W06	C1	Lec1, Lec 6 Sem 2,Sem 14	N1-4
PEK_W02	K2INF_W04, K2INF_W06	C3,C4	Lec 3, Lec 4 Sem 6,Sem 7, Sem 11	N1-4
PEK_W03	K2INF_W02, K2INF_W06	C2	Lec 5, Lec 6 Sem 13,Sem 14	N1-4
PEK_W04	K2INF_W03	C3	Lec 3, Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U01	K2INF_U01, K2INF_U08	C3	Lec 3,Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U02	K2INF_U05, K2INF_U08	C4	Lec 2,Lec 7 Sem 7,Sem 8,Sem 12,Sem 13	N1-4
PEK_U03	K2INF_U05, K2INF_U08	C3	Lec 2, Lec 5 Sem 3, Sem 5, Se6,Se9	N1-4
PEK_U04	K2INF_U02, K2INF_U03	C5, C6	Lec 5, Lec 6 Sem 3, Sem 5, Sem 6, Sem 9, Sem 10	N1-4

PEK_K01	K2INF_K01, K2INF_U02	C5	Lec 5, Lec 6 Sem 9, Sem 10	N1-4
PEK_K02	K2INF_K02	C1	Lec 1, Lec 6 Sem 2, Sem 14	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Systemy wyszukiwania informacji

Name in English Information Retrieval Systems

Main field of study (if applicable): Computer Science

Specialization (if applicable): Database Systems

Level and form of studies~~: 1st~~/ 2nd* level, full-time~~ / part-time*~~

Kind of subject: obligatory ~~/ optional / university-wide*~~

Subject code INZ003780

Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload (CNPS)	60			60	
Form of crediting	~~Examination /~~ crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination /~~ crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2			2	
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2			1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Student has fundamental competence from the scope of the computer science and databases. Student has a knowledge in the scope of the designing and producing methods of the software database systems.

\

SUBJECT OBJECTIVES

C1.Get to know the issues of information retrieval systems.

C2. Learn how to design information retrieval systems.

C3. Knowledge of classical methods of information retrieval in text online databases

C4. Acquiring the ability to modify the classical methods of information retrieval.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 - Student has a knowledge about connected issues from an understanding of information retrieval system

PEK_W02 – Student has knowledge of the classical methods of information retrieval in text online databases.

PEK_W03 – Student knows the rules of indexing documents

PEK_W04 – Student has knowledge of the possibility of modifying the classical methods of information retrieval

PEK_W05 – Student knows the ranking method documents

PEK_W06 – Student knows methods of document indexing

PEK_W07 – Student knows the basic information retrieval models

PEK_W08 – Student knows the basic methods of information retrieval

PEK_W09 – Student knows the measure of the effectiveness of information retrieval systems

PEK_W10 - Student has knowledge about the use of neural networks and the Semantic Web to information retrieval

PEK_W11 – Student has knowledge of the automatic processing of texts

PEK_W12 – Student knows methods of text and data mining, information retrieval on the Internet.

relating to skills:

PEK_U01 - student is able to correctly use the terminology associated with information retrieval

PEK_U02 - the student is able to apply classical methods of information retrieval and can be modified

PEK_U03 - the student can choose the model of information retrieval system

PEK_U04 - the student is able to implement methods of information retrieval

PEK_U05 - the student is able to implement the chosen method of indexing documents

PEK_U06 - the student is able to design and implement a simple text search engine

PEK_U07 - the student is able to carry out testing methods for ranking documents

PEK_U08 - the student is able to propose and carry out experiments to search for information online.

relating to social competences:

PEK_K01 Student is able to cooperate in team during the designing and implementing of information retrieval system.

PEK_K02 Student is able to notice social and legal problems of applying methods of information retrieval system.

PEK_K03 Student has a skill of the independent and creative thinking with the respect for the law and of professional ethics.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction into information retrieval systems. Basic definitions. Basic concepts and terminology in the field of information retrieval systems.	1
Lec 2	Information retrieval in text databases.	2
Lec 3	Models of information retrieval systems.	2
Lec 4	Methods of information retrieval	2

Lec 5	Indexing documents.	2
Lec 6	Neural networks in an information retrieval system. Semantic Web in an information retrieval.	2
Lec 7	Measures of the effectiveness of information retrieval systems	2
Lec 8	Information retrieval on the Internet.	2
	Total hours	15

Form of classes - class		Number of hours
Cw 1		
Cw 2		
Cw 3		
Cw 4		
Cw 5		
Cw 6		
Cw 7		
Cw 8		

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
...		
	Total hours	

Form of classes - project		Number of hours
Proj 1	Introduction into the project implementation. Determining preliminary requirements.	2
Proj 2	Analysis of requirements for the designed information retrieval system. Works on the model.	4
Proj 3	Formal design specification.	4
Proj 4	Implementation of the first step.	4
Proj 5	Implementation of the second step.	4
Proj 6	Testing. Tests of the safety.	4
Proj 7	Model tests and the audit.	4
Proj 8	Presentation of tasks carried out and findings.	4
	Total hours	30

Form of classes - seminar		Number of hours

	Total hours	

TEACHING TOOLS USED
N1. Multimedia presentations N2. The course Web page N3. Electronics and paper books and library references

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01÷PEK_U08 PEK_K01÷PEK_K03	Evaluation of presentation, discussion and activity
F2	PEK_W01÷PEK_W12 PEK_U01÷PEK_U08 PEK_K01÷PEK_K03	Final test
C=F1+F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[188] Buttcher S., Clarke c., Cormack G., Information Retrieval. Implementing and Evaluating Search Engines. MIT Press, 2010.
[189] Baeza-Yates R., Ribeiro-Neto B., Modern information retrieval. Addison Vesley, 1999.

SECONDARY LITERATURE:

[1] Gobinda G. Chowdhury, Introduction to modern information retrieval. Library Association Publishing, 2009.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Zygmunt Mazur, zygmunt.mazur@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_K01	K2INF_W06_S2SBD_W001	C1-C6	Lec1-8,Pr1-Pr8	N1-N3
PEK_W01	K2INF_W06_S2SBD_W05	C1-C4	Lec1-Lec8	N1-N3
PEK_W02	K2INF_W06_S2SBD_W05	C1-C4	Lec2, Lec8	N1-N3
PEK_W03	K2INF_W06_S2SBD_W05	C1-C4	Lec5	N1-N3
PEK_W04	K2INF_W06_S2SBD_W05	C1-C4	Lec1-Lec8	N1-N3
PEK_W05	K2INF_W06_S2SBD_W05	C1-C4	Lec2-Lec8	N1-N3
PEK_W06	K2INF_W06_S2SBD_W05	C1-C4	Wy1-Wy8	N1-N3
PEK_W07	K2INF_W06_S2SBD_W05	C1-C4	Lec5	N1-N3
PEK_W08	K2INF_W06_S2SBD_W05	C1-C4	Lec4-Lec5	N1-N3
PEK_W09	K2INF_W06_S2SBD_W05	C1-C4	Lec7	N1-N3
PEK_W10	K2INF_W06_S2SBD_W05	C1-C4	Lec6	N1-N3
PEK_W11	K2INF_W06_S2SBD_W05	C1-C4	Lec1-Lec8	N1-N3
PEK_W12	K2INF_W06_S2SBD_W05	C1-C4	Lec8	N1-N3
PEK_U01	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3
PEK_U02	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3
PEK_U03	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3
PEK_U04	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3
PEK_U05	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3
PEK_U06	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3
PEK_U07	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3
PEK_U08	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: Systemy wspomagania decyzji
Name in English: Decision Support Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Decision Support Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / university-wide*
Subject code: INZ003761
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	15		15	
Number of hours of total student workload (CNPS)	60	30		60	
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / ~~crediting with grade~~*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2	1		2	
including number of ECTS points for practical (P) classes				2	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	0,6		1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None.

\

SUBJECT OBJECTIVES

C1 Getting to know foundations of designing computer science decision support systems using general systemic methods which make it possible to apply unified approaches for analysis and decision making for decision support systems of different nature.
C2 Acquisition of skills to represent in the form of mathematical formulas of decision making plants treated as input-output plants.
C3 Acquisition of skills to analyze of decision making plants treated as input-output plants.
C4 Getting acquainted with methods and algorithms of multi-stage decision making.
C5 Acquisition of skills to apply dynamic programming method.
C6 Getting to know metods and algorithms of multi-criteria decision making.
C7 Acquisition of skills to use AHP method.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student knows foundations of designing of decision support systems for any kind of plants.

PEK_W02 Student knows foundations of analysis and decision making for input-output plants with logic knowledge representation.

PEK_W03 Student knows selected method of multi-stage and multi-criteria decision making.

relating to skills:

PEK_U01 Student is able to elaborate a mathematical model for an input-output decision making plant in discrete state space as well as with logic knowledge representation.

PEK_U02 Student can solve analysis and decision making tasks for elementary plants with logic knowledge representation.

PEK_U03 Student is able to solve multi-stage decision making problem using Bellman's Principle and dynamic programming.

PEK_U04 Student can use AHP algorithm for the solution od multi-criteria decision making problem

relating to social competences:

PEK_K01 Student can take advantage of professional literature by oneself and can perform the critical analysis of information mined.

PEK_K02 Student can think creatively.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Decision support systems – definitions, structures, problems.	1
Lec 2	Application of discrete state equations and logic expressions for representation of decision making plants.	2
Lec 3	Analysis of decision making plants, in particular logic-algebraic method.	2
Lec 4	Decision making – definition, typology, logic-algebraic plant.	2
Lec 5	Bellman's Principle and multi-stage decision making.	3
Lec 6	Multi-criteria decision making, Pareto sets, AHP method.	3
Lec 7	Examples of computer decision support systems.	2
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Solution of numerical exercises concerning difference equations.	1
Cl 2	Solution of numerical exercises concerning differential equations as well as propositional calculus.	2
Cl 3	Solution of numerical exercises concerning mathematical representations of input-output plants.	2
Cl 4	Solution of numerical exercises concerning analysis using logic-algebraic method.	2
Cl 5	Solution of numerical exercises concerning decision making using logic-algebraic method.	2
Cl 6	Solution of numerical exercises concerning dynamic programming.	2
Cl 7	Solution of numerical exercises concerning AHP method.	2
Cl 8	Final test.	2
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab 1		

Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Collecting of indispensable information about selected plant being the decision making plant.	2
Proj 2	Determination of mathematical model of selected decision making plant and decision making problem formulation.	2
Proj 3	Analysis of decision making plant using its mathematical model.	2
Proj 4	Choice of decision making method for further usage as well as elaboration of decision making algorithm.	3
Proj 5	Implementation and alalysis of decision making algorithm.	4
Proj 6	Elaboration of conclusions and written report of the project performed.	2
	Total hours	15

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1 Lecture – traditional method. N2 Classes – traditional method. N3 Consultation. N4 Individual discussion with student. N5 Short test (10 mins.). N6 Self-contained work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Short tests during the classes.
F2	PEK_K01– PEK_K02	Individual discussion with student during the project.
P (Classes)	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Test.
P (Project)	PEK_U01–PEK_U04; PEK_K01–PEK_K02	Evaluation of written report of the project.
P (Lecture)	PEK_W01–PEK_W03; PEK_K02	Exam.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[190] [1] Józefczyk J., Wybrane problemy podejmowania decyzji w kompleksach operacji, Oficyna Wydawnicza PWr, Wrocław 2001.

[191] Bubnicki Z., Podstawy informatycznych systemów zarządzania, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1993.

[192] Roy B., Wielokryterialne podejmowanie decyzji, WNT, Warszawa 1990.

SECONDARY LITERATURE:

[1] Techniki informacyjne w badaniach systemowych, P. Kulczycki, O. Hryniewicz, J. Kacprzyk (red.), WNT, Warszawa 2007.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Jerzy Józefczyk, Jerzy.Jozefczyk@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Decision Support systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Decision Support systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1	Lec1, Lec 2, Lec 7, Cl1, Cl 2, Pr1	N1, N3, N6
PEK_W02	K2INF_W02	C1	Lec3, Lec4	N1, N3, N6
PEK_W03	K2INF_W02	C4, C6	Lec5, Lec6	N1, N3, N6
PEK_U01 (skills)	K2INF_U05; K2INF_U06	C2	Lec2, Cl 3, Proj2	N2–N6
PEK_U02	K2INF_U05; K2INF_U06	C3	Cl 4, Cl 5, Proj3, Pro4	N2–N6
PEK_U03	K2INF_U05; K2INF_U06	C5	Cl 6, Proj4	N2–N6
PEK_U04	K2INF_U05; K2INF_U06	C7	Cl 7, Proj4	N2–N6
PEK_K01 (competences)	K2INF_K01	C1, C4, C6	Lec1– Lec7, Proj1, Proj4	N2–N6
PEK_K02	K2INF_K01	C1–C7	Proj1–Proj6	N2–N6

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: Teoria i inżynieria ruchu teleinformatycznego

Name in English: Theory and engineering of teletraffic

Main field of study (if applicable): Computer science

Specialization (if applicable): Teleinformatics

Level and form of studies: 2nd level, full-time

Kind of subject: obligatory

Subject code INZ3759

Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload	30			90	

(CNPS)					
Form of crediting	Crediting with grade			Crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	1			3	
including number of ECTS points for practical (P) classes				3	
including number of ECTS points for direct teacher-student contact (BK) classes	0,6			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

31. Has a basic knowledge of ICT systems and computer communication networks (K1INF_W11).
32. Knows the basic methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_W16)
33. Can use the right tools to build a simple model of the process (the object), to formulate specific task analysis and decision making (K1INF_U15)
34. Can effectively use the methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_U16)
35. It has the ability to self-education, including in order to improve the professional competence (K1INF_U05)
36. Understands the need and knows the possibility of lifelong learning and to improve their professional and social competences (K1INF_K01)

SUBJECT OBJECTIVES

C1. Ordered, underpinned by theoretical knowledge of methods and techniques for transmitting signals using different modulation techniques, methods and techniques of information transmission, methods of organization and management of data communications traffic in the tasks of design and analysis of communication systems, methods of delivering service quality of ICT systems, analysis of quantitative and qualitative requirements and methods for sizing of distributed IT systems.

C2. Skills about the differences and benefits of the use of analog and digital data transmission techniques, the differences and benefits of the use of wired and wireless signal transmission techniques, developing the concept of using wired and wireless technologies in the basic applications of ICT systems, defining the qualitative and quantitative requirements of the user information and communication systems range of data, designing ICT solutions needed to achieve the qualitative and quantitative requirements of the user, using standards and solutions available on the market, estimating the cost of preparing and maintaining ICT solutions needed to achieve the qualitative and quantitative requirements, designing modernization of IT solutions needed to achieve the qualitative and quantitative requirements, identifying differences and similarities between solutions in a variety of applications (e-health, e-government and e-learning, in real-time systems, etc.).

C3. Skills for the design and analysis of complex, distributed ICT systems providing network services for distributed computer communication systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

K2INF_W02: Has a structured, theoretically founded essential knowledge of business modeling and requirements specification systems.

K2INF_W03: Has a structured, theoretically founded essential knowledge in the delivery of information distributed systems

K2INF_W06: Achieves results in the category of knowledge for specialty data communications

relating to skills:

K2INF_U05: Can - in formulating and solving engineering tasks - integrate knowledge of the fields of science and scientific disciplines relevant to the study being studied and applied a systemic approach, taking into account the non-technical aspects

K2INF_U06: Can solve the modeling, analysis and decision making for different types of objects

K2INF_U08: Achieves results and skills in areas of data exchange and computer communications systems

relating to social competences:

K2INF_K01: Can think and act in a creative and enterprising

K2INF_K02: Has aware of the social role of technical graduating, especially understands the need for the formulation and communication to the public, especially through the mass media, information and opinion on the achievements of technology and other aspects of engineering, shall endeavor to provide such information and opinions in a widely understood the reasons for the different points of view

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Classification of ICT systems from different points of view. Quality of Experience (QoE) and Quality of Service (QoS) in ICT systems with elastic and streaming traffic.	2
Lec 2	Introduction to queuing. Open and close networks of queues.	2
Lec 3	Queuing models of circuit-switched and packet-switched computer communication systems. Burke's theorem and Kleinrock approximation.	2
Lec 4	Access control, flow control and routing tasks formulation and solution in distributed environments.	2
Lec 5	Requirements analysis	1
Lec 6	Models (Poisson, Markov modulated, self-similarity, etc) of teletraffic and its application in traffic engineering tasks.	2
Lec 7	QoS delivery concepts: best effort, integrated services and differentiated services	2
Lec 8	New concepts of systems and networks - NXGN (Next Generation Networks) i NWGN (New Generation Network). Summary.	2
	Total hours	15

PROGRAMME CONTENT

Form of classes - project		Number of hours
Proj 1	Formulation design task based on the analysis of the literature, documentation, etc.	2
Proj 2	Justification for the choice task and purpose of the task design - an analysis of the expected benefits of the project task.	2
Proj 3	Quantitative requirements analysis for the communication system under design	2
Proj 4	Qualitative requirements analysis for the communication system under design	2
Proj 5	Analysis of state of the art on how to solve the task design	2
Proj 6	Analysis and selection of the task design methodology	2
Proj 7	Tools (methods, algorithms, procedures, software and hardware) analysis and selection required for the implementation of the project task	2
Proj 8	Implementation of prototype of modules solve the task	2
Proj 9	Prototype testing and evaluation	2
Proj 10	Modification of solutions using prototype test results	2
Proj 11	Integration of modules distinguished at the stages of requirements analysis and prototyping	2
Proj 12	Verification and testing of an integrated solution design task	2
Proj 13	Analysis of the possibility of extending the project tasks	2
Proj 14	Preparation of the presentation and documentation of the design task	2
Proj 15	Presentation of the results of the design task	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture supported by whole class multimedia presentations based on literature and open access and commercial sources.
N2. Student's own works – solving experiments and tasks in laboratory as well as homework.
N3. Student's own works – literature and open access sources studies.
N5. Collective works in laboratory
N5. Student's own works – preparation of presentations and technical documentations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05	Observation and verification of student activity. Solving the sample jobs.

	K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	
F1 – F15 (project)	K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and assessment of student autonomy.
P (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	Colloquium (course credit) in the evaluation of forming F1 (lecture)
P (project)	K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Total weighted ratings F1 - F15 (project) and the assessment for the presentation of the final results of the project.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[193] A.S. Tanenbaum, „Computer networks", Prentice Hall; 1996
[194] G. Pujolle, D. Seret, D. Dromard, E. Horlait, „Integrated Digital Communication Networks", J. Wiley & Sons
[195] B. Russell, „The art of computer networks", Prentice Hall; 2009
[196] V.S. Bagad, I.A. Dhotre, „Computer networks", Technical Publications, 2009.
[197] M. Roden, „Analog and digital communication systems", Prentice Hall
[198] http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

SECONDARY LITERATURE:

[69] S. Haykin, „Telecommunication systems", Prentice Hall, 1999.
[70] MIT Free Open Course Materials (http://ocw.mit.edu/index.htm)
[71] CCNA Exploration Network Fundamentals, Cisco Academy, PWN, 2008

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Adam Grzech, adam.grzech@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Theory and engineering of teletraffic

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer science

AND SPECIALIZATION
Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1, C2, C3	Lec 1 – Lec 8	N1, N4
PEK_W02	K2INF_W03	C1	Lec 1 – Lec 8	N1,N2, N4
PEK_W03	K2INF_W06	C1	Lec 1 – Lec 8	N1, N4
PEK_U01 (skills)	K2INF_U05	C1, C2, C3	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_U02	K2INF_U06	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_U03	K2INF_U08	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_K01 (competences)	K2INF_K01	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_K02	K2INF_K02	C1, C2	Lec 1 – Lec 8	N1, N2, N3, N4, N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Zaawansowane metody i techniki analizy danych
Name in English Advanced Methods and Techniques of Data Analysis
Main field of study (if applicable): computer science
Specialization (if applicable): …….
Level and form of studies: 2nd* level, full-time
Kind of subject: obligatory
Subject code INZ003758
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	crediting with grade*		crediting with grade*		

For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes	0		4		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of mathematics and mathematical statistics

\

SUBJECT OBJECTIVES

C1 Introduce the methods and techniques of the statistical data analysis to students
C2 Gather knowledge for Knowledge Discovery (Data Mining)
C3 Applying the gathered knowledge to drawing conclusions based on data analysis

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has a basic knowledge of Knowledge Discovery (Data Mining)
PEK_W02 student has a basic knowledge of statistical data analysis
PEK_W03 student is able to present differences between parametric and non-parametric tests

relating to skills:
PEK_U01 student is able to choose a proper statistical test
PEK_U02 student is able to draw conclusion from data analysis
PEK_U03 student is able to select a proper data mining method

relating to social competences:
PEK_K01 student is able to search and reuse the primary and secondary literature listed below and is able to gather the proper knowledge
PEK_K02 student understands the need for systematic and individual work in order to cover the scope of the course

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to knowledge discovery	2
Lec 2	Classification and Data Clustering	2
Lec 3	Clustering Algorithms	2
Lec 4	Discovering association rules	2
Lec 5	Statistics - basic notions	2
Lec 6	The selected problems of estimation theory	2
Lec 7	Introduction to verification of statistical hypothesis	2
Lec 8	Parametric tests for one population	2
Lec 9	Non-parametric tests for one population	2
Lec 10	Parametric tests for two populations	2
Lec 11	Non-parametric tests for two populations	2

Lec 12	Parametric tests for more than 2 populations	2
Lec 13	Non-parametric tests for more than 2 population	2
Lec 14	Correlation and regression methods	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Introduction to WEKA	2
Lab 2	Knowledge discovery in WEKA	8
Lab 3	Introduction to MATLAB	2
Lab 4	Statistical data analysis in MATLAB	8
Lab 5	Introduction to R	2
Lab 6	Statistical data analysis in R	8
	Total hours	30

Form of classes - project		**Number of**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Traditional lecture N2. Labs N3. One-to-one consultancy during stuff hours

N4. Student self-study

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P -laboratory	PEK_U01-PEK_U03, PEK_K01-PEK_K02	Evaluation of the prepared tasks during labs, oral test
P-lecture	PEK_W01-PEK_W03 PEK_K01-PEK_K02	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[199] M. Sobczyk: Statystyka, Wydawnictwo Naukowe PWN, 2007

[200] W.Krysicki, J.Bartos, W. Dyczka, K. Królikowska, M. Wasilewski: Statystyka, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, cz. 2 Statystyka matematyczna, Wydawnictwo Naukowe PWN, 2007

[201] Marek Walesiak, Eugeniusz Gatnar (Red. nauk.) :Statystyczna analiza danych z wykorzystaniem programu R, Wydawnictwo Naukowe PWN, 2009

[202] M. Korzyński: Metodyka eksperymentu Planowanie realizacja i statystyczne opracowanie wyników eksperymentów technologicznych, Wydawnictwo Naukowo-Techniczne 2006

[203] Nong Ye, : The Handbook of Data Mining, Lawrence Erlbaum Associates, Publishers, 2003

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Prof. dr hab. inż Ngoc Thanh Nguyen, Ngoc-Thanh.Nguyen@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Advanced Methods and Techniques of Data Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY computer science
AND SPECIALIZATION **……**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C2	Lec1-4 Lab1-2	N1-4
PEK_W02	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_W03	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_U01	K2INF_U01, K2INF_W06, K2INF_W08	C1	Lec5-14 Lab3-6	N1-4
PEK_U02	K2INF_U01, K2INF_W06, K2INF_W08	C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_U03	K2INF_U01, K2INF_W06, K2INF_W08	C2	Lec1-4 Lab1-2	N1-4
PEK_K01		C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_K02		C1, C2, C3	Lec1-14 Lab1-6	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish *Zaawansowane systemy baz danych*
Name in English *Advanced database systems*

Main field of study (if applicable): Computer Science
Specialization (if applicable): Database Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part time~~*
Kind of subject: obligatory ~~/ optional / university wide~~*
Subject code INZ003800
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			30	
Number of hours of total student workload (CNPS)	90			90	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3			3	
including number of ECTS points for practical (P) classes	0			3	
including number of ECTS points for direct teacher-student contact (BK) classes	1,8			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of elementary data models and database design methods
2. Elementary knowledge of Database architectures
3. Elementary knowledge of SQL

\

SUBJECT OBJECTIVES

C1 To enhance students' knowledge about modern data models
C2 To learn how to practically apply modern data models in advanced database applications

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Has a basic knowledge about advanced data models
PEK_W02 Is able to present and compare usages of advanced data models
PEK_W03 Is able to evaluate suitability of advanced data model in particular application
…
relating to skills:
PEK_U01Is able to choose proper data model meeting concrete requirements
PEK_U02 Is able to prepare proof of concept for advanced database application

…
relating to social competences:
PEK_K01Is able to work in and manage a small software development team

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Introduction to advanced database models	2
Lec 2	Active databases	2
Lec 3	Temporal databases	2
Lec 4	Data stream management	2
Lec 5	Complex event processing	2
Lec 6	Semistructural data storage	2
Lec 7	Semistructural data processing	2
Lec 8	Query languages for semistructural data	2
Lec 9	Spatial data storage and processing	2
Lec 10	Multidimensional data	2
Lec 11	Physical storage of multidimensional data	2
Lec 12	Distributed database systems	2
Lec 13	Distributed transactional processing	2
Lec 14	Cloud databases	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
...		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Introduction, Building of projects teams.	2
Proj 2	Preparing an environment aimed for evaluating database applications.	4
Proj 3	Design and implementation of active database.	8
Proj 4	Design and implementation of semistructural database.	8

Proj 5	Design and implementation of spatial database.	8
Proj 6	Design and implementation of multidimensional database.	8
	Total hours	30

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Lecture N2. Individual consultations N3. The course web page with references to literature N4. Software development tools N5. Database Management System

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01-02, PEK_K01	Evaluation of the concept of solution [20 points] (Proj2)
F2	PEK_U01-02, PEK_K01	Evaluation of the first project assignment[20 points] (Proj3)
F3	PEK_U01-02, PEK_K01	Evaluation of the second project assignment [20 points] (Proj4)
F4	PEK_U01-02, PEK_K01	Evaluation of the third project assignment [20 points] (Proj5)
F5	PEK_U01-02, PEK_K01	Evaluation of the fourth project assignment [20 points] (Proj6)
C1	PEK_U01-02, PEK_K01	C1 is based on the sum of the points from F1…F5. At least 50% of points is required.
C2	PEK_W01-03	C2 is based on the result of a written test covering material presented during lectures. At least 50% of points is required to pass the test.
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] C.J. Date, Date on Database, Writings 2000-2006, Apress, 2006
[2] R. Elmasri, S. B. Navathe, Fundamentals of Database Systems , Fourth Edition, Addison-Wesley, 2003
[3] R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw-Hill, 2000

SECONDARY LITERATURE:

[1] N.W.Paton, O. Díaz, Active database systems, ACM Computing Surveys, 1999, 31 (1): 63–103
[2] Principles of Distributed Database Systems, Third Edition, M. Tamer Özsu, Patrick Valduriez, Springer, 2010

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Artur Wilczek,
Artur.wilczek@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Advanced database systems

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..

AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2SBD_W01	C1 – C2	Lec1-Lec14	N1-N3
PEK_W02	K2INF_W06_S2SBD_W01	C1 – C2	Lec1-Lec14	N1-N3
PEK_W03	K2INF_W06_S2SBD_W01	C1 – C2	Lec1-Lec14	N1-N3
PEK_U01 (skills)	K2INF_W06_S2SBD_W01, K2INF_U08_S2SBD_U08, K2INF_U08_S2SBD_U05, K2INF_U08_S2SBD_U04, K2INF_U08_S2SBD_U02, K2INF_U08_S2SBD_U01	C1 – C2	Lec1-Lec14, Proj2-Proj6	N1-N5
PEK_U02	K2INF_W06_S2SBD_W01, K2INF_U08_S2SBD_U08, K2INF_U08_S2SBD_U05, K2INF_U08_S2SBD_U04, K2INF_U08_S2SBD_U02, K2INF_U08_S2SBD_U01	C1 – C2	Lec1-Lec14, Proj2-Proj6	N1-N5
PEK_K01 (competences)	K2INF_U08_S2SBD_U08	C1- C2	Proj2-Proj6	N1-N5

** - enter symbols for main-field-of-study/specialization educational effects

*** - from table above

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Bezpieczeństwo baz danych

Name in English Database Security

Main field of study (if applicable): Computer Science

Specialization (if applicable): Database Systems

Level and form of studies~~: 1st~~/ 2nd* level, full-~~time / part-time*~~

Kind of subject: obligatory ~~/ optional / university-wide*~~

Subject code INZ003788

Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			15	
Number of hours of total student workload (CNPS)	120			60	
Form of crediting	Examination / ~~crediting with grade*~~	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	4			2	
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	2,4			1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Student has competence from the scope of bases of the computer science and bases of databases. Student has a knowledge in the scope of the designing and producing the software.

\

SUBJECT OBJECTIVES

C1 Educating the abilities of solving and understanding problems connected to all levels of data and database protection.
C2 Providing the knowledge of the evaluation and applying the cryptographic protection of databases and applying high technologies of the access and management policy with use confidence.
C3 Providing the knowledge of safety of the data warehouse and stream data systems
C4 Educating the abilities from the scope of particular methods of the protection of sensitive databases and the privacy protection.
C5 Educating the ability of assuring safety in statistical databases and databases in mobile systems
C6 Providing the knowledge in the scope of the systems design of databases assuring safety
C7 Providing the competences of implementation of algorithms and protection systems of databases

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student has a knowledge about designing and implementing the protection of databases on the different level of the model of the data protection

PEK_W02 Student has competence in of cryptographic methods applied in the data protection and databases,

PEK_W03 Student knows contemporary methods in assuring safety at data warehouses and in flow systems

PEK_W04 Student has the knowledge in the scope of the privacy protection and protections of sensitive databases

PEK_W05 Student knows principles of protection and algorithms applied in statistical databases and mobile data systems

PEK_W06 Student has an ability of designing safe databases,

relating to skills:

PEK_U01 Student is possessing skills of the evaluation of the state of the safety of the database

PEK_U02 Student has the abilities of noticing threats and applying suitable methods of the data protection

PEK_U03 Student is able to apply principles of protection of flow and mobile databases in practice

PEK_U04 Student is able to apply the safe data storage and the data recovery methods

PEK_U05 Student is possessing a skill of analysis, the design and the implementation of security systems in databases,

relating to social competences:

PEK_K01 Student is able to cooperate in team during the realization of protection systems of databases.

PEK_K02 Student is able to notice social and legal problems of applying methods of the protection of databases.

PEK_K03 Student has a skill of the independent and creative thinking with the respect for the law and of professional ethics.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction. Basic definitions. Information security, data security, safety of databases.	2
Lec 2	Basic model of the safety of databases. Physical security, politics of the protection, computer protection.	2
Lec 3	Databases and cryptographic methods. Cryptographic schemes used in protecting databases.	2
Lec 4	Advanced classical cryptographic schemes. Cryptographic protocols and the data security.	2
Lec 5	An electronic signatures and systems of authenticating.	2
Lec 6	Models of the access control. The access policy and its realization.	2
Lec 7	Managing the confidence and the negotiation of the confidence.	2
Lec 8	Structures of authentication indices in the outsourcing of databases. Safe and trusted databases.	2
Lec 9	The management and encoded enquiries. The safety of the data warehouse and OLAP systems.	2
Lec 10	Safety of flow systems. Safe semantic Web networks. Safety of spatial databases.	2
Lec 11	Concepts and techniques reengineering of safety. Watermarks of data and databases. Trusted retentions of records.	2
Lec 12	Damaging and recovering databases. Systems of the storage and the data security.	2
Lec 13	Medical databases and their safety. Ensuring the privacy and the safeguard against systems of the data mining.	2
Lec 14	The privacy and the publication of data. Statistical databases. Anonymizing.	2
Lec 15	Data security and of databases in mobile systems.	2

	Total hours	30

Form of classes - class		Number of hours
Cw 1		
Cw 2		
Cw 3		
Cw 4		
Cw 5		
Cw 6		
Cw 7		
Cw 8		

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
...		
	Total hours	

Form of classes - project		Number of hours
Proj 1	Introduction into the project implementation. Determining preliminary requirements.	1
Proj 2	Analysis of requirements for the designed security system. Works on the model.	2
Proj 3	Formal design specification.	2
Proj 4	Implementation of the first step.	2
Proj 5	Implementation of the second step.	2
Proj 6	Testing. Tests of the safety.	2
Proj 7	Model tests and the audit.	2
Proj 8	Presentation of tasks carried out and findings.	2
	Total hours	15

Form of classes - seminar		Number of hours
	Total hours	

TEACHING TOOLS USED

N1. Multimedia presentations N2. The course Web page N3. Electronics and paper books and library references

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01÷PEK_U05 PEK_K01÷PEK_K03	Evaluation of presentation, discussion and activity
F2	PEK_W01÷PEK_W07 PEK_U01÷PEK_U05 PEK_K01÷PEK_K03	Final exam
C=F1+F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[204] Gertz M., Jajodia S., Handbook of database security. Springer. 2008.
[205] Natan R.B., Implementing Database Security and Auditing, Elsevier 2007.
[206] Wayner P., Translucent Database. CreateSpace Independent Publishing Paltform 2009.
[207] Liber A., Wprowadzenie do bezpieczeństwa baz danych. Wrocław 2012 (w druku).

SECONDARY LITERATURE:

[72] Nisbet R., Elder J., Miner G., Handbook of Statistical Analysis and Data Mining Applications. Academic Press. 2009.
[73] www.ii.pwr.wroc.pl/~liber

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Arkadiusz Liber, arkadiusz.liber@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

……

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..

AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006,	C1	Lec1,Lec2,Lec3	N1,N2,N3
PEK_W02	K2INF_U08_S2SBD_U006, K2INF_U08_S2SBD_U004	C2	Lec4,Lec5,Lec6,Lec7, Lec8	N1,N2,N3
PEK_W03,	K2INF_U08_S2SBD_U004	C2, C3	Lec9,Lec10,Lec11	N1,N2
PEK_W04	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006	C4	Lec12	N1,N2,N3
PEK_W05	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006	C5	Lec13	N1,N2,N3
PEK_W06	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006, K2INF_U08_S2SBD_U004	C6	Lec14,Lec15	N1,N2,N3
PEK_U01, PEK_U02	K2INF_U08_S2SBD_U004	C1,C6,C7	Lec1,Lec2,Lec3, Lec4,Lec5,Lec6,Lec7, Lec8, Lec9	N1,N2,N3
PEK_U03	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006, K2INF_U08_S2SBD_U004		Lec10	N1
PEK_U04	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006, K2INF_U08_S2SBD_U004	C1,C3,C4,C5,C7	Lec11,Lec12,Lec13,Lec14,Lec15	N1,N2,N3
PEK_U05	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006, K2INF_U08_S2SBD_U004	C1,C3,C4,C5	Pr1,Pr2,Pr3,Pr4,Pr5,Pr6,Pr7,Pr8	N1,N2,N3

PEK_K01	K2INF_W06_S2SBD_W004, K2INF_U08_S2SBD_U006, K2INF_U08_S2SBD_U004	C1-C7	Lec1-W15,Pr1-Pr8	N1-N3
PEK_K02, PEK_K02	K2INF_U08_S2SBD_U004	C1-C7	Lec1-W15,Pr1-Pr8Lec1,Lec4,Lec7, Lec8,Lec9Lec10,Lec11,Lec12,Lec13,Lec14, Lec15	N1-N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Dedukcyjne bazy danych
Name in English *Deductive databases*
Main field of study (if applicable): Computer Science
Specialization (if applicable): Database systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part time~~*
Kind of subject: obligatory ~~/ optional / university wide~~*
Subject code INZ003787
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			30	
Number of hours of total student workload (CNPS)	120			120	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	4			4	
including number of ECTS points for practical (P) classes	0			4	
including number of ECTS points for direct teacher-student contact (BK) classes	2,4			2,4	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of relational data model
2. Is able to develop database application with SQL language

3. Knowledge of mathematical logic (propositional, predicate calculus)

\

SUBJECT OBJECTIVES

C1 The development of students skills in building logical models
C2 To enhance students' knowledge about deduction methods used in deductive databases
C2 To learn how to practically apply best practices in deductive database design with Datalog language.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Is familiar with Datalog language
PEK_W02 Is able to present and compare usages of deduction methods used in deductive databases
PEK_W03 Knows methods of Datalog queries processing and optimization

relating to skills:
PEK_U01Is able to develop models of real world with Datalog language
PEK_U02 Is able to evaluate and eventually improve efficiency of Datalog queries.

relating to social competences:
PEK_K01Is able to work in and manager a small software development team

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to deductive databases	2
Lec 2	Classification of clauses	2
Lec 3	Principle of resolution	2
Lec 4	Logic programming (Prolog)	2
Lec 5	Prolog inference engine	2
Lec 6	Prolog and the relation algebra	2
Lec 7	Introduction to Datalog	2
Lec 8	Datalog language	2
Lec 9	Datalog queries processing	2
Lec 10	Datalog optimization methods	2
Lec 11	Magic sets	2
Lec 12	Integrity constrains	2
Lec 13	Design of knowledge base	2
Lec 14	The quality of knowledge base	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		

Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1	Introduction, Building of projects teams.	2
Proj 2	Preparing of development environment. DES installation. Developer guide studies. Demonstration of available samples and tutorials.	4
Proj 3	Enhancement of chosen sample project shipped with DES distribution.	4
Proj 4	Implementing of assigned project based on its specification.	4
Proj 5	Enhancement of assigned project with simple additional rules.	4
Proj 6	Enhancement of assigned project with complex additional rules.	4
Proj 7	Preparing the specification of self developed project.	4
Proj 8	Implementing of self developed project.	4
	Total hours	30

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Lecture N2. Individual consultations N3. The course web page with references to literature N4. Software development tools N5. DES System N6. Sample deductive database

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P –	Educational effect number	Way of evaluating educational effect achievement

concluding (at semester end)		
F1	PEK_U01-02, PEK_K01	Evaluation of the 3th project assignment[20 points] (Proj3)
F2	PEK_U01-02, PEK_K01	Evaluation of the 4th project assignment[20 points] (Proj4)
F3	PEK_U01-02, PEK_K01	Evaluation of the 5th project assignment[20 points] (Proj5)
F4	PEK_U01-02, PEK_K01	Evaluation of the 6th project assignment[20 points] (Proj6)
F5	PEK_U01-02, PEK_K01	Evaluation of the 8th project assignment[40 points] (Proj8)
P1	PEK_U01-02, PEK_K01	P1 is based on the sum of the points from F1…F5. At least 50% of points is required.
P2	PEK_W01-03	P2 is based on the result of a written test covering material presented during lectures. At least 50% of points is required to pass the test.
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] R. Colomb, Deductive Databases and Their Applications, CRC Press, 1998

SECONDARY LITERATURE:

[1] S. Ceri, G. Gottlob, L. Tanca, Logic Programming and Databases, Surveys in Computer Science, Springer, 1990
[2] S.K. Das, Deductive Databases and Logic Programming, Addison-Wesley, 1992
[3] J. Ullman: Principles of Database and Knowledge-Base Systems Volume II: The New Technologies,W.H. Freeman & Co., 1989

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Artur Wilczek,
Artur.wilczek@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Deductive databases
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	**Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)****	**Subject objectives*****	**Programme content*****	**Teaching tool number*****
PEK_W01 (knowledge)	K2INF_W06_S2SBD_W04	C1 - C3	Lec1-Lec14	N1-N3
PEK_W02	K2INF_W06_S2SBD_W04	C1 - C3	Lec1-Lec14	N1-N3
PEK_W03	K2INF_W06_S2SBD_W04	C1 - C3	Lec1-Lec14	N1-N3
PEK_U01 (skills)	K2INF_W06_S2SBD_W04, K2INF_U08_S2SBD_U05	C1 – C3	Lec1-Lec14, Proj2-Proj8	N1-N6
PEK_U02	K2INF_W06_S2SBD_W04, K2INF_U08_S2SBD_U05	C1 – C3	Lec1-Lec14, Proj2-Proj8	N1-N6
PEK_K01 (competences)	K2INF_U08_S2SBD_U05	C1	Proj2-Proj8	N1-N6

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: *Implementacja systemów baz danych*
Name in English: *Implementation of database systems*
Main field of study (if applicable): Computer Science
Specialization (if applicable): Database systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide~~*
Subject code INZ003792
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			15	
Number of hours of total student workload (CNPS)	90			30	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3			1	
including number of					

ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,8			0,6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Elementary knowledge of classical data models and database design methods
2. Elementary knowledge of chosen Database Management Systems (Oracle, DB2, MSSQL)

\

SUBJECT OBJECTIVES

C1 To enhance students knowledge about data storage and indexing methods.
C2 To enhance students knowledge about transactions management, data protection methods used in databases.
C3 To get familiarity of query processing and optimization methods.
C4 To obtain by students the ability of effective usage of features offered by modern Database Management Systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Is familiar with functions of components of DBMS and general DBMS architecture
PEK_W02 Is able to present and compare data storage, indexing, queries and transactions processing and optimization methods used in databases
PEK_W03 Is able to evaluate the possibility of usage BMDS features in particular application

relating to skills:
PEK_U01Is able to chose data storage and access methods appropriate for certain requirements.
PEK_U02 Is able to evaluate and eventually improve efficiency of database queries and transactions.

relating to social competences:
PEK_K01Is able to work in and manager a small software development team.
PEK_K02Is able to conduct proof-of concept, test and evaluate database systems available on the market.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction, DMBS architecture	2
Lec 2	External memory (devices, access time characteristics)	2
Lec 3	Storage methods for files of records	1
Lec 4	Data storage techniques 1. Heap files 2. Ordered files 3. Hashed files	6
Lec 5	Indexing 1. Index classification 2. Multilayered indexes (B-trees)	6

	3. Bitmap indexes	
Lec 6	Query processing and optimization 1. Query processing 2. Join algorithms (nested-loop, merge-join, hash-join) 3. Query optimization	6
Lec 7	Transactions management and data protection 1. Transaction serializability 2. Concurrent transactions execution 3. Transaction logs	6
Lec 8	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Introduction, Building of projects teams.	2
Proj 2	Preparing of workload for self chosen database schema and DBMS tests environment	4
Proj 3	Evaluation of database indexing methods	3
Proj 4	Evaluation of database partitioning methods	3
Proj 5	Evaluation of query optimization technics	3
	Total hours	15

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Lecture N2. Individual consultations N3. The course web page with references to literature N4. Software development tools N5. DBMS System N6. DBMS testing tools

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01-02, PEK_K01	Evaluation of the 2th project assignment[20 points] (Proj2)
F2	PEK_U01-02, PEK_K01	Evaluation of the 3th project assignment[20 points] (Proj3)
F3	PEK_U01-02, PEK_K01	Evaluation of the 4th project assignment[20 points] (Proj4)
F4	PEK_U01-02, PEK_K01	Evaluation of the 5th project assignment[20 points] (Proj5)
P1	PEK_U01-02, PEK_K01	P1 is based on the sum of the points from F1…F4. At least 50% of points is required.
P2	PEK_W01-03	P2 is based on the result of a written test covering material presented during lectures. At least 50% of points is required to pass the test.
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] R. Elmasri, S. B. Navathe, Fundamentals of Database Systems , Fourth Edition, Addison-Wesley, 2003
[2] R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw-Hill, 2000

SECONDARY LITERATURE:

[1] C.J. Date, Date on Database, Writings 2000-2006, Apress, 2006

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Artur Wilczek,
Artur.wilczek@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Implementation of database systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2SBD_W02	C1 - C3	Lec1-Lec7	N1-N3
PEK_W02	K2INF_W06_S2SBD_W02	C1 - C3	Lec1-Lec7	N1-N3
PEK_W03	K2INF_W06_S2SBD_W02	C1 - C3	Lec1-Lec7	N1-N3
PEK_U01 (skills)	K2INF_W06_S2SBD_W02, K2INF_U08_S2SBD_U02, K2INF_U08_S2SBD_U06	C1 – C4	Lec1-Lec7, Proj2-Proj5	N1-N6
PEK_U02	K2INF_W06_S2SBD_W02, K2INF_U08_S2SBD_U02, K2INF_U08_S2SBD_U06	C1 – C4	Lec1-Lec7, Proj2-Proj5	N1-N6
PEK_K01 (competences)	K2INF_U08_S2SBD_U02	C4	Proj2-Proj5	N1-N6
PEK_K02	K2INF_U08_S2SBD_U02	C4	Proj2-Proj5	N1-N6

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Metodologia badań naukowych
Name in English Methodology of empirical sciences…….
Main field of study (if applicable): Informatics…….
Specialization (if applicable): ……..
Level and form of studies: 2nd* level, full-time /
Kind of subject: obligatory /
Subject code INZ003763……
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	0	0	0	0
Number of hours of total student workload (CNPS)	90	0	0	0	0
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*

For group of courses mark (X) final course					
Number of ECTS points	3				
including number of ECTS points for practical (P) classes	0				
including number of ECTS points for direct teacher-student contact (BK) classes	1,8				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Competence in basic algebra
2. Competence in mathematical analysis
3. Differential equations

\

SUBJECT OBJECTIVES

C1 Knowledge on the methodological postulates
C2Competence in mathematical modeling on the base of methodology of empirical sciences
C3Competence in hypothesis testing
C4Competence in creation of homogeneous and invariant in relation to the system of units models

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01Knowledge on methodological postulates
PEK_W02Logical postulates of mathematical models construction (invariance and homogeneity)
PEK_WOO3Logical base of hypothesis testing

…
relating to skills:
PEK_U01Competence in mathematical modeling with accordance to methodological postulates
PEK_U02Competence in hypothesis and empirical models testing
…
relating to social competences:
PEK_K01Competence in the exactness of process description
PEK_K02Competence on ability of studying and reflection on experiment

PROGRAMME CONTENT

Form of classes - lecture		**Number of**
Lec 1Methods of scientific and technical project validation on the base of citation analysis	2	
Lec 2Methodological postulates of determinism, closed system, interconnectedness, simplicity and Popper's condition of falsification	2	
Lec 3Classical theory of measurements and the postulate of uniquenes	2	
Lec 4Dimensionally invariant description of a process, dimensional space	2	

Lec 5Theorem Pi of dimensional analysis and examples of its applications	2	
Lec 6Applications of theorem Pi in: models construction, experiment planning, identification Lec 7Theory of similarity Lec 8Invariance of models in relation to rotations group, tensors homogeneity Lec 9 Models testing and falsification of hypothesis Lec 10Identification of mathematical models Lec 11Multistage identification, models interpretability Lec 12Description of models construction Lec 13Models testing	2 2 2 2 2 2 2 2 2 2	
	Total hours26	Plus 2 colloqiums

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		

Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1.Literature N2.Examples analysis N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1P-1colloquium evaluation	WO1,WO2	Evaluation of students work
F2P-2colloquium evaluation	UO1,UO2	Evaluation of examples solving
F3		
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J.M. Bochenski The methods of contemporary thought. Harper Torchbooks, NY,1968
[2] W.Kasprzak, B. Lysik, M.Rybaczuk Measurements, Dimensions, Invariant Models and Fractals Spolom Wroclaw Lviv 2004
[3]
[4]

SECONDARY LITERATURE:

[1] K. R. Popper The logic of Scientific Discovery. Hutchinson Publ. Comp. 1959
[2]
[3]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Waclaw Kasprzak waclaw.kasprzak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Methodology of empirical sciences……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_WO1	Methodology basis	K1,K2,K3	N1,N2,P1
PEK_W02	K2INF_WO6	Models testing	K4,K13	P1
…				
…				
PEK_U01 (skills)	K2INF_UO6	Construction of models	K5,K6,K7	N1,N2,P2
PEK_U02	K2INF_UO8	Hyothesis testing	K8,K13	N1,N2,P2
…				
PEK_K01 (competences)	K_2SWD_KO1		K2	N1,N2
PEK_K02	K2_SWD_KO2		K13	N1,N2,P2
…				

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: Informatics and Management

SUBJECT CARD

Name in Polish: Modelowanie i analiza biznesowa
Name in English: Modeling and business analysis
Main field of study (if applicable): Informatics
Specialization (if applicable): Computer Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ3760
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	30			
Number of hours of total student workload (CNPS)	60	90			
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points	2	3			
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	1,8			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

18. Practice in object-oriented programming.
19. Basic knowledge of software engineering.

\

SUBJECT OBJECTIVES

C1. Basic knowledge in the area of software system modeling with the stress on business modeling as the initial phase of the software development process.
C2. Basic knowledge in the area of the requirements specification.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEK_W01: Students have basic knowledge on business modeling.
PEK_W02: Students know and understand the role of specification requirements.
PEK_W03: Students have basic knowledge on selected modeling languages.

Relating to skills:
PEK_U01: Students, in cooperation with domain experts, can construct and analyze business models.
PEK_U02: Students can build models of system requirements.

Relating to social competences:
PEK_K01: Students are able to cooperate with representatives of application domain.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Basic notions for software development cycle. Survey of modeling languages – UML and BPMN.	2
Lec 2	Class diagrams – classes, associations, generalizations.	2
Lec 3	Validation and verification.	1
Lec 4	Object Constraint Language.	2
Lec 5	UML activity diagrams.	2
Lec 6	BPMN process diagrams.	2
Lec 7	UML statechart diagrams.	2
Lec 8	System requirements; use case diagrams.	2

	Total hours	15

Form of classes - class		Number of hours
Cl 1	Construction and analysis of simple class diagrams.	2
Cl 2	Construction and analysis of advanced class diagrams.	2
Cl 3	Analysis of textual descriptions of exemplary application domains – structural aspect (1).	2
Cl 4	Analysis of textual descriptions of exemplary application domains – structural aspect (2).	2
Cl 5	Case study – an example of structural modeling.	2
Cl 6	Construction and analysis of OCL constraints imposed on diagrams.	2
Cl 7	Test 1.	2
Cl 8	Analysis of textual descriptions of exemplary application domains – structural and behavior aspect.	2
Cl 9	Analysis of simple BPMN diagrams.	2
Cl 10	Construction of simple BPMN diagrams.	2
Cl 11	Construction and analysis of advanced BPMN diagrams.	2
Cl 12	Construction and analysis of simple state diagrams.	2
Cl 12	Construction and analysis of advanced state diagrams..	2
Cl 13	Construction and analysis of use case diagrams.	2
Cl 14	Test 2.	2
Cl 15	Corrective test.	2
	Total hours	30

TEACHING TOOLS USED

N1. Lecturer's presentation at a blackboard, supported by a multimedia presentation using a laptop and a projector.
N2. Individual search and study of literature and Internet sources.
N3. Access to teaching materials published in the local area network.
N4. Individual consultations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 PEK_U01 PEK_K01	Each student gets 1 point for own solution of a problem from the list of problems for the given class.

<table>
<tr><td>F2</td><td>PEK_W01
PEK_W02
PEK_U01
PEK_U02
PEK_K01</td><td>Each student gets up to 10 points for own solution of problems for the given test (intermediate and final).</td></tr>
<tr><td>F3</td><td>PEK_W01
PEK_W02
PEK_W03
PEK_U01
PEK_U02
PEK_K01</td><td>The final evaluation for the classes is determined on the basis of total marks obtained by the student's activity for exercise (F1) and colloquia (F2). Positive mark is awarded to a student who has obtained at least 4 points for each of the symposia and has won a total of 10 points.
If this condition is met, the number of points P is the basis for evaluation in accordance with the following table:
<table>
<tr><td>P</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table>
Students who get at least a very good grade are exempt from the examination with the same mark as for the classes.</td></tr>
<tr><td colspan="3">C: The final evaluation of the course is determined based on the results of the examination. The examination lasts two hours and consists of a set of tasks, the total number of 20 points. The condition for a positive assessment of the final exam is to get 10 points and a positive final evaluation of the exercise.
The final evaluation of the examination is determined in accordance with the following table:
<table>
<tr><td>Points</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table></td></tr>
</table>

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[31] Rumbaugh J., Jacobson I., Booch G., *The Unified Modeling Language – Reference Manual*. Second edition, Addison-Wesley, 2005.

[32] Weilkiens T., Oestereich B., *UML 2 Certification Guide. Fundamental and Intermediate Exams*, Elsevier 2007.

[33] Maciaszek L. A., *Requirements Analysis and System Design*, Second edition, Pearson, Addison-Wesley, 2005.

[34] Adolph S., Bramble P., *Patterns for Effective Use Cases,* Addison-Wesley, 2003

[35] Gašević D., Djurić D., Devedžić V., *Model Driven Architecture and Ontology Development*, Springer, 2006.

SECONDARY LITERATURE:

[208] Graessle P., Baumann H., Baumann P., *UML 2.0 w akcji. Przewodnik oparty na projektach*, Helion, 2006.

[209] Object Management Group, Unified Modeling Language (available on the website: www.omg.com).

[210] Object Management Group, System Modeling Language SysML (available on the website: www.omg.com).

[211] Object Management Group, Business Process Modeling Notation BPMN (available on the website: www.omg.com).

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Zbigniew Huzar, zbigniew.huzar@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems Modeling and Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION
Computer Engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W02	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W03	K2INF_W03		Lec1-Lec8	N1, N2, N3, N4
PEK_U01 (skills)	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_U02	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_K01 (competences)	K2_SWD_K01	C1, C2	Lec1-Lec15 Cl1-Cl15	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from the table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Multimedialne bazy danych

Name in English Multimedia databases

Main field of study (if applicable): Computer Science

Specialization (if applicable): Database Systems

Level and form of studies~~: 1st~~/ 2nd* level, full-time /~~ part-time*~~

Kind of subject: obligatory ~~/ optional / university-wide*~~

Subject code INZ003793

Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload (CNPS)	60			60	
Form of crediting	~~Examination /~~ crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination /~~ crediting with grade*	Examination / crediting with grade*

For group of courses mark (X) final course					
Number of ECTS points	2			2	
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2			1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Student has fundamental competence from the scope of the computer science and databases. Student has a knowledge in the scope of the designing and producing the software.

\

SUBJECT OBJECTIVES

C1 Educating the abilities of classification and representatives of multimedia data and their special properties associated with the system of perceiving information.
C2 Providing the knowledge of the multimedia data processing with the SQL and SQL/MM languages.
C3 Providing the knowledge of the modelling metadata and multimedia databases.
C4 Educating the abilities from the scope of architecture and productivities of multimedia databases.
C5 Educating the ability of text, graphical abilities of the data processing and the video in multimedia databases
C6 Providing the knowledge of the design multimedia databases
C7 Providing the competences of of the implementation algorithms and systems of multimedia databases.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Student has a knowledge about connected issues from classification and multimedia data representation
PEK_W02 Student has competence in the multimedia data processing with using the SQL and SQL/MM languages,
PEK_W03 Student knows contemporary models of multimedia databases,
PEK_W04 Student has the knowledge about the structure of multimedia databases and about ways of providing multimedia data for the conversion efficiency
PEK_W05 Student knows principles and algorithms of the text, graphical and video data processing in multimedia databases
PEK_W06 Student has an ability of designing safe multimedia databases,
relating to skills:
PEK_U01 Student is possessing skills of classification and multimedia data representations
PEK_U02 Student has the abilities of processing multimedia databases with using the SQL and SQL/MM languages
PEK_U03 Student knows and is able to apply models of multimedia databases,
PEK_U04 Student is able to assess the productivity of data processing in the multimedia database with the optimization and the productivity
PEK_U05 Student is possessing a skill of analysis, the design and the implementation of algorithms and systems of multimedia databases,
relating to social competences:
PEK_K01 Student is able to cooperate in team during the designing and implementing of multimedia databases.
PEK_K02 Student is able to notice social and legal problems of applying methods of the multimedia databases.
PEK_K03 Student has a skill of the independent and creative thinking with the respect for the law and of professional ethics.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction into multimedia databases. Basic definitions.	1
Lec 2	Multimedia data and the human receptor system.	2
Lec 3	Introduction into SQL queries in multimedia bases. Special ownerships of multimedia data and the specificity of processing them.	2
Lec 4	Modelling of multimedia bases. Using multimedia metadata.	2
Lec 5	Architecture and the productivity of multimedia databases.	2
Lec 6	Internet MRDBMS.	2
Lec 7	Text data in multimedia databases. Introduction into the image processing in multimedia databases.	2
Lec 8	Advanced image and video processing in multimedia databases. Final test	2
	Total hours	15

Form of classes - class		Number of hours
Cw 1		
Cw 2		
Cw 3		
Cw 4		
Cw 5		
Cw 6		
Cw 7		
Cw 8		

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
...		
	Total hours	

Form of classes - project		Number of hours
Proj 1	Introduction into the project implementation. Determining preliminary requirements.	2
Proj 2	Analysis of requirements for the designed multimedia database system. Works on the model.	4
Proj 3	Formal design specification.	4
Proj 4	Implementation of the first step.	4
Proj 5	Implementation of the second step.	4
Proj 6	Testing. Tests of the safety.	4
Proj 7	Model tests and the audit.	4
Proj 8	Presentation of tasks carried out and findings.	4
	Total hours	30

	Form of classes - seminar	Number of hours
	Total hours	

TEACHING TOOLS USED
N1. Multimedia presentations N2. The course Web page N3. Electronics and paper books and library references

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01÷PEK_U05 PEK_K01÷PEK_K03	Evaluation of presentation, discussion and activity
F2	PEK_W01÷PEK_W07 PEK_U01÷PEK_U05 PEK_K01÷PEK_K03	Final test
C=F1+F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[212] Duckley L.., Multimedia databases. Addison-Wesley. 2008.
[213] Natan R.B., the Semantics Multimedia: Metadata, Analysis and Interaction, Wiley-Blackwell 2011.
[214] Candan K., Sapino M., Date Management for Retrieval Multimedia, University Cambridge Press 2010.

SECONDARY LITERATURE:

[74] Nisbet R., Elder J., Miner G., Handbook of Statistical Analysis and Data Mining Applications. Academic Press. 2009.
[75] www.ii.pwr.wroc.pl/~liber

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Arkadiusz Liber, arkadiusz.liber@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W06_S2SBD_W001, K2INF_U08_S2SBD_U007	C1	Lec1,Lec2	N1,N2,N3
PEK_W02	K2INF_W06_S2SBD_W002	C2	Lec3	N1,N2,N3
PEK_W03,	K2INF_U08_S2SBD_U007	C3	Lec4	N1,N2,N3
PEK_W04	K2INF_W06_S2SBD_W001, K2INF_U08_S2SBD_U007, K2INF_W06_S2SBD_W002	C4	Lec5,Lec6	N1
PEK_W05, PEK_W06	K2INF_W06_S2SBD_W001	C5,C6	Lec7, Lec8	N1,N2,N3
PEK_U01, PEK_U02	K2INF_W06_S2SBD_W001, K2INF_U08_S2SBD_U007, K2INF_W06_S2SBD_W002	C1,C2,C6	Pr1-Pr8	N1,N2,N3
PEK_U03	K2INF_W06_S2SBD_W001, K2INF_U08_S2SBD_U007, K2INF_W06_S2SBD_W002	C3	Pr1-Pr8	N1
PEK_U04	K2INF_U08_S2SBD_U007	C4	Pr1-Pr8	N1,N2,N3
PEK_U05	K2INF_W06_S2SBD_W002	C5	Pr1-Pr8	N1,N2,N3
PEK_K01	K2INF_W06_S2SBD_W001	C1-C6	Lec1-8,Pr1-Pr8	N1-N3
PEK_K02, PEK_K02	K2INF_W06_S2SBD_W002	C1-C6	Lec1-8,Pr1-Pr8	N1-N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish *Nowe Technologie Baz Danych*
Name in English *New database technologies*
Main field of study (if applicable): Computer Science
Specialization (if applicable): Database Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide~~*
Subject code INZ003796
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		30		15
Number of hours of total student workload (CNPS)	60		90		30
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2		3		1
including number of ECTS points for practical (P) classes	0		3		0
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		1,8		0,6

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Elementary knowledge of classical data models and database design methods
2. Knowledge object programming language
3. Knowledge object-oriented software design methods

\

SUBJECT OBJECTIVES

C1 To enhance students knowledge about modern database development trends and emerging new data models
C2 To learn how to practically apply object enhancements of relational databases and/or pure object-oriented databases
C3 To get familiarity with object-relational mapping tools (ORM).

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Has a basic knowledge about emerging database trends.
PEK_W02 Is able to discuss the most important achievements in the area of modern database .

relating to skills:
PEK_U01Is able to choose and customise database implementation tools appropriate for certain requirements.
PEK_U02 Is able to design and implement pure object or object–relational database.

relating to social competences:
PEK_K01Is able to work in and manager a small software development team.
PEK_K02Is able to prepare and present speech based on self studies.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction, modern database trends	2
Lec 2	ORM tools	4
Lec 3	Object enhancements of relation databases	2
Lec 4	Object databases	2
Lec 5	Columnar databases	2
Lec 6	Big Data and noSQL	2
Lec 7	Test	1
	Total hours	15

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1	Introduction to assigned ORM environment	2
Lab 2	Configuration of ORM environment and modification of sample project	2
Lab 3	Developing of simple object-oriented queries for sample project	2
Lab 4	Developing of complex, aggregating queries for sample project	2
Lab 5	Introducing of simple changes in mapping descriptor and database schema	2
Lab 6	Introducing of complex changes in mapping descriptor and database schema	2
Lab 7	Introducing generalization relation in mapping descriptor and database schema	2
Lab 8	Developing of transactions over sample schema	2
Lab 9	Design of individual database application with ORM layer	2
Lab 10	Development of individual database application with ORM layer	4

Lab 11	Introduction to object enhancements of chosen relational DBMS	2
Lab 12	Development of individual database application with object-relational extensions	4
Lab 13	Efficiency comparing of application build with ORM and object-relational extensions.	2
	Total hours	30

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
Proj 5		
...		
	Total hours	30

Form of classes - seminar		**Number of hours**
Sem 1	Introduction, Subject and term assignment	2
Sem 2-Sem 8	Individual presentations prepared by students on topics related to ORM, XML, CEP, in-memory and columnar databases	13
	Total hours	15

TEACHING TOOLS USED
N1. Lecture N2. Individual consultations N3. The course web page with references to literature N4. Software development tools N5. Sample ORM application N6. Sample ORM layer configuration

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01-02, PEK_K01	Evaluation of the simply ORM enhancements [30 points] (Lab3-5)
F2	PEK_U01-02, PEK_K01	Evaluation of the complex ORM enhancements [30 points] (Lab6-8)
F3	PEK_U01-02, PEK_K01	Evaluation of the individual project with ORM [30 points] (Lab9-10)
F4	PEK_U01-02, PEK_K01	Evaluation of the individual project with ORDBMS [30 points] (Lab12-13)
P1	PEK_U01-02, PEK_K01	P1 is based on the sum of the points from F1…F4. At least 50% of points is required.
P2	PEK_U01	P2 is based on quality of seminar presentation.

P3	PEK_W01-02	P3 is based on the result of a written test covering material presented during lectures. At least 50% of points is required to pass the test.
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw-Hill, 2000
[2] R. Elmasri, S. B. Navathe, Fundamentals of Database Systems , Fourth Edition, Addison-Wesley, 2003

SECONDARY LITERATURE:

[1] Robin M. Roos, Java Data Objects, Addison-Wesley, London, 2003
[2] Hadoop The Definitive Guide 2nd Edition, Tom White, O'Reilly, 2011
[3] Oracle Information Architecture: An Architect's Guide to Big Data, An Oracle White Paper in Enterprise Architectur, 201

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Artur Wilczek,
Artur.wilczek@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
New database technologies
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2SBD_W01	C1, C3	Lec1-Lec6	N1-N4
PEK_W02	K2INF_W06_S2SBD_W01	C1, C3	Lec1-Lec6	N1-N4
PEK_U01 (skills)	K2INF_W06_S2SBD_W01, K2INF_U08_S2SBD_U01	C2,C3	Lec1-Lec4, Lab1-Lab13	N1-N6
PEK_U02	K2INF_U08_S2SBD_U03, K2INF_U08_S2SBD_U01	C2	Lec1-Lec4, Lab1-Lab13	N1-N6
PEK_K01 (competences)	K2INF_U08_S2SBD_U03	C1,C3	Lec1-Lec6	N1-N4
PEK_K02		C1	Sem2 – Sem8	N1-N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa I
Name in English MSc Thesis I
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part time~~*
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code INZ003818
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				60	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points				2	

including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes				0,6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 2rd semester

\

SUBJECT OBJECTIVES

C1 Preparation of students to write a master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology, with special attention of all stages of writing a thesis.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Preparation of students to write a master thesis according the internal requirements of Faculty of Computer Science and Management (Computer Science field of study), Wrocław University of Technology, with special attention of all stages of writing a thesis. Literature studies, selection and	

	learning of systems, tools, methods and algorithms needed for the realization of the chosen subject of thesis. The preparation of an outline of work and schedule of future work. Basic work on the research, design and implementation. Familiarization with the research works carried out at the Institute of Informatics. Final results: the initial solution and / or the prototype of developed system, knowledge about the current state of art in the field of thesis, an outline of future work and timetable for further works documented in English and Polish languages.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED

N1. Literature study - analysis of publications (including websites) related to subject of thesis, including the research works of the Institute of Informatics.
N2. Own work, independent research on the tasks defined in the master's thesis
N3. Student consultation with the supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessment based on the final results achieved

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[215] Literature related to the scope of realized project selected by student and recommended by the teacher.
[216] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis I
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U03, K2INF_U08	C1	Pr1	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa II
Name in English MSc Thesis II
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005221
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				540	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points				18	
including number of ECTS points for practical (P) classes				18	
including number of ECTS points for direct teacher-student contact (BK) classes				6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 4th semester

\

SUBJECT OBJECTIVES

C1 Preparation of master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish language, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes – project		**Number of hours**
Proj 1	Subject is the main component of the process of realization the master thesis and involves the preparation by the student his master thesis. Master thesis is done under the direction of his supervisor, with whom student defines its scope, goals, tasks and timetable for implementation.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED

N1. Preparation of master thesis N2. The text of the master thesis N3. Thesis review prepared by the supervisor N4. Students consultation with supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of master thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessed is the final text of the diploma thesis. The assessment is carried out in the form of a review done by the promoter. The condition to pass the course is delivering the final text of master thesis before the defined deadline. The second review, which does not, however the condition for pass the course is done by the reviewer appointed by the Faculty Dean. Reviews are made according to the standard format. The student is admitted to the defense (final exam) if both reviews are positive

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[217] Literature related to the scope of realized project selected by student and recommended by the teacher.

[218] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis II
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K1INF_U03, K2INF_U08	C1	Proj1	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Seminarium dyplomowe
Name in English Diploma seminar
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005220
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					90
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points					2
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes					1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge, skills and competences acquired at Informatics field at second level of study until 3th semester

\

SUBJECT OBJECTIVES

C1 Preparing students to write a master thesis according the internal requirements in Informatics field at Faculty of Computer Science and Management, Wrocław University of Technology,

C2 Providing students with basic skills related to preparation and presentation of scientific texts, beginning from the choice of topic, selection of tasks to be performed, use of literature to interpretation of the results.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He is able to acquire information from literature, databases and other sources, also in English or other language used for communication in Informatics field, is able to integrate the information obtained, interpret them, make critical evaluation and also draw conclusions and formulate and justify opinions related to prepared master thesis.

PEK_U02 He can communicate using a variety of techniques in his professional environment and in other environments, also in English or other foreign language used for communication in Informatics field and also to present the results of his master thesis

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
	Total hours	

Form of classes - seminar	**Number of hours**

Sem 1	Familiarization with the principles of master thesis realization at Informatics field. Rules related to student presentations. Determining the schedule of student presentations.	2
Sem 2	Review of basic skills related to preparation and presentation of scientific texts by students, beginning from the choice of topic, selection of tasks to be performed, use of literature and also how to write thesis and how obtained results should be interpret.	2
Sem 3 – Sem15	During semester each student has 2 presentations. The first presentation is related to the general view of the thesis topic, its placement in the literature and in the Informatics field. The student should present the primary aim of thesis, the state of art related to thesis topic, the concept of solution, the initial structure of thesis and timetable for further work. The purpose of the second presentation is preparation to defense and demonstrate presentation skills in English. The second presentation consists of two parts, namely, discussion of the results of the work in English and a short presentation in Polish devoted to the results of the thesis.	26
	Total hours	30

TEACHING TOOLS USED

N1. Multimedia presentations
N2. Examples of scientific papers and reports from the field of computer science.
N3. E-Learning System used to publish teaching materials and announcements, also used for collection and evaluation of student work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01 PEK_U02	Evaluation of the presentation of the work at the seminar and prepared documentation from the presentation. The evaluation shall be subject to the fulfillment of the requirements for the presentation, including its substantive scope, structure and organization of presentation, techniques of conversation, a form of presentation, compactness of presentation and conclusions reached. Participation in the discussions after presentation is also evaluated. In addition, the seminar leader is able to control the cooperation between supervisors and graduate students.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[219] Literature related to the scope of realized project selected by student and recommended by the teacher.

[220] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. inż. Leszek Borzemski, prof. PWr, leszek.borzemski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Diploma seminar
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
AND SPECIALIZATION **every specjalization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3
PEK_U02	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT…

SUBJECT CARD

Name in Polish Systemy informacyjne
Name in English Information systems
Main field of study (if applicable): Informatics
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code INZ3762
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				30
Number of hours of total student workload (CNPS)	60				60
Form of crediting	crediting with grade	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	crediting with grade
For group of courses mark (X) final course					
Number of ECTS points	2				2
including number of ECTS points for practical (P) classes	0				0
including number of ECTS points for direct teacher-student contact (BK) classes	1,2				1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic mathematical knowledge for 1st level of studies.

2. Informatics knowledge background.
3. Algorithms knowledge background.

\

SUBJECT OBJECTIVES

C1 Acquiring knowledge about functions and significance of information systems in contemporary organizations
C2 Acquainting with the functions and development of information systems in information society
C3 Acquainting with the different methods of information retrieval by surfing the Web
C4 Recognizing the problems of passing of contemporary organizations to Internet space
C5 Obtainment of skills to analyze the literature from information systems area and to synthesize the contents from different sources
C6 Application of the obtained knowledge to presentation the problems from information systems area by means of using adequate tools

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Familiarity with basic models of information systems
PEK_W02 Basic knowledge about Web information systems
PEK_W03 Familiarity with common multimedia technologies
PEK_W04 Understanding of the measures of information retrieval efficiency

relating to skills:
PEK_U01 Student can to build information query for different types of information needs
PEK_U02 Can to determine basic features of information system for given organization
PEK_U03Student be able to evaluate the precision of retrieved information
PEK_U04 Can to present basic features of given information system

relating to social competences:
PEK_K01 Can individually to use literature of the subject and to select useful information
PEK_K02 Student is convinced above positive role of information systems in stimulation of the civilization development

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	History of information systems development. Information processing. Theoretical basis of information systems.	2
Lec 2	Main information systems' models. Automation of information flow in organization.	2
Lec 3	Information retrieval on Internet – fundamentals.	2
Lec 4	Web information systems.	2
Lec 5	Multimedia. Importance of multimedia technologies in information systems development.	2
Lec 6	How societies embrace information technology. Digital libraries.	2
Lec 7	Efficiency of information systems. Case study of chosen information system.	2
Lec 8	Test	1
	Total hours	15

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Introductory seminar.	2
Sem 2	Information systems – definitions, types, features, examples.	2
Sem 3	Information retrieval fundamentals – models, dictionaries, indexes.	2
Sem 4	Evaluation of information systems' efficiency.	2
Sem 5	Analytical retrieval of information.	2
Sem 6	Information retrieval on Internet.	2
Sem 7	ERP class systems.	2
Sem 8	Mobile information systems.	2
Sem 9	Multimedia information systems.	2
Sem 10	Information systems for teleworking.	2
Sem 11	How societies embrace information technology.	2
Sem 12	CRM systems.	2
Sem 13	Knowledge management systems.	2
Sem 14	Information society: e-business, e-administration, e-commerce, e-health	2

Sem 15	Seminar summation and credit.	2
	Total hours	30

TEACHING TOOLS USED

N1. Computerized presentation at the lectures.
N2. Presentation with visualization and using Internet resources during the seminar.
N3. Consultations.
N4. Students' homework with using software packages.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 PEK_U04 PEK_K02	Grade of presentation (quality of slides, oral presentation, relevance, duration), presence and activity.
F2	PEK_K01	Report's grade
P-seminar	PEK_U02	Grade result from F1 and F2
P-lecture	PEK_W01-PEKW04 PEK_U03	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Manning C. D., Raghavan P., Schutze H.: *Introduction to Information Retrieval*, Cambridge University Press, New York, 2009, dostępne także bezpłatnie: www.cambridge.org

[2] Kłopotek M. A.: *Inteligentne wyszukiwarki internetowe* , Akademicka Oficyna Wydawnicza EXIT, Warszawa, 2001.

[3] Wrycza S. (red.): *Informatyka ekonomiczna. Podręcznik akademicki*, PWE, Warszawa, 2010.

[4] Cortada J. W. : How Societies Embrace Information Technology, WILEY-IEEE, NY, 2009.

[5] Baeza-Yates R., Ribeiro-Neto B.: *Modern Information Retrieval*, ACM Press, Adison-Wesley, New York, 1999.

SECONDARY LITERATURE:

[1] Zgrzywa A., Choroś K., Siemiński A.(Eds.): *Multimedia and Internet Systems: Theory and Practice,* Spriger Verlag, Berlin, 2013.

[2] Nguyen N.T., Zgrzywa A., Czyżewski A.(Eds.): *Advances in Multimedia and Network Information System Technology,* Spriger Verlag, Berlin, 2010.

[3] Zawiła-Niedźwiecki J. : *Informatyka gospodarcza*, Wyd. C. H. Beck, 2010.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Aleksander Zgrzywa, Aleksander.Zgrzywa@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INFW03, K2INF_W06	C1	Lec1, Lec 6 Sem 2,Sem 14	N1-4
PEK_W02	K2INF_W04, K2INF_W06	C3,C4	Lec 3, Lec 4 Sem 6,Sem 7, Sem 11	N1-4
PEK_W03	K2INF_W02, K2INF_W06	C2	Lec 5, Lec 6 Sem 13,Sem 14	N1-4
PEK_W04	K2INF_W03	C3	Lec 3, Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U01	K2INF_U01, K2INF_U08	C3	Lec 3,Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U02	K2INF_U05, K2INF_U08	C4	Lec 2,Lec 7 Sem 7,Sem 8,Sem 12,Sem 13	N1-4
PEK_U03	K2INF_U05, K2INF_U08	C3	Lec 2, Lec 5 Sem 3, Sem 5, Se6,Se9	N1-4
PEK_U04	K2INF_U02, K2INF_U03	C5, C6	Lec 5, Lec 6 Sem 3, Sem 5, Sem 6, Sem 9, Sem 10	N1-4

PEK_K01	K2INF_K01, K2INF_U02	C5	Lec 5, Lec 6 Sem 9, Sem 10	N1-4
PEK_K02	K2INF_K02	C1	Lec 1, Lec 6 Sem 2, Sem 14	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Systemy wyszukiwania informacji

Name in English Information Retrieval Systems

Main field of study (if applicable): Computer Science

Specialization (if applicable): Database Systems

Level and form of studies~~: 1st~~/ 2nd* level, full-time~~ / part-time*~~

Kind of subject: obligatory ~~/ optional / university-wide*~~

Subject code INZ003780

Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload (CNPS)	60			60	
Form of crediting	~~Examination /~~ crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination /~~ crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2			2	
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2			1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Student has fundamental competence from the scope of the computer science and databases. Student has a knowledge in the scope of the designing and producing methods of the software database systems.

\

SUBJECT OBJECTIVES

C1.Get to know the issues of information retrieval systems.

C2. Learn how to design information retrieval systems.

C3. Knowledge of classical methods of information retrieval in text online databases

C4. Acquiring the ability to modify the classical methods of information retrieval.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 - Student has a knowledge about connected issues from an understanding of information retrieval system

PEK_W02 – Student has knowledge of the classical methods of information retrieval in text online databases.

PEK_W03 – Student knows the rules of indexing documents

PEK_W04 – Student has knowledge of the possibility of modifying the classical methods of information retrieval

PEK_W05 – Student knows the ranking method documents

PEK_W06 – Student knows methods of document indexing

PEK_W07 – Student knows the basic information retrieval models

PEK_W08 – Student knows the basic methods of information retrieval

PEK_W09 – Student knows the measure of the effectiveness of information retrieval systems

PEK_W10 - Student has knowledge about the use of neural networks and the Semantic Web to information retrieval

PEK_W11 – Student has knowledge of the automatic processing of texts

PEK_W12 – Student knows methods of text and data mining, information retrieval on the Internet.

relating to skills:

PEK_U01 - student is able to correctly use the terminology associated with information retrieval

PEK_U02 - the student is able to apply classical methods of information retrieval and can be modified

PEK_U03 - the student can choose the model of information retrieval system

PEK_U04 - the student is able to implement methods of information retrieval

PEK_U05 - the student is able to implement the chosen method of indexing documents

PEK_U06 - the student is able to design and implement a simple text search engine

PEK_U07 - the student is able to carry out testing methods for ranking documents

PEK_U08 - the student is able to propose and carry out experiments to search for information online.

relating to social competences:

PEK_K01 Student is able to cooperate in team during the designing and implementing of information retrieval system.

PEK_K02 Student is able to notice social and legal problems of applying methods of information retrieval system.

PEK_K03 Student has a skill of the independent and creative thinking with the respect for the law and of professional ethics.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction into information retrieval systems. Basic definitions. Basic concepts and terminology in the field of information retrieval systems.	1
Lec 2	Information retrieval in text databases.	2
Lec 3	Models of information retrieval systems.	2
Lec 4	Methods of information retrieval	2

Lec 5	Indexing documents.	2
Lec 6	Neural networks in an information retrieval system. Semantic Web in an information retrieval.	2
Lec 7	Measures of the effectiveness of information retrieval systems	2
Lec 8	Information retrieval on the Internet.	2
	Total hours	15

Form of classes - class		Number of hours
Cw 1		
Cw 2		
Cw 3		
Cw 4		
Cw 5		
Cw 6		
Cw 7		
Cw 8		

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
...		
	Total hours	

Form of classes - project		Number of hours
Proj 1	Introduction into the project implementation. Determining preliminary requirements.	2
Proj 2	Analysis of requirements for the designed information retrieval system. Works on the model.	4
Proj 3	Formal design specification.	4
Proj 4	Implementation of the first step.	4
Proj 5	Implementation of the second step.	4
Proj 6	Testing. Tests of the safety.	4
Proj 7	Model tests and the audit.	4
Proj 8	Presentation of tasks carried out and findings.	4
	Total hours	30

Form of classes - seminar		Number of hours

	Total hours	

TEACHING TOOLS USED
N1. Multimedia presentations N2. The course Web page N3. Electronics and paper books and library references

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01÷PEK_U08 PEK_K01÷PEK_K03	Evaluation of presentation, discussion and activity
F2	PEK_W01÷PEK_W12 PEK_U01÷PEK_U08 PEK_K01÷PEK_K03	Final test
C=F1+F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[221] Buttcher S., Clarke c., Cormack G., Information Retrieval. Implementing and Evaluating Search Engines. MIT Press, 2010.
[222] Baeza-Yates R., Ribeiro-Neto B., Modern information retrieval. Addison Vesley, 1999.

SECONDARY LITERATURE:

[1] Gobinda G. Chowdhury, Introduction to modern information retrieval. Library Association Publishing, 2009.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Zygmunt Mazur, zygmunt.mazur@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_K01	K2INF_W06_S2SBD_W001	C1-C6	Lec1-8,Pr1-Pr8	N1-N3
PEK_W01	K2INF_W06_S2SBD_W05	C1-C4	Lec1-Lec8	N1-N3
PEK_W02	K2INF_W06_S2SBD_W05	C1-C4	Lec2, Lec8	N1-N3
PEK_W03	K2INF_W06_S2SBD_W05	C1-C4	Lec5	N1-N3
PEK_W04	K2INF_W06_S2SBD_W05	C1-C4	Lec1-Lec8	N1-N3
PEK_W05	K2INF_W06_S2SBD_W05	C1-C4	Lec2-Lec8	N1-N3
PEK_W06	K2INF_W06_S2SBD_W05	C1-C4	Wy1-Wy8	N1-N3
PEK_W07	K2INF_W06_S2SBD_W05	C1-C4	Lec5	N1-N3
PEK_W08	K2INF_W06_S2SBD_W05	C1-C4	Lec4-Lec5	N1-N3
PEK_W09	K2INF_W06_S2SBD_W05	C1-C4	Lec7	N1-N3
PEK_W10	K2INF_W06_S2SBD_W05	C1-C4	Lec6	N1-N3
PEK_W11	K2INF_W06_S2SBD_W05	C1-C4	Lec1-Lec8	N1-N3
PEK_W12	K2INF_W06_S2SBD_W05	C1-C4	Lec8	N1-N3
PEK_U01	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3
PEK_U02	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3
PEK_U03	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3
PEK_U04	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3
PEK_U05	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3
PEK_U06	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3
PEK_U07	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3
PEK_U08	K2INF_U08_S2SBD_U10	C1-C4	Pr1-P15	N1-N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: Systemy wspomagania decyzji
Name in English: Decision Support Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Decision Support Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / university-wide*
Subject code: INZ003761
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	15		15	
Number of hours of total student workload (CNPS)	60	30		60	
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / ~~crediting with grade~~*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2	1		2	
including number of ECTS points for practical (P) classes				2	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	0,6		1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None.

\

SUBJECT OBJECTIVES

C1 Getting to know foundations of designing computer science decision support systems using general systemic methods which make it possible to apply unified approaches for analysis and decision making for decision support systems of different nature.
C2 Acquisition of skills to represent in the form of mathematical formulas of decision making plants treated as input-output plants.
C3 Acquisition of skills to analyze of decision making plants treated as input-output plants.
C4 Getting acquainted with methods and algorithms of multi-stage decision making.
C5 Acquisition of skills to apply dynamic programming method.
C6 Getting to know metods and algorithms of multi-criteria decision making.
C7 Acquisition of skills to use AHP method.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student knows foundations of designing of decision support systems for any kind of plants.

PEK_W02 Student knows foundations of analysis and decision making for input-output plants with logic knowledge representation.

PEK_W03 Student knows selected method of multi-stage and multi-criteria decision making.

relating to skills:

PEK_U01 Student is able to elaborate a mathematical model for an input-output decision making plant in discrete state space as well as with logic knowledge representation.

PEK_U02 Student can solve analysis and decision making tasks for elementary plants with logic knowledge representation.

PEK_U03 Student is able to solve multi-stage decision making problem using Bellman's Principle and dynamic programming.

PEK_U04 Student can use AHP algorithm for the solution od multi-criteria decision making problem

relating to social competences:

PEK_K01 Student can take advantage of professional literature by oneself and can perform the critical analysis of information mined.

PEK_K02 Student can think creatively.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Decision support systems – definitions, structures, problems.	1
Lec 2	Application of discrete state equations and logic expressions for representation of decision making plants.	2
Lec 3	Analysis of decision making plants, in particular logic-algebraic method.	2
Lec 4	Decision making – definition, typology, logic-algebraic plant.	2
Lec 5	Bellman's Principle and multi-stage decision making.	3
Lec 6	Multi-criteria decision making, Pareto sets, AHP method.	3
Lec 7	Examples of computer decision support systems.	2
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Solution of numerical exercises concerning difference equations.	1
Cl 2	Solution of numerical exercises concerning differential equations as well as propositional calculus.	2
Cl 3	Solution of numerical exercises concerning mathematical representations of input-output plants.	2
Cl 4	Solution of numerical exercises concerning analysis using logic-algebraic method.	2
Cl 5	Solution of numerical exercises concerning decision making using logic-algebraic method.	2
Cl 6	Solution of numerical exercises concerning dynamic programming.	2
Cl 7	Solution of numerical exercises concerning AHP method.	2
Cl 8	Final test.	2
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab 1		

Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Collecting of indispensable information about selected plant being the decision making plant.	2
Proj 2	Determination of mathematical model of selected decision making plant and decision making problem formulation.	2
Proj 3	Analysis of decision making plant using its mathematical model.	2
Proj 4	Choice of decision making method for further usage as well as elaboration of decision making algorithm.	3
Proj 5	Implementation and alalysis of decision making algorithm.	4
Proj 6	Elaboration of conclusions and written report of the project performed.	2
	Total hours	15

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1 Lecture – traditional method. N2 Classes – traditional method. N3 Consultation. N4 Individual discussion with student. N5 Short test (10 mins.). N6 Self-contained work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Short tests during the classes.
F2	PEK_K01– PEK_K02	Individual discussion with student during the project.
P (Classes)	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Test.
P (Project)	PEK_U01–PEK_U04; PEK_K01–PEK_K02	Evaluation of written report of the project.
P (Lecture)	PEK_W01–PEK_W03; PEK_K02	Exam.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[223] [1] Józefczyk J., Wybrane problemy podejmowania decyzji w kompleksach operacji, Oficyna Wydawnicza PWr, Wrocław 2001.

[224] Bubnicki Z., Podstawy informatycznych systemów zarządzania, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1993.

[225] Roy B., Wielokryterialne podejmowanie decyzji, WNT, Warszawa 1990.

SECONDARY LITERATURE:

[1] Techniki informacyjne w badaniach systemowych, P. Kulczycki, O. Hryniewicz, J. Kacprzyk (red.), WNT, Warszawa 2007.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Jerzy Józefczyk, Jerzy.Jozefczyk@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Decision Support systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Decision Support systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1	Lec1, Lec 2, Lec 7, Cl1, Cl 2, Pr1	N1, N3, N6
PEK_W02	K2INF_W02	C1	Lec3, Lec4	N1, N3, N6
PEK_W03	K2INF_W02	C4, C6	Lec5, Lec6	N1, N3, N6
PEK_U01 (skills)	K2INF_U05; K2INF_U06	C2	Lec2, Cl 3, Proj2	N2–N6
PEK_U02	K2INF_U05; K2INF_U06	C3	Cl 4, Cl 5, Proj3, Pro4	N2–N6
PEK_U03	K2INF_U05; K2INF_U06	C5	Cl 6, Proj4	N2–N6
PEK_U04	K2INF_U05; K2INF_U06	C7	Cl 7, Proj4	N2–N6
PEK_K01 (competences)	K2INF_K01	C1, C4, C6	Lec1– Lec7, Proj1, Proj4	N2–N6
PEK_K02	K2INF_K01	C1–C7	Proj1–Proj6	N2–N6

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: Teoria i inżynieria ruchu teleinformatycznego

Name in English: Theory and engineering of teletraffic

Main field of study (if applicable): Computer science

Specialization (if applicable): Teleinformatics

Level and form of studies: 2nd level, full-time

Kind of subject: obligatory

Subject code INZ3759

Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload	30			90	

(CNPS)					
Form of crediting	Crediting with grade			Crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	1			3	
including number of ECTS points for practical (P) classes				3	
including number of ECTS points for direct teacher-student contact (BK) classes	0,6			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

37. Has a basic knowledge of ICT systems and computer communication networks (K1INF_W11).
38. Knows the basic methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_W16)
39. Can use the right tools to build a simple model of the process (the object), to formulate specific task analysis and decision making (K1INF_U15)
40. Can effectively use the methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_U16)
41. It has the ability to self-education, including in order to improve the professional competence (K1INF_U05)
42. Understands the need and knows the possibility of lifelong learning and to improve their professional and social competences (K1INF_K01)

SUBJECT OBJECTIVES

C1. Ordered, underpinned by theoretical knowledge of methods and techniques for transmitting signals using different modulation techniques, methods and techniques of information transmission, methods of organization and management of data communications traffic in the tasks of design and analysis of communication systems, methods of delivering service quality of ICT systems, analysis of quantitative and qualitative requirements and methods for sizing of distributed IT systems.

C2. Skills about the differences and benefits of the use of analog and digital data transmission techniques, the differences and benefits of the use of wired and wireless signal transmission techniques, developing the concept of using wired and wireless technologies in the basic applications of ICT systems, defining the qualitative and quantitative requirements of the user information and communication systems range of data, designing ICT solutions needed to achieve the qualitative and quantitative requirements of the user, using standards and solutions available on the market, estimating the cost of preparing and maintaining ICT solutions needed to achieve the qualitative and quantitative requirements, designing modernization of IT solutions needed to achieve the qualitative and quantitative requirements, identifying differences and similarities between solutions in a variety of applications (e-health, e-government and e-learning, in real-time systems, etc.).

C3. Skills for the design and analysis of complex, distributed ICT systems providing network services for distributed computer communication systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

K2INF_W02: Has a structured, theoretically founded essential knowledge of business modeling and requirements specification systems.

K2INF_W03: Has a structured, theoretically founded essential knowledge in the delivery of information distributed systems

K2INF_W06: Achieves results in the category of knowledge for specialty data communications

relating to skills:

K2INF_U05: Can - in formulating and solving engineering tasks - integrate knowledge of the fields of science and scientific disciplines relevant to the study being studied and applied a systemic approach, taking into account the non-technical aspects

K2INF_U06: Can solve the modeling, analysis and decision making for different types of objects

K2INF_U08: Achieves results and skills in areas of data exchange and computer communications systems

relating to social competences:

K2INF_K01: Can think and act in a creative and enterprising

K2INF_K02: Has aware of the social role of technical graduating, especially understands the need for the formulation and communication to the public, especially through the mass media, information and opinion on the achievements of technology and other aspects of engineering, shall endeavor to provide such information and opinions in a widely understood the reasons for the different points of view

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Classification of ICT systems from different points of view. Quality of Experience (QoE) and Quality of Service (QoS) in ICT systems with elastic and streaming traffic.	2
Lec 2	Introduction to queuing. Open and close networks of queues.	2
Lec 3	Queuing models of circuit-switched and packet-switched computer communication systems. Burke's theorem and Kleinrock approximation.	2
Lec 4	Access control, flow control and routing tasks formulation and solution in distributed environments.	2
Lec 5	Requirements analysis	1
Lec 6	Models (Poisson, Markov modulated, self-similarity, etc) of teletraffic and its application in traffic engineering tasks.	2
Lec 7	QoS delivery concepts: best effort, integrated services and differentiated services	2
Lec 8	New concepts of systems and networks - NXGN (Next Generation Networks) i NWGN (New Generation Network). Summary.	2
	Total hours	15

PROGRAMME CONTENT

Form of classes - project		Number of hours
Proj 1	Formulation design task based on the analysis of the literature, documentation, etc.	2
Proj 2	Justification for the choice task and purpose of the task design - an analysis of the expected benefits of the project task.	2
Proj 3	Quantitative requirements analysis for the communication system under design	2
Proj 4	Qualitative requirements analysis for the communication system under design	2
Proj 5	Analysis of state of the art on how to solve the task design	2
Proj 6	Analysis and selection of the task design methodology	2
Proj 7	Tools (methods, algorithms, procedures, software and hardware) analysis and selection required for the implementation of the project task	2
Proj 8	Implementation of prototype of modules solve the task	2
Proj 9	Prototype testing and evaluation	2
Proj 10	Modification of solutions using prototype test results	2
Proj 11	Integration of modules distinguished at the stages of requirements analysis and prototyping	2
Proj 12	Verification and testing of an integrated solution design task	2
Proj 13	Analysis of the possibility of extending the project tasks	2
Proj 14	Preparation of the presentation and documentation of the design task	2
Proj 15	Presentation of the results of the design task	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture supported by whole class multimedia presentations based on literature and open access and commercial sources.
N2. Student's own works – solving experiments and tasks in laboratory as well as homework.
N3. Student's own works – literature and open access sources studies.
N5. Collective works in laboratory
N5. Student's own works – preparation of presentations and technical documentations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05	Observation and verification of student activity. Solving the sample jobs.

	K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	
F1 – F15 (project)	K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and assessment of student autonomy.
P (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	Colloquium (course credit) in the evaluation of forming F1 (lecture)
P (project)	K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Total weighted ratings F1 - F15 (project) and the assessment for the presentation of the final results of the project.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[226] A.S. Tanenbaum, „Computer networks", Prentice Hall; 1996
[227] G. Pujolle, D. Seret, D. Dromard, E. Horlait, „Integrated Digital Communication Networks", J. Wiley & Sons
[228] B. Russell, „The art of computer networks", Prentice Hall; 2009
[229] V.S. Bagad, I.A. Dhotre, „Computer networks", Technical Publications, 2009.
[230] M. Roden, „Analog and digital communication systems", Prentice Hall
[231] http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

SECONDARY LITERATURE:

[76] S. Haykin, „Telecommunication systems", Prentice Hall, 1999.
[77] MIT Free Open Course Materials (http://ocw.mit.edu/index.htm)
[78] CCNA Exploration Network Fundamentals, Cisco Academy, PWN, 2008

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Adam Grzech, adam.grzech@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Theory and engineering of teletraffic

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer science

AND SPECIALIZATION
Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1, C2, C3	Lec 1 – Lec 8	N1, N4
PEK_W02	K2INF_W03	C1	Lec 1 – Lec 8	N1,N2, N4
PEK_W03	K2INF_W06	C1	Lec 1 – Lec 8	N1, N4
PEK_U01 (skills)	K2INF_U05	C1, C2, C3	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_U02	K2INF_U06	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_U03	K2INF_U08	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_K01 (competences)	K2INF_K01	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_K02	K2INF_K02	C1, C2	Lec 1 – Lec 8	N1, N2, N3, N4, N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Zaawansowane metody i techniki analizy danych
Name in English Advanced Methods and Techniques of Data Analysis
Main field of study (if applicable): computer science
Specialization (if applicable): …….
Level and form of studies: 2nd* level, full-time
Kind of subject: obligatory
Subject code INZ003758
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	crediting with grade*		crediting with grade*		

For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes	0		4		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of mathematics and mathematical statistics

\

SUBJECT OBJECTIVES

C1 Introduce the methods and techniques of the statistical data analysis to students
C2 Gather knowledge for Knowledge Discovery (Data Mining)
C3 Applying the gathered knowledge to drawing conclusions based on data analysis

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has a basic knowledge of Knowledge Discovery (Data Mining)
PEK_W02 student has a basic knowledge of statistical data analysis
PEK_W03 student is able to present differences between parametric and non-parametric tests

relating to skills:
PEK_U01 student is able to choose a proper statistical test
PEK_U02 student is able to draw conclusion from data analysis
PEK_U03 student is able to select a proper data mining method

relating to social competences:
PEK_K01 student is able to search and reuse the primary and secondary literature listed below and is able to gather the proper knowledge
PEK_K02 student understands the need for systematic and individual work in order to cover the scope of the course

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to knowledge discovery	2
Lec 2	Classification and Data Clustering	2
Lec 3	Clustering Algorithms	2
Lec 4	Discovering association rules	2
Lec 5	Statistics - basic notions	2
Lec 6	The selected problems of estimation theory	2
Lec 7	Introduction to verification of statistical hypothesis	2
Lec 8	Parametric tests for one population	2
Lec 9	Non-parametric tests for one population	2
Lec 10	Parametric tests for two populations	2
Lec 11	Non-parametric tests for two populations	2

Lec 12	Parametric tests for more than 2 populations	2
Lec 13	Non-parametric tests for more than 2 population	2
Lec 14	Correlation and regression methods	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Introduction to WEKA	2
Lab 2	Knowledge discovery in WEKA	8
Lab 3	Introduction to MATLAB	2
Lab 4	Statistical data analysis in MATLAB	8
Lab 5	Introduction to R	2
Lab 6	Statistical data analysis in R	8
	Total hours	30

Form of classes - project		**Number of**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Traditional lecture N2. Labs N3. One-to-one consultancy during stuff hours

N4. Student self-study

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P -laboratory	PEK_U01-PEK_U03, PEK_K01-PEK_K02	Evaluation of the prepared tasks during labs, oral test
P-lecture	PEK_W01-PEK_W03 PEK_K01-PEK_K02	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[232] M. Sobczyk: Statystyka, Wydawnictwo Naukowe PWN, 2007

[233] W.Krysicki, J.Bartos, W. Dyczka, K. Królikowska, M. Wasilewski: Statystyka, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, cz. 2 Statystyka matematyczna, Wydawnictwo Naukowe PWN, 2007

[234] Marek Walesiak, Eugeniusz Gatnar (Red. nauk.) :Statystyczna analiza danych z wykorzystaniem programu R, Wydawnictwo Naukowe PWN, 2009

[235] M. Korzyński: Metodyka eksperymentu Planowanie realizacja i statystyczne opracowanie wyników eksperymentów technologicznych, Wydawnictwo Naukowo-Techniczne 2006

[236] Nong Ye, : The Handbook of Data Mining, Lawrence Erlbaum Associates, Publishers, 2003

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Prof. dr hab. inż Ngoc Thanh Nguyen, Ngoc-Thanh.Nguyen@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Advanced Methods and Techniques of Data Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY computer science
AND SPECIALIZATION **……**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C2	Lec1-4 Lab1-2	N1-4
PEK_W02	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_W03	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_U01	K2INF_U01, K2INF_W06, K2INF_W08	C1	Lec5-14 Lab3-6	N1-4
PEK_U02	K2INF_U01, K2INF_W06, K2INF_W08	C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_U03	K2INF_U01, K2INF_W06, K2INF_W08	C2	Lec1-4 Lab1-2	N1-4
PEK_K01		C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_K02		C1, C2, C3	Lec1-14 Lab1-6	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish *Zaawansowane systemy baz danych*
Name in English *Advanced database systems*

Main field of study (if applicable): Computer Science
Specialization (if applicable): Database Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part time~~*
Kind of subject: obligatory ~~/ optional / university wide~~*
Subject code INZ003800
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			30	
Number of hours of total student workload (CNPS)	90			90	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3			3	
including number of ECTS points for practical (P) classes	0			3	
including number of ECTS points for direct teacher-student contact (BK) classes	1,8			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of elementary data models and database design methods
2. Elementary knowledge of Database architectures
3. Elementary knowledge of SQL

\

SUBJECT OBJECTIVES

C1 To enhance students' knowledge about modern data models
C2 To learn how to practically apply modern data models in advanced database applications

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Has a basic knowledge about advanced data models
PEK_W02 Is able to present and compare usages of advanced data models
PEK_W03 Is able to evaluate suitability of advanced data model in particular application
…
relating to skills:
PEK_U01Is able to choose proper data model meeting concrete requirements
PEK_U02 Is able to prepare proof of concept for advanced database application

…
relating to social competences:
PEK_K01Is able to work in and manage a small software development team

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Introduction to advanced database models	2
Lec 2	Active databases	2
Lec 3	Temporal databases	2
Lec 4	Data stream management	2
Lec 5	Complex event processing	2
Lec 6	Semistructural data storage	2
Lec 7	Semistructural data processing	2
Lec 8	Query languages for semistructural data	2
Lec 9	Spatial data storage and processing	2
Lec 10	Multidimensional data	2
Lec 11	Physical storage of multidimensional data	2
Lec 12	Distributed database systems	2
Lec 13	Distributed transactional processing	2
Lec 14	Cloud databases	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
...		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Introduction, Building of projects teams.	2
Proj 2	Preparing an environment aimed for evaluating database applications.	4
Proj 3	Design and implementation of active database.	8
Proj 4	Design and implementation of semistructural database.	8

Proj 5	Design and implementation of spatial database.	8
Proj 6	Design and implementation of multidimensional database.	8
	Total hours	30

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Lecture N2. Individual consultations N3. The course web page with references to literature N4. Software development tools N5. Database Management System

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01-02, PEK_K01	Evaluation of the concept of solution [20 points] (Proj2)
F2	PEK_U01-02, PEK_K01	Evaluation of the first project assignment[20 points] (Proj3)
F3	PEK_U01-02, PEK_K01	Evaluation of the second project assignment [20 points] (Proj4)
F4	PEK_U01-02, PEK_K01	Evaluation of the third project assignment [20 points] (Proj5)
F5	PEK_U01-02, PEK_K01	Evaluation of the fourth project assignment [20 points] (Proj6)
C1	PEK_U01-02, PEK_K01	C1 is based on the sum of the points from F1…F5. At least 50% of points is required.
C2	PEK_W01-03	C2 is based on the result of a written test covering material presented during lectures. At least 50% of points is required to pass the test.
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] C.J. Date, Date on Database, Writings 2000-2006, Apress, 2006
[2] R. Elmasri, S. B. Navathe, Fundamentals of Database Systems , Fourth Edition, Addison-Wesley, 2003
[3] R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw-Hill, 2000

SECONDARY LITERATURE:

[1] N.W.Paton, O. Díaz, Active database systems, ACM Computing Surveys, 1999, 31 (1): 63–103
[2] Principles of Distributed Database Systems, Third Edition, M. Tamer Özsu, Patrick Valduriez, Springer, 2010

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Artur Wilczek,
Artur.wilczek@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Advanced database systems

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..

AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2SBD_W01	C1 – C2	Lec1-Lec14	N1-N3
PEK_W02	K2INF_W06_S2SBD_W01	C1 – C2	Lec1-Lec14	N1-N3
PEK_W03	K2INF_W06_S2SBD_W01	C1 – C2	Lec1-Lec14	N1-N3
PEK_U01 (skills)	K2INF_W06_S2SBD_W01, K2INF_U08_S2SBD_U08, K2INF_U08_S2SBD_U05, K2INF_U08_S2SBD_U04, K2INF_U08_S2SBD_U02, K2INF_U08_S2SBD_U01	C1 – C2	Lec1-Lec14, Proj2-Proj6	N1-N5
PEK_U02	K2INF_W06_S2SBD_W01, K2INF_U08_S2SBD_U08, K2INF_U08_S2SBD_U05, K2INF_U08_S2SBD_U04, K2INF_U08_S2SBD_U02, K2INF_U08_S2SBD_U01	C1 – C2	Lec1-Lec14, Proj2-Proj6	N1-N5
PEK_K01 (competences)	K2INF_U08_S2SBD_U08	C1- C2	Proj2-Proj6	N1-N5

** - enter symbols for main-field-of-study/specialization educational effects

*** - from table above

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Biznesowe Systemy Informatyczne
Name in English Business Information Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): …Information Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time*~~
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code INZ3802
Group of courses YES / ~~NO*~~

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			30	
Number of hours of total student workload (CNPS)	60			60	
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3			3	
including number of ECTS points for practical (P) classes				3	
including number of ECTS points for direct teacher-student contact (BK) classes	1,8			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of project management topics.
2. Knowledge of software development methodologies: traditional and agile.
3. Ability to write technical papers

\

SUBJECT OBJECTIVES

C1 To familiarize students with the entirety of issues related to the selection, purchase, implementation and operation of information systems for business organizations with particular emphasis on the legal requirements for public contracts and the protection of personal data. Explanation of the possibilities offered by new technologies for business information systems especially those offered by the Internet.

C2 To familiarize students with technologically advanced systems, analyzing real life example systems and discussing problems in their implementation and operation. Mastering ability to analyze information needs and choosing an appropriate system, taking into account both functional and non functional requirements.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Knowledge of standard solutions used in the current information systems.

PEK_W02 Knowledge of the legal status required for the selection, implementation and operation of business information systems

PEK_W03 Knowledge of the capabilities and limitations of the use of new hardware and software solutions in the implementation of information systems.

relating to skills:

PEK_U01 Selection of information system for the fulfilling needs of an enterprise.

PEK_U02 Assessing the suitability of modern technology solutions.

PEK_U02 Interpretation of legal provisions on the selection and operation of information systems.

relating to social competences:

PEK_K01 Ability to negotiate contract for an information system for an enterprise.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Business Information Systems: classification, the influence of Internet.	2
Lec 2	Legal aspects of information systems: data protection, copyright law, public procurement law.	2
Lec 3	Patent information: available services, search techniques.	2
Lec 4	Cloud computing: technology, legal aspects, applications.	2
Lec 5	Automatic Identification Technology: biometrics, product identification (bar codes one-and two-dimensional, RFID)	2
Lec 6	Security of operations on the Internet: the open key cryptography, digital signature, accreditation centers, watermarks.	2
Lec 7	Financial operations of the Internet: banking, secure payment systems, e-accounting	2
Lec 8	Using the Internet for e-procurement and auctions.	2
Lec 9	Advertising: traditional techniques, media houses, use of the internet, SEO.	2
Lec 10	Software quality of information systems: quality measures, system selection methodology.	2
Lec 11	Data quality in information systems: measurement of quality, sources of threats, ways to achieve proper quality level.	2
Lec 12	Negotiations: the phases of the negotiation process, the recommended negotiation techniques.	2
Lec 13	Case study: discussion of the ERP system (e.g. SAP ERP) system implementation.	2
Lec 14	Case Study: Risk Management (e.g. SAP BI).	2
Lec 15	Final test.	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		

Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1	Basic data on customer enterprise.	2
Proj 2	Analysis of the scope of company activities and its business environment.	2
Proj 3	Developing functional specification.	4
Proj 4	Analysis of non functional requirements and legal status.	2
Proj 5	The flow of information, interfaces to other systems.	2
Proj 6	Developing processing algorithms.	2
Proj 7	Analysis of commercially available software that meets the requirements.	2
Proj 8	Analysis of commercially available software tools, and their selection, feasibility study, risk assessment.	2
Proj 9	The development of user interface.	4
Proj 10	Drafting of the database structure.	2
Proj 11	Development of the reports.	2
Proj 12	Drafting of the hardware infrastructure, the anticipated effects the implementation and its schedule.	2
Proj 13	Acceptance and evaluation of system design.	2
	Total hours	30

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Informative lecture, supported by multimedia presentations.

N2. Examples of documentation for the implementation of business systems.
N3. E-learning system used for the publication of teaching materials and equipment, collection and assessment of student work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1_1	PEK_U01, PEK_U3	Activity for available solutions 30% Quality of development of stage ending 50% Involvement in the work of the project group 20%
F1_2	PEK_U02, PEK_W03	Activity in identifying problems and proposing solutions to 30% Quality of development of stage ending 50% Involvement in the work of the project group 20%
P1 final evaluation of the project	PEK_U04	The components of the final grade: 20% - analysis of business conditions, legal and environmental. 30% - the choice of technology and the functional scope of the project. 20% - developed substantive value of the final project 20% - quality of the presentation of the final project 10% - activity during the semester
P2 final evaluation of the course lectures	PEK_W01, PEK_W02, PEK_W03, PEK_K01	The final evaluation of the course is calculated based on the test results of successful completion. The assessment is positive if a minimum of 50% of the maximum number of points is scored. The passing the project is also required.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Mayewski, Matt; Cyfrowa przestrzeń biznesowa: przyszłość internetowych serwisów biznesowych, 2011
[2] Górski Janusz; Inżynieria oprogramowania w projekcie informatycznym, wyd. Mikom, Warszawa, 2000
[3] Arkadiusz Szyszkowski, Aneta Trześniewska-Markowicz; Prawo zamówień publicznych : komentarz dla praktyków, Gdańsk : Ośrodek Doradztwa i Doskonalenia Kadr, 2009
[4] Włodzimierz Dąbrowski, Przemysław Kowalczuk; Podpis Elektroniczny, Mikom, 2003

SECONDARY LITERATURE:

[1] Janusz Barta, Ryszard Markiewicz; Prawo autorskie i prawa pokrewne, Kraków : Kantor Wydawniczy "Zakamycze", 2004
[2] Nic Peeling: Negocjacje, Polskie Wydawnictwo Ekonomiczne, 2010
[3] Holdren, Anastasia: Google AdWords : skuteczna kampania reklamowa w internecie, Wydawnictwo Helion, cop. 2012
[4] Finkenzeller, Klaus. RFID handbook [Dokument elektroniczny] : fundamentals and applications in contactless smart cards and identification, 2nd ed., Chichester, England ; Hoboken, N.J. : Wiley, cop. 2003
[5] Bertino, Elisa :Security for Web services and service-oriented architectures, Springer, cop. 2010.
[6] Zaremba, Marianna Barbara; Usługi informacji patentowej, Warszawa, Zakład Systemów Ekonomicznych "Wektory Gospodarki", 1995
[7] Hunt D., Patent Searching Tools and Techniques, John Wiley & Sons, 2007
[8] Fajgielski P., Kontrola i audyt przetwarzania danych osobowych, Wrocław Presscom

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Andrzej Siemiński, Andrzej.Siemiński@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

……

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..

AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W06_S2SI_W01	C1	Lec1, Lec 13, Lec 14	N1, N3
PEK_W02	K2INF_W06_S2SI_U04	C1	Lec 2 Lec 3	N1, N3
PEK_W03	K2INF_W06_S2SI_U02	C2	Lec4..Lec 11. Lec 13, Lec 14	N1, N3
PEK_U01	K2INF_W06_S2SI_U03	C2	Lec 1, Lec 2	N1, N3
PEK_U02	K2INF_W06_S2SI_U03	C2	Lec 2, Lec 8	N1, N3
PEK_U03	K2INF_W06_S2SI_U04	C1	Lec 4 .. Lec 8	N1, N3
PEK_U04	K2INF_U03	C2	Proj.	N2
PEK_K01	K2INF_W06_S2SI_U02	C1	Lec 12	N1, N3

** - enter symbols for main-field-of-study/specialization educational effects

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: Eksploracja Internetu.
Name in English: Exploration of Internet.
Main field of study (if applicable): Computer Science.
Specialization (if applicable): Information Systems
Level and form of studies: ~~1st/~~ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: ~~obligatory /~~ optional ~~/ university-wide*~~
Subject code INZXXXX
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30				15
Number of hours of total student workload (CNPS)	90				30
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3				1

including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,8				0,6

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Introduction to information search.
2. Processing of multimedia data.
3. Fundamentals of natural language processing.

\

SUBJECT OBJECTIVES

C1 Getting familiar with the current state and development tends of Internet search engines.
C2 2 Ability to search for a given topic, extracting and aggregating information and preparing a multimedia presentation.
C3 Ability to select and evaluate available software, to conduct studies aiming at measuring the effectiveness of the information retrieval and comprehensive presentation of obtained results.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Understanding the current state of Internet search engines and their development trends.
PEK_W02 Getting familiar with advanced information technologies applicable in a retrieval system

relating to skills:
PEK_U01 Presenting own conclusions on the basis of information aggregated from different sources.
PEK_U02 Presenting own conclusions from the conducted tests and experiments .

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Typology of Internet search engines.	2
Lec 2	Extraction of data from the Internet.	2
Lec 3	Tools for indexing and searching of texts.	2
Lec 4	Using links for web page ranking.	2
Lec 5	The basics of Semantic Network	2
Lec 6	Semantic Network in practice.	2
Lec 7	XML specific retrieval.	2
Lec 8	Multimedia indexing and retrieval	2
Lec 9	Shallow text analysis	2
Lec 10	Exploiting the natural language semantics.	2
Lec 11	The structure of a web search engine	2
Lec 12	Syndication of Information	2
Lec 13	QA Systems	2
Lec 14	Media Monitoring	2

Lec 15	Final test.	2
	Total hours	30

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Introduction, topic presentation and assignment.	1
Sem 2	The practice of indexing and searching of text-based content.	2
Sem 3	The practice of extracting of text-based content from the Internet	2
Sem 4	The QA (question and answer) systems.	2
Sem 5	Evaluation of the effectiveness of selected methods of communication in natural language.	2
Sem 6	Evaluation of the effectiveness of methods of searching for pictures and videos.	2
Sem 7	Evaluation of the effectiveness of methods of music information retrieval.	2
Sem 8	Summary of activities, selection and integration of the presented topics.	2
	Total hours	15

TEACHING TOOLS USED

N1. N2. N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P1 The final evaluation of the seminar	PEK_U01 PEK_U02	The scope of research / studies 25% The quality of selected materials 45% The quality of presentation 20% Activity in discussions 10%
P2 the final evaluation of the course	PEK_W01 PEK_W02	The final evaluation of the course is calculated based on the results of the final test. The assessment is positive in the case of a minimum of 40% of the maximum number of points. Delivering a seminar is also required. Thresholds: <40% 2.0 <= 40, 50> 3.0 <= 50, 60> 3.5 <= 60, 70> 4.0 <= 70, 80> 4.5 <= 80, 90> 5.0 <= 90, 100> = 5.5

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Christopher D. Manning C.D., Raghavan P., Schütze H.: An Introduction to Information Retrieval Cambridge University Press, Cambridge, England, 2008

[2] McCandless, Hatcher E., Gospodnetic O.: Lucene in Action, Manning Publications Co., 2010

[3] Tse, P. , Multimedia information storage and retrieval : techniques and technologies IGI Publishing, cop. 2008.

SECONDARY LITERATURE:

[1] Mihalcea, R., Graph-based natural language processing and information retrievalCambridge University Press, 2011.

[2] Battelle J., Jak Google i konkurencja wywołali biznesową i kulturową rewolucję Warszawa : Wydawnictwo Naukowe PWN, 2006

[3] Prager, J. Open-domain question-answering, Boston ; Delft : Now, cop. 2007

[4] Moens, Marie-Francine, Information extraction : algorithms and prospects in a retrieval context, Dordrecht : Springer, cop. 2006.

[5] Piasecki M., Szpakowicz St., Broda, B. , A Wordnet from the ground up, Wrocław : Oficyna Wydawnicza Politechniki Wrocławskiej, 2009.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Andrzej Siemiński, Andrzej.Sieminski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Exploration of Internet
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION **Information Systems**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	**K2INF_W06_S2SI_W01**	**C1**	**Lec 1. .Lec 14**	**N1**
PEK_W02	**K2INF_W06_S2SI_W05**	**C1**	**Lec 1. .Lec 14**	**N1**
PEK_U01	**K2INF_U08_S2SI_U05** **K2INF_U08_S2SI_U09** **K2INF_U08_S2SI_U10**	**C2**	**Sem 2. .Sem 8**	**N2, N4**
PEK_U02	**K2INF_U08_S2SI_U05** **K2INF_U08_S2SI_U09** **K2INF_U08_S2SI_U10**	**C3**	**Sem 2. .Sem 8**	**N3, N4**

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: Integracja Systemów Informacyjnych
Name in English: Integration of Information Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Information Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ3799
Group of courses: ~~YES /~~ NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			30	
Number of hours of total student workload (CNPS)	120			90	
Form of crediting	Examination	Examination / crediting with grade*	Examination / crediting with grade*	Crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	4		3	3	
including number of ECTS points for practical (P) classes	0		3	3	

including number of ECTS points for direct teacher-student contact (BK) classes	2,4		1,8	1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of fundamentals in databases
2. Knowledge about general profile of information system design
3. Practice in any programming language

……

\

SUBJECT OBJECTIVES

C1 Acquaintance with basics and problems of integration of the recent information systems

C2 Introduction to the problematic of data structure modelling and process design for IT system integration

C3 Practical skill in design and prototyping of IT system integration by means of usable software components and libraries

…….

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Knowledge about basic problems and architectures of integration solutions for IT systems

PEK_W02 Knowledge about modelling of business processes related to IT system integration

PEK_W03 Knowledge about features and limitations in structure modelling for data exchange based on XML

PEK_W04 Knowledge about web services and ESB (Enterprise Service Bus)

……

relating to skills:

PEK_U01 Modelling of integration processes by means of BPMN

EK_U02 Modelling and conversion of structures for data exchange using XML

PEK_U03 Implementation of the software system for integration of various independent, external IT systems using web services and ESB

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Organisational issues. Introduction to information system integration	2
Lec 2	Business process modelling by means of BPMN	2
Lec 3	BPMN in IT system integration	2
Lec 4	Analysis of use cases for business processes	2
Lec 5	XML family. Components and structure of XML documents	2
Lec 6	EDI. XML Schema, part I	2
Lec 7	XML Schema, part II. Limitation of XML schema	2
Lec 8	XPath	2
Lec 9	XSLT	2

Lec 10	RPC, Cobra, DCOM, RMI, web services	2
Lec 11	UDDI, WSDL, SOAP	2
Lec 12	Recent examples of large scale integration projects in Poland, e.g. in health care	2
Lec 13	Architecture of ESB	2
Lec 14	Features and components of ESB, BPEL	2
Lec 15	Use cases and the market for ESB	2
	Total hours	30

Form of classes - project		**Number of hours**
Proj 1	Safety training, splitting into 2-person groups, subject selection, preliminary analysis of subjects	2
Proj 2	Architecture of systems being integrated, identification of basic business processes	2
Proj 3	Integration processes modelling by means of selected tools e.g. *Bizagi Process Modeler*	2
Proj 4	Modelling of data exchange structures based on XML	2
Proj 5	Structure mapping (conversion), XSLT, data presentation in web browsers	2
Proj 6	Presentation of recent achievements to other students	2
Proj 7	Introduction to web services, use cases analysis	2
Proj 8	Simple web services	2
Proj 9	New functionalities of web services, REST	2
Proj 10	WSDL, SOAP	2
Proj 11	Installation and preparation of the ESB framework, e.g. Mule	2
Proj 12	Implementation of two agents in ESB	2
Proj 13	Extension to other agents using various transportation methods	2
Proj 14	Project extension to external connectors	2
Proj 15	Presentation of integration ESB to other students	2
	Total hours	30

TEACHING TOOLS USED

N1. Multimedia presentations for lectures
N2. Individual consultations of the supervisor for each student team at the computer, excludes presentation to other students
N3. Student multimedia presentation to other groups
N4. Online e-learning service (Moodle) for communication and advances verification for the entire course (Stopka4)

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 – assessment of integration architecture, integration business processes and XML structures	PEK_U01 PEK_U02	Talks with individual student teams during each meeting, student presentation at Proj3.
F2 – assessment of ESB	PEK_U03	Talks with individual student teams during

		each meeting, student presentation at Proj15.
P1 – the final lecture grade (exam)	PEK_W01 PEK_W02 PEK_W03 PEK_W04	Multiple choice test
P2 – the final laboratory grade	PEK_U01 PEK_U02 PEK_U03	The final grade aggregates the component grades.
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Górski T., *Platformy integracyjne: zagadnienia wybrane*. Wydawnictwo Naukowe PWN, 2012

[2] Kazienko P., Gwiazda K., *XML na poważnie*, Helion, Gliwice 2002

[3] Walmsley P., *Definitive XML Schema, 2nd Edition*, Prentice Hall, 2012

[4] Dossot D., D'Emic J., Romero V., *Mule in Action*, Manning Publications, Sec. Edition, 2013

[5] Barry D.K., *Web Services, Service-Oriented Architectures, and Cloud Computing, Second Edition: The Savvy Manager's Guide*, Morgan Kaufmann; 2-nd edition, 2013

[6] Laliwala Z., Samad A., Desai A., Vyas U., *Mule ESB Cookbook*, Packt Publishing, 2013

[7] Carter R., *Getting Started with Mule Cloud Connect: Accelerating Integration with SaaS, Social Media, and Open APIs*, O'Reilly Media, 2013

[8] Rotem-Gal-Oz A., *SOA Patterns*, Manning Publications, 2012

[9] Pautasso C., Wilde E., Alarcon R., *REST: Advanced Research Topics and Practical Applications*, Springer, 2013

[10] B. Gold-Bernstein and W. A. Ruh, *Enterprise integration: the essential guide to integration solutions*. Addison-Wesley, 2005

Matjaz B. Juric [et al.], *SOA approach to integration :XML, Web services, ESB,*

SECONDARY LITERATURE:

[11] Kanjilal J., *ASP.NET Web API: Build Restful Web Applications and Services on the .NET Framework*, Packt Publishing Limited, 2013

[12] Subrahmanyam A., *RESTful web services cookbook*, Sebastopol, Calif. : O'Reilly, 2010

[13] Delia P., Borg A., *Mule 2 : a developer's guide to ESB and integration platform*, Berkeley : Apress, 2008

[14] E. Cerami, *Web services essentials*. O'Reilly Media, Inc., 2002.

[15] Krafzig, K. Banke, and D. Slama, *Enterprise SOA: service-oriented architecture best practices*. Prentice Hall PTR, 2005.

[16] K. Ballinger, *NET Web services: architecture and implementation*. Addison-Wesley, 2003.

[17] L. Richardson and S. Ruby, *RESTful web services*. O'Reilly Media, Inc., 2007.

A. Prencipe, A. Davies, M. Hobday, and M. Hobday, *The business of systems integration*. Oxford University Press, 2005.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Przemysław Kazienko, kazienko@pwr. wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Integration of Information Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION **Information Systems**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 PEK_W02 PEK_W03 PEK_W04	K2INF_W06_S2SI_W03	C1 C2	Lec 1. .Lec 15	N1 N4
PEK_U01 PEK_U02 PEK_U03	K2INF_U08_S2SI_U05 K2INF_U08_S2SI_U06	C2 C3	Proj 1. .Proj 15	N2 N3 N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: **Inteligentne Aplikacje Webowe**
Name in English: **Intelligent Web Applications**
Main field of study (if applicable): **Computer Science**
Specialization (if applicable): **Information Systems**
Level and form of studies: **2nd level, full-time**
Kind of subject: **optional**
Subject code **INZXXXX**
Group of courses **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30				15
Number of hours of total student workload (CNPS)	90				30
Form of crediting	crediting with grade				crediting with grade
For group of courses mark (X) final course					
Number of ECTS points	3				1
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,8				0,6

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of creating Web-based systems
2. Basic knowledge of databases and SQL

SUBJECT OBJECTIVES

C1. Introduce students with the basic aspects of the Third Generation Web (Web3.0).

C2. Acquaint students with the use of semantic metadata in creating intelligent Web applications.

C3. Train the ability to find answers to questions based on resources that are not available via traditional web search engines.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Knowledge of basic issues concerning metadata processing and Semantic Web.

PEK_W02 Knowledge that enables the characterization of basic web ontologies and intelligent semantic services.

PEK_W03 Knowledge of ontologies management and metadata applications in information systems.

relating to skills:

PEK_U01 Designing and presenting application for processing semantic metadata.

PEK_U02 Prototyping new solutions based on available components and libraries.

relating to social skills:

PEK_K01 Ability to defend own ideas and designs.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Wy1	Evolution of the Web: Web 1.0, Web 2,0, Web 3.0	2
Wy2	Tima Berners'a-Lee visions: Semantic Web and Linked Data	2
Wy3	RDF – base standard for Semantic Web.	2
Wy4	RDF Notations: RDF/XML, Notation 3, Turtle, N-Triples	2
Wy5	Popular ontologies: DOAP, DC, FOAF, SIOC, SKOS, UMBEL, GoodRelations	2
Wy6	Top-level ontologies: Cyc, BFO, DOLCE, WordNet, SUMO,	2
Wy7	Describing languages for ontologies and rules: OWL, CycL, KIF, RIF, SWRL	2
Wy8	Semantic enrichment of HTML: eRDF, GRDDL, Microdata, Microformats, RDFa	2
Wy9	Dbpedia – semantic version of Wikipedia and semantic browsers.	2
Wy10	SPARQL – semantic query language.	2
Wy11	D2RQ – accessing relational databases as RDf graph.	2
Wy12	Freebase and semantic applications (parallax).	2
Wy13	Semantic matching and light ontologies.	2
Wy14	Ontology alignment. Libraries of ontologies.	2
Wy15	Semantic apploications: Powerset, NNDB Mapper, Echonest, Musicbrainz	2

	Total hours	30

Form of classes - seminar		Number of hours
Se 1	Topics discussion. Topic selection.	1
Se 2	Processing metadata with Wolfram Alpha.	2
Se 3	Visualizing using Gapminder.	2
Se 4	DBpedia semantic tools.	2
Se 5	Freebase semantic applications (parallax).	2
Se 6	Many Eyes – diagrams for metadata.	2
Se 7	SIMILE Widgets (Exhibit).	2
Se 8	OpenLink Virtuoso SPARQL Query Editor	2
	Total hours	15

TEACHING TOOLS USED
N1. Multimedia presentations and videos introducing and illustrating the subjects presented in the lecture. N2. Practical introduction to using software tools via remote desktop / projector. N3. Online learning management system (moodle) for communication and monitoring progress of student learning.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
C1 – final mark for lecture	PEK_W01 PEK_W02 PEK_W03	Multiple choice test
C2 – final evaluation of seminar	PEK_U01 PEK_U02 PEK_K01	Final mark after the presentation on seminar.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Marek Kopel: Metody analizy spójności i zgodności kolekcji dokumentów WWW (rozprawa doktorska)
[2] John Hebeler [et al.]: Semantic Web programming; Indianapolis [etc.] : Wiley, cop. 2009.
[3] Bhavani Thuraisingham : Building trustworthy semantic webs; New York : Auerbach Publications, cop. 2008.

SECONDARY LITERATURE:

[1] H. Peter Alesso and Craig F. Smith.: Thinking on the Web : Berners-Lee, Gödel and Turing; Hoboken : John Wiley & Sons, cop. 2006.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
Marek Kopel, Marek.Kopel@pwr.edu.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Intelligent Web Applications
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION **Information Systems**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 **PEK_W02** **PEK_W03**	**K2INF_W06_S2SI_W01** **K2INF_W06_S2SI_W05**	C1 C2	Lec 1-15	N1 N2
PEK_U01 **PEK_U02**	**K2INF_U08_S2SI_U05** **K2INF_U08_S2SI_U10**	C2 C3	Se1-7	N2 N3
PEK_K01	**K2INF_K01_S2SI_K01**	C3	Se1-8	N2 N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT……

SUBJECT CARD

Name in Polish: Interaktywne systemy multimedialne
Name in English: Interactive Multimedia Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Information Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZXXXX
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**15**		
Number of hours of total student workload (CNPS)	**90**		**60**		
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					

Number of ECTS points	**3**		**2**		
including number of ECTS points for practical (P) classes	**0**		**2**		
including number of ECTS points for direct teacher-student contact (BK) classes	**1,8**		**1,2**		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic Knowledge in the Area of Digital Sound Processing.
2. Basic Knowledge in the Area of Digital Image and Video Processing.

SUBJECT OBJECTIVES

C1 Passing knowledge on the principles of user interface designing.
C2 Acquisition of knowledge on modern methods of human-computer communication.
C3 Acquiring practical knowledge on use of modern means of human-computer interaction.
C4 Acquiring practical knowledge on user interface designing with the use of advanced multimodal interaction technologies.
C5 Developing skills of analysis and interpretation of the results as well as drawing the conclusions.
C6 Improving abilities of technical documentation elaboration.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Student knows how to design user interface and how to test its usability
PEK_W02 Student knows and can describe the methods of man-computer communication
PEK_W03 Student knows basic concepts of multimodal analysis.
PEK_W04 Student is able to enumerate and describe the methods of modalities fusion.
PEK_W05 Student knows multimodal input and output Interface.
PEK_W06 Student knows and can describe multimodal recognition problems. He/she can indicate the applications of multimodal recognition

relating to skills:
PEK_U01 Student uses modern methods of human-computer interaction.
PEK_U02 Student is able to design multimodal user interface
PEK_U03 Student knows how to test user interface usability.
PEK_U04 Student is able to evaluate the results obtained, interpret the results of analysis, and formulate the conclusions.
PEK_U05 Student knows how to prepare documentation of a task execution.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction. Statistical methods of machine learning in human-computer communication.	2
Lec 2	Foundations of speech processing. Speech recognition.	2

Lec 3	Speaker recognition. Speech synthesis. Basics of natural language processing.	2
Lec 4	Natural language understanding and generation. Dialog modeling and management.	2
Lec 5	Digital image and video processing tools for human-computer interaction.	2
Lec 6	Handwriting processing.	2
Lec 7	Basic concepts of multimodal analysis. Multimodal information fusion.	2
Lec 8	Modality integration methods.	2
Lec 9	Multimodal recognition.	2
Lec 10	Multimodal data management.	2
Lec 11	User interface designing principles. Interface usability testing.	2
Lec 12	Multimodal input and output.	2
Lec 13	Multimodal databases	2
Lec 14	Modeling interest from multimodal nonverbal behavior.	2
Lec 15	Colloquium	2
	Total hours	**30**

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Classes organization: substantial introduction to laboratory, organization and schedule of classes, credit conditions, BHP training.	1
Lab 2	Speech recognition and synthesis	3
Lab 3	Face recognition	2
Lab 4	Wirtual reality	1
Lab 5	Haptic Technologies: multimedia gloves, kinect, leap motion	2
Lab 6	Handwriting analysis. Digital ink	2
Lab 7	Final task: project of multimodal user interface	3
Lab 8	Final task presentation	1
	Total hours	15

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		

…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED

N1. Traditional lecture assisted multimedia presentation.
N2. E-learning: making available lecture teaching aids.
N3. E-learning: colloquium in a form of electronic test.
N4. E-learning: organization of laboratory classes, making available exercises instructions, patterns of documentation and other teaching aids, sending completed tasks and reports via e-portal, using forum and e-mail for teacher-student and student-student communication.
N5. Specialist hardware and software.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01, PEK_U04	Grades of completed tasks
F2	PEK_U05	Grades of reports
F3	PEK_U02, PEK_U03, PEK_U04, PEK_U05	Grade of final task
C – laboratory		Weighted mean of grades obtained = 0,3*(mean of grades of completed tasks) + 0,3*(mean of reports grades) + 0,4*grade of final task
C – lecture	PEK_W01..PEK_W06	Colloquium in a form of e-test; to pass the test student has to obtain at least 50% of total points.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[237] Thiran J.P., Marques F., Bourlard H., Multimodal Signal Processing: Theory and Applications for Human-Computer Interaction, Academic Press, Elsevier, 2010.
[238] Chapman N., Chapman J., *Digital media. Third edition*. Ontario: John Wiley & Sons Ltd., 2009.
[239] Marcin Sikorski, *Interakcja Człowiek-Komputer*. Wydawnictwo PJWSTK 2010.

SECONDARY LITERATURE:

[1] Jurafsky D., Martin J. H., An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition, Prentice Hall, Inc., 2000,
[2] Handbook of natural language processing, Edited by Dale R., Moisl H, Sumers H. L., New York ; Basel : Marcel Dekker, cop. 2000, (document elektroniczny)

[3] Automatic speech and speaker recognition: large margin and kernel methods, Edited by Keshet J., Bengio S., Chichester : John Wiley & Sons, 2009
[4] Furui S., Digital speech processing, synthesis, and recognition, New York : Marcel Dekker, cop. 2003.
[5] Shapiro L.G., Stockman G.C., Computer Vision, Upper Saddle River : Prentice Hall, 2001
[6] Progress in computer vision and image analysis, Editors Bunke H. [et al.], Singapore [etc.]: World Scientific, cop. 2010.
[7] Jef Raskin, *The Human Interface. New Directions for Designing Interactive Systems.* Boston: Addison-Wesley 2000.
[8] Joel Spolsky, *Projektowanie interfejsu użytkownika. Poradnik programistów.* Warszawa: MIKOM 2001.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Elżbieta Kukla, Elzbieta.Kukla@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Interactive Multimedia Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION **Information Systems**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	**K2INF_U08_ S2SI_W04**	**C1**	**Lec 11**	**N1, N2**
PEK_W02	**K2INF_U08_ S2SI_W04**	**C2**	**Lec 1. .Lec 6**	**N1, N2**
PEK_W03	**K2INF_U08_ S2SI_W04**	**C2**	**Lec 7**	**N1, N2**
PEK_W04	**K2INF_U08_ S2SI_W04**	**C2**	**Lec 8**	**N1, N2**
PEK_W05	**K2INF_U08_ S2SI_W04**	**C2**	**Lec 10, Lec 13**	**N1, N2**
PEK_W06	**K2INF_U08_ S2SI_W04**	**C2**	**Lec 12**	**N1, N2**
PEK_U01	**K2INF_U08_S2SI_U07**	**C3**	**Lab 2. .Lab 8**	**N4, N5**
PEK_U02	**K2INF_U08_S2SI_U07**	**C4, C5, C6**	**Lab 2. .Lab 8**	**N4, N5**
PEK_U03	**K2INF_U08_S2SI_U07**	**C4, C5, C6**	**Lab 2. .Lab 8**	**N4, N5**
PEK_U04	**K2INF_U08_S2SI_U07**	**C4, C5, C6**	**Lab 2. .Lab 8**	**N4, N5**
PEK_U05	**K2INF_U08_S2SI_U07**	**C4, C5, C6**	**Lab 2. .Lab 8**	**N4, N5**

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Metodologia badań naukowych
Name in English Methodology of empirical sciences…….
Main field of study (if applicable): Informatics…….
Specialization (if applicable): ……..
Level and form of studies: 2nd* level, full-time /
Kind of subject: obligatory /
Subject code INZ003763……
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	0	0	0	0
Number of hours of total student workload (CNPS)	90	0	0	0	0
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*

For group of courses mark (X) final course					
Number of ECTS points	3				
including number of ECTS points for practical (P) classes	0				
including number of ECTS points for direct teacher-student contact (BK) classes	1,8				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Competence in basic algebra
2. Competence in mathematical analysis
3. Differential equations

\

SUBJECT OBJECTIVES

C1 Knowledge on the methodological postulates
C2Competence in mathematical modeling on the base of methodology of empirical sciences
C3Competence in hypothesis testing
C4Competence in creation of homogeneous and invariant in relation to the system of units models

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01Knowledge on methodological postulates
PEK_W02Logical postulates of mathematical models construction (invariance and homogeneity)
PEK_WOO3Logical base of hypothesis testing

…
relating to skills:
PEK_U01Competence in mathematical modeling with accordance to methodological postulates
PEK_U02Competence in hypothesis and empirical models testing
…
relating to social competences:
PEK_K01Competence in the exactness of process description
PEK_K02Competence on ability of studying and reflection on experiment

PROGRAMME CONTENT

Form of classes - lecture		**Number of**
Lec 1Methods of scientific and technical project validation on the base of citation analysis	2	
Lec 2Methodological postulates of determinism, closed system, interconnectedness, simplicity and Popper's condition of falsification	2	
Lec 3Classical theory of measurements and the postulate of uniquenes	2	
Lec 4Dimensionally invariant description of a process, dimensional space	2	

Lec 5Theorem Pi of dimensional analysis and examples of its applications	2	
Lec 6Applications of theorem Pi in: models construction, experiment planning, identification Lec 7Theory of similarity Lec 8Invariance of models in relation to rotations group, tensors homogeneity Lec 9 Models testing and falsification of hypothesis Lec 10Identification of mathematical models Lec 11Multistage identification, models interpretability Lec 12Description of models construction Lec 13Models testing	2 2 2 2 2 2 2 2 2	
	Total hours26	Plus 2 colloqiums

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		

Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1.Literature N2.Examples analysis N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1P-1colloquium evaluation	WO1,WO2	Evaluation of students work
F2P-2colloquium evaluation	UO1,UO2	Evaluation of examples solving
F3		
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J.M. Bochenski The methods of contemporary thought. Harper Torchbooks, NY,1968
[2] W.Kasprzak, B. Lysik, M.Rybaczuk Measurements, Dimensions, Invariant Models and Fractals Spolom Wroclaw Lviv 2004
[3]
[4]

SECONDARY LITERATURE:

[1] K. R. Popper The logic of Scientific Discovery. Hutchinson Publ. Comp. 1959
[2]
[3]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Waclaw Kasprzak waclaw.kasprzak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Methodology of empirical sciences……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_WO1	Methodology basis	K1,K2,K3	N1,N2,P1
PEK_W02	K2INF_WO6	Models testing	K4,K13	P1
…				
…				
PEK_U01 (skills)	K2INF_UO6	Construction of models	K5,K6,K7	N1,N2,P2
PEK_U02	K2INF_UO8	Hyothesis testing	K8,K13	N1,N2,P2
…				
PEK_K01 (competences)	K_2SWD_KO1		K2	N1,N2
PEK_K02	K2_SWD_KO2		K13	N1,N2,P2
…				

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8/ DEPARTMENT……

SUBJECT CARD

Name in Polish: : Mobilne Systemy Webowe
Name in English: Mobile Web Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Information Systems
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code INZXXXX
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			15	
Number of hours of total student workload (CNPS)	90			60	
Form of crediting	crediting with grade			crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	3			2	
including number of ECTS points for practical					

(P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,8			1,2	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of Web systems design.
2. Ability to process multimedia information at basic level.
3. Practical knowledge of basic technologies in online systems.

SUBJECT OBJECTIVES

C1. To acquaint students with basic issues of mobile platforms and the possibility of its use in building Web systems.

C2. To introduce students to the problems of developing systems providing the limits and benefits of mobile platforms.

C3. To provide practical skills of mobile systems design and prototyping using available components and libraries.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Basic knowledge of mobile platforms and their use in building Web systems.

PEK_W02 Knowledge enabling the characterization of services and information available from mobile sensors.

PEK_W03 Knowledge about constrains of mobile platforms and workarounds for building a dedicated mobile Web systems.

relating to skills:

PEK_U01 The use of mobile platform features in Web systems design.

PEK_U02 IT project implementation using mobile platforms.

relating to social skills:

PEK_K01 Working in project teams.

PEK_K02 Ability to defend own ideas and designs.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to mobile systems. Comparison of platforms	2
Lec 2	Mobile trends of Web systems	2
Lec 3	Typology of developer tools for mobile platforms	2
Lec 4	Geolocalization in mobile systems	2
Lec 5	Position sensors and Augmented Reality in mobile systems	2
Lec 6	Accessing resources through mobile systems	2
Lec 7	Mobile device as a remote controller	2

Lec 8	HTML5 implementations for mobile platforms	2
Lec 9	Single task tool applications	2
Lec 10	Single task toy applications	2
Lec 11	Music aspects of mobile systems	2
Lec 12	Gamification in mobile Web systems	2
Lec 13	3D graphics on mobile plaforms	2
Lec 14	Game engines for mobile plaforms	2
Lec 15	Mobile platform applications enhancing large-scale Web systems.	2
	Total hours	30

Form of classes - project		**Number of hours**
Proj 1	Choosing project subject.	1
Proj 2	Application/system design for mobile platforms.	2
Proj 3	Project implementation – sprint 1	2
Proj 4	Project implementation – sprint 2	2
Proj 5	Project implementation – sprint 3	2
Proj 6	Project implementation – sprint 4	2
Proj 7	Project implementation – sprint 5	2
Proj 8	Project outcome presentation	2
	Total hours	15

TEACHING TOOLS USED
N1. Multimedia presentations and videos introducing and illustrating the subjects presented in the lecture. N2. Practical introduction to using developer software via remote desktop / projector. N3. Online learning management system (moodle) for communication and monitoring progress of student learning.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 – design evaluation	PEK_U01 PEK_K01 PEK_K02	Individual conversation with project team members.
F2 – progres evaluation after sprint 3	PEK_U02 PEK_K01 PEK_K02	Individual conversation with project team members.
C1 – final mark for lecture	PEK_W01 PEK_W02 PEK_W03	Multiple choice test

C2 – final evaluation of the project	PEK_U01 PEK_U02	Final mark after the presentation of a finished project.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[18] [1] Ian F. Darwin: Android. Receptury (tyt.org.: Android Cookbook; tł. Tomasz Walczak) , Helion, 2013

[19] J. F. DiMarzio: Tworzenie gier na platformę Android 4 (tyt. org.: Practical Android 4 Games Development; tł. Szymon Pietrzak), Helion, 2013

[20] Gabe Zichermann, Christopher Cunningham : Grywalizacja. Mechanika gry na stronach WWW i w aplikacjach mobilnych (tyt. org.: Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps; tł. Rafał Jońca), Helion, 2012

SECONDARY LITERATURE:

[1] Jakob Nielsen, Raluca Budiu: Funkcjonalność aplikacji mobilnych. Nowoczesne standardy UX i UI (tyt. org.: Mobile Usability; tł. Marta Najman), Helion, 2013

[2] Jason Tyler, Will Verduzco : Hakowanie Androida : kompletny przewodnik XDA Developers po rootowaniu, ROM-ach i kompozycjach (tyt. oryg.:XDA Developers' Android Hacker's Toolkit : the complete guide to rooting, ROMs and theming; tł. Tomasz Walczak) , Helion, 2013

[3] API Guides for Android Developers, http://developer.android.com/ [as viewed: 2013.10.01]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Marek Kopel, Marek.Kopel@pwr.edu.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Mobile Web Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION **Information Systems**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 **PEK_W02** **PEK_W03**	**K2INF_W06_S2SI_W01**	C1 C2	Lec1-15	N1 N2
PEK_U01 **PEK_U02**	**K2INF_U08_S2SI_U01** **K2INF_U08_S2SI_U08**	C2 C3	Proj1-7	N2 N3
PEK_K01 **PEK_K02**	**K2INF_K01_S2SI_K01**	C3	Proj1-8	N2 N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: Informatics and Management

SUBJECT CARD

Name in Polish: Modelowanie i analiza biznesowa
Name in English: Modeling and business analysis
Main field of study (if applicable): Informatics
Specialization (if applicable): Computer Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ3760
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	30			
Number of hours of total student workload (CNPS)	60	90			
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2	3			
including number of ECTS points for practical (P) classes					

including number of ECTS points for direct teacher-student contact (BK) classes	1,2	1,8			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

20. Practice in object-oriented programming.
21. Basic knowledge of software engineering.

\

SUBJECT OBJECTIVES

C1. Basic knowledge in the area of software system modeling with the stress on business modeling as the initial phase of the software development process.
C2. Basic knowledge in the area of the requirements specification.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEK_W01: Students have basic knowledge on business modeling.
PEK_W02: Students know and understand the role of specification requirements.
PEK_W03: Students have basic knowledge on selected modeling languages.

Relating to skills:
PEK_U01: Students, in cooperation with domain experts, can construct and analyze business models.
PEK_U02: Students can build models of system requirements.

Relating to social competences:
PEK_K01: Students are able to cooperate with representatives of application domain.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Basic notions for software development cycle. Survey of modeling languages – UML and BPMN.	2
Lec 2	Class diagrams – classes, associations, generalizations.	2
Lec 3	Validation and verification.	1
Lec 4	Object Constraint Language.	2
Lec 5	UML activity diagrams.	2
Lec 6	BPMN process diagrams.	2
Lec 7	UML statechart diagrams.	2
Lec 8	System requirements; use case diagrams.	2
	Total hours	15

Form of classes - class	**Number of**

		hours
Cl 1	Construction and analysis of simple class diagrams.	2
Cl 2	Construction and analysis of advanced class diagrams.	2
Cl 3	Analysis of textual descriptions of exemplary application domains – structural aspect (1).	2
Cl 4	Analysis of textual descriptions of exemplary application domains – structural aspect (2).	2
Cl 5	Case study – an example of structural modeling.	2
Cl 6	Construction and analysis of OCL constraints imposed on diagrams.	2
Cl 7	Test 1.	2
Cl 8	Analysis of textual descriptions of exemplary application domains – structural and behavior aspect.	2
Cl 9	Analysis of simple BPMN diagrams.	2
Cl 10	Construction of simple BPMN diagrams.	2
Cl 11	Construction and analysis of advanced BPMN diagrams.	2
Cl 12	Construction and analysis of simple state diagrams.	2
Cl 12	Construction and analysis of advanced state diagrams..	2
Cl 13	Construction and analysis of use case diagrams.	2
Cl 14	Test 2.	2
Cl 15	Corrective test.	2
	Total hours	30

TEACHING TOOLS USED

N1. Lecturer's presentation at a blackboard, supported by a multimedia presentation using a laptop and a projector.
N2. Individual search and study of literature and Internet sources.
N3. Access to teaching materials published in the local area network.
N4. Individual consultations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 PEK_U01 PEK_K01	Each student gets 1 point for own solution of a problem from the list of problems for the given class.
F2	PEK_W01 PEK_W02 PEK_U01 PEK_U02 PEK_K01	Each student gets up to 10 points for own solution of problems for the given test (intermediate and final).

<table>
<tr>
<td>F3</td>
<td>PEK_W01
PEK_W02
PEK_W03
PEK_U01
PEK_U02
PEK_K01</td>
<td>The final evaluation for the classes is determined on the basis of total marks obtained by the student's activity for exercise (F1) and colloquia (F2). Positive mark is awarded to a student who has obtained at least 4 points for each of the symposia and has won a total of 10 points.
If this condition is met, the number of points P is the basis for evaluation in accordance with the following table:
<table>
<tr><td>P</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table>
Students who get at least a very good grade are exempt from the examination with the same mark as for the classes.</td>
</tr>
<tr>
<td colspan="3">C: The final evaluation of the course is determined based on the results of the examination. The examination lasts two hours and consists of a set of tasks, the total number of 20 points. The condition for a positive assessment of the final exam is to get 10 points and a positive final evaluation of the exercise.
The final evaluation of the examination is determined in accordance with the following table:
<table>
<tr><td>Points</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table>
</td>
</tr>
</table>

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[36] Rumbaugh J., Jacobson I., Booch G., *The Unified Modeling Language – Reference Manual*. Second edition, Addison-Wesley, 2005.

[37] Weilkiens T., Oestereich B., *UML 2 Certification Guide. Fundamental and Intermediate Exams*, Elsevier 2007.

[38] Maciaszek L. A., *Requirements Analysis and System Design*, Second edition, Pearson, Addison-Wesley, 2005.

[39] Adolph S., Bramble P., *Patterns for Effective Use Cases,* Addison-Wesley, 2003

[40] Gašević D., Djurić D., Devedžić V., *Model Driven Architecture and Ontology Development*, Springer, 2006.

SECONDARY LITERATURE:

[240] Graessle P., Baumann H., Baumann P., *UML 2.0 w akcji. Przewodnik oparty na projektach*, Helion, 2006.

[241] Object Management Group, Unified Modeling Language (available on the website: www.omg.com).

[242] Object Management Group, System Modeling Language SysML (available on the website: www.omg.com).

[243] Object Management Group, Business Process Modeling Notation BPMN (available on the website: www.omg.com).

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Zbigniew Huzar, zbigniew.huzar@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems Modeling and Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION
Computer Engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W02	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W03	K2INF_W03		Lec1-Lec8	N1, N2, N3, N4
PEK_U01 (skills)	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_U02	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_K01 (competences)	K2_SWD_K01	C1, C2	Lec1-Lec15 Cl1-Cl15	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from the table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa I
Name in English MSc Thesis I
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code INZ003818
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				60	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points				2	
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes				0,6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 2rd semester

\

SUBJECT OBJECTIVES

C1 Preparation of students to write a master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology, with special attention of all stages of writing a thesis.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Preparation of students to write a master thesis according the internal	

	requirements of Faculty of Computer Science and Management (Computer Science field of study), Wrocław University of Technology, with special attention of all stages of writing a thesis. Literature studies, selection and learning of systems, tools, methods and algorithms needed for the realization of the chosen subject of thesis. The preparation of an outline of work and schedule of future work. Basic work on the research, design and implementation. Familiarization with the research works carried out at the Institute of Informatics. Final results: the initial solution and / or the prototype of developed system, knowledge about the current state of art in the field of thesis, an outline of future work and timetable for further works documented in English and Polish languages.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED
N1. Literature study - analysis of publications (including websites) related to subject of thesis, including the research works of the Institute of Informatics. N2. Own work, independent research on the tasks defined in the master's thesis N3. Student consultation with the supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessment based on the final results achieved

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[244] Literature related to the scope of realized project selected by student and recommended by the teacher.

[245] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis I
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U03, K2INF_U08	C1	Pr1	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa II
Name in English MSc Thesis II
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005221
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				540	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points				18	
including number of ECTS points for practical (P) classes				18	
including number of ECTS points for direct teacher-student contact (BK) classes				6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 4th semester

\

SUBJECT OBJECTIVES

C1 Preparation of master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish language, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes – project		**Number of hours**
Proj 1	Subject is the main component of the process of realization the master thesis and involves the preparation by the student his master thesis. Master thesis is done under the direction of his supervisor, with whom student defines its scope, goals, tasks and timetable for implementation.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED

N1. Preparation of master thesis N2. The text of the master thesis N3. Thesis review prepared by the supervisor N4. Students consultation with supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of master thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessed is the final text of the diploma thesis. The assessment is carried out in the form of a review done by the promoter. The condition to pass the course is delivering the final text of master thesis before the defined deadline. The second review, which does not, however the condition for pass the course is done by the reviewer appointed by the Faculty Dean. Reviews are made according to the standard format. The student is admitted to the defense (final exam) if both reviews are positive

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[246] Literature related to the scope of realized project selected by student and recommended by the teacher.

[247] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis II
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K1INF_U03, K2INF_U08	C1	Proj1	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY of Computer Science and Management / Institute of Informatics
SUBJECT CARD
Name in Polish: Projektowanie i Zarządzanie Systemami Informacyjnymi
Name in English: Designing and Management of Information Systems
Main field of study (if applicable): …….
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code INZXXXX
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			30	
Number of hours of total student workload (CNPS)	120			90	
Form of crediting	Examination			Crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	4			3	
including number of ECTS points for practical (P) classes	0			3	
including number of ECTS points for direct teacher-student contact (BK) classes	2,4			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
1. Ability to use computer.
2. Basic knowledge of computer programming.
3.

SUBJECT OBJECTIVES

C1 Delivering the knowledge of the methodology of information system designing
C2 Presenting of the management rules of projects of computer systems, of information systems as well as of IT company

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 T2A_W03
PEK_W02 T2A_W04
…
relating to skills:
PEK_U01 T2A_U08
PEK_U02 T2A_U19
…
relating to social competences:
PEK_K01 T2A_K02
PEK_K02 T2A_K06

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Structural elements of computer systems. Types of computer systems: data systems, information-retrieval systems. expert systems.	2
Lec 2	Specific characters of information systems.	2
Lec 3	Organization of index files of information systems.	2
Lec 4	Stages of computer system designing.	2
Lec 5	Analysis and specification of system requirements. Definition of system assumptions. Specification and modeling of system functions.	2
Lec 6	Cost estimations and realization schedules (business plans).	2
Lec 7	ERD – Data modeling, DFD – Data flow diagrams, STD – State transition diagram. Modeling of system software structures. Modeling languages.	2
Lec 8	System interface modeling (according to ISO norms).	2
Lec 9	Strategies of information system implementations.	2
Lec 10	CASE methods.	2
Lec 11	System documentations.	2
Lec 12	Standards and legislation for the system design and project management.	2
Lec 13	Quality assessment and quality management of system software. System testing.	2
Lec 14	Release management.	2
Lec 15	Systems supporting work in IT company.	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		

Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
..		
	Total hours	

Form of classes - project		Number of hours
Proj 1	Presentation of project classes schedule. Presentation of proposed computer systems.	2
Proj 2	Setting up the project teams. Choice of a computer system to design. Discussion.	2
Proj 3	Modeling of an information system environment.	2
Proj 4	Choice of elements of man activities to implement.	2
Proj 5	Presentation of system functionalities.	2
Proj 6	Cost estimation of the system (business plans).	2
Proj 7	Realization schedules (Gantt charts).	2
Proj 8	Presentation of system requirements.	2
Proj 9	Choice of technologies and programming tools adequate for the implementation of the designed information system.	2
Proj 10	Design diagrams.	2
Proj 11	Data modeling.	2
Proj 12	Process modeling	2
Proj 13	Designing the system interface.	2
Proj 14	Analysis of the relations with other systems.	2
Proj 15	Presentation of the technical design of the designed information system.	2
	Total hours	30

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Books and handbooks. N2. Computer software manuals. N3. Online materials in the Web. N4. Documents available for students in a faculty e-learning system. N5. Specific software and specific equipments available in a computer laboratory.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1		
F2		
F3		
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Flasiński M.: Zarządzanie projektami informatycznymi. Warszawa: PWN 2006.
[2] Fowler M.: Refaktoryzacja. WN-T, 2006.
[3] Gamma E., Helm R., Ralph Johnson, and Vilissides J.: Wzorce projektowe. WN-T, 2005.
[4] Kerievsky J.: Refaktoryzacja do wzorców projektowych (tytuł oryg.: Refactoring to Patterns). Wydawnictwo Helion, 2010.
[5] Myers G.J, Sandler C., Badgett T., Thomas T.M.: Sztuka testowania oprogramowania. Gliwice: Helion 2005.
[6] Nowicki A. (Red.): Komputerowe wspomaganie biznesu. Wydawnictwo PLACET 2006.
[7] Phillips J.: Zarządzanie projektami IT. Gliwice: Helion 2011.
[8] Schwaber K.: Sprawne zarządzanie projektami metodą Scrum. Wydawnictwo Microsoft Press 2005.
[9] Szyjewski Z.: Metodyki zarządzania projektami informatycznymi. Wydawnictwo Placet 2004.
[10] Wrycza S. (Red.): Informatyka ekonomiczna. Warszawa: PWE 2010.

SECONDARY LITERATURE:

[1] Booch G., Rumbaugh J., Jacobson J.: UML – przewodnik użytkownika (z ang. przeł. Krzysztof Stencel) Warszawa: WN-T 2002.
[2] Cockburn A.: Agile Software Development. Gra zespołowa. Wydawnictwo Helion, 2008.
[3] Cormen T.H., Leiserson Ch.E., Rivest R.L., Stein C.: Wprowadzenie do algorytmów, Warszawa: WN-T 2004.
[4] Elssamadisy A.: Agile. Wzorce wdrażania praktyk zwinnych. Wydawnictwo HELION 2010.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Kazimierz Choroś, Ph.D.,
kazimierz.choros@pwr.wroc.pl,
Institute of Informatics, Wrocław University of Technology
Wyb. Wyspiańskiego 27, 50-370 Wrocław, Poland
http://www.ii.pwr.wroc.pl/~choros/

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)				
PEK_W02				
…				
…				
PEK_U01 (skills)				
PEK_U02				
…				
PEK_K01 (competences)				
PEK_K02				
…				

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY of Computer Science and Management / Institute of Informatics
SUBJECT CARD
Name in Polish: Przetwarzanie Obrazów i Cyfrowego Wideo
Name in English: Digital Image and Video Processing
Main field of study (if applicable): …….
Specialization (if applicable): …….
Level and form of studies: 2nd level, full-time
Kind of subject: optional
Subject code INZ3811
Group of courses ~~YES /~~NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		15		
Number of hours of total student workload (CNPS)	90		30		
Form of crediting	Examination		crediting with grade		
For group of courses mark (X) final course					
Number of ECTS points	3		1		
including number of ECTS points for practical (P)	0		1		

classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,8		0,6		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Ability to use computer.
2. Basics of computer graphics.

\

SUBJECT OBJECTIVES

C1 Delivering the knowledge of structures and formats of digital images, techniques of image digitalization in scanners and digital photo cameras, methods and algorithms of image processing and compression.

C2 Presenting the techniques of non-linear digital video editing.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 T2A_W03
PEK_W02 T2A_W04
…
relating to skills:
PEK_U01 T2A_U08
PEK_U02 T2A_U19
…
relating to social competences:
PEK_K01 T2A_K02
PEK_K02 T2A_K06

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Cyberspace. History of photography, movie, digital movie, and virtual reality. Media encapsulation.	2
Lec 2	Methodology of movie production (filmmaking). Examples of scenarios, screenplays, and storyboards. Rules of non-linear movie editing. Digital video formats. Video conversion.	2
Lec 3	Digital image classification. Structures of digital and printing images. Color depth. Color systems.	2
Lec 4	Classification of digital image transformations. Specificity of image transformations and their influence on the image quality.	2
Lec 5	Real image digitalization. Scanners construction. Scanning techniques. 3D Scanners.	2
Lec 6	Image deformations during digitalization process. Image correction techniques. Mora effects. Format conversion.	2
Lec 7	Special effects and filters. Image watermarking. Metadata.	2
Lec 8	Digital image compression.	2

Lec 9	Digital photo cameras. Digital movie cameras.	2
Lec 10	Software for digital image and video processing. Characteristics of image and video processing software.	2
Lec 11	Digital video effects.	2
Lec 12	MPEG and other video formats. Video codecs. DVD technology.	2
Lec 13	Automatic content-based video analysis and indexing. Temporal segmentation of video.	2
Lec 14	Automatic analysis of shot contents. Scene detection. Test I.	2
Lec 15	Principles of computer animations. Test II.	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Work regulations in the Multimedia Laboratory. Presentation of laboratory classes schedule.	1
Lab 2	Digital video shot production using morphing technique.	2
Lab 3	Video coding and compression. Testing of parameters of coding and compression algorithms.	2
Lab 4	Presentation of the storyboards of a movie and of the digital editing techniques applied in a movie production.	2
Lab 5	Acquisition of digital video materials for a movie editing.	2
Lab 6	Digital video editing.	2
Lab 7	Movie presentations, discussions and evaluations.	2
Lab 8	Movie presentations, discussions and evaluations.	2
	Total hours	15

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
...		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED

N1. Books and handbooks.
N2. Computer software manuals.
N3. Online materials in the Web.
N4. Documents available for students in a faculty e-learning system.
N5. Specific software and specific equipments available in the Multimedia Laboratory of the Institute of Informatics.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1		
F2		
F3		
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[248] Beach A.: Kompresja dźwięku i obrazu wideo: zapewnij najlepszą jakość przy najmniejszym rozmiarze! (Real world video compression). Gliwice: Helion 2009.
[249] Law M.S. (Ed.), Principles of Visual Information Retrieval. London: Springer-Verlag 2001.
[250] Long B., Schenk S.: Cyfrowe filmy wideo (The Digital Filmmaking Handbook). Gliwice: Helion 2003.
[251] Millerson Gerald, Owens Jim: Video Production Handbook. Burlington: Focal Press 2008.
[252] Richardson I.: H.264 and MPEG-4 Video Compression: Video Coding for Next-Generation Multimedia. Chichester: John Wiley & Sons, 2005.

SECONDARY LITERATURE:

[1] Bovik A. (Ed.): Handbook of Image and Video Processing. Amsterdam: Elsevier 2005.
[2] Choroś K.: Video structure analysis and content-based indexing in the Automatic Video Indexer AVI. W: Advances in Multimedia and Network Information System Technologies. Berlin, Heidelberg: Springer 2010. s. 79–90.
[3] Danowski B.: Komputerowy montaż wideo: ćwiczenia praktyczne. Gliwice: Helion 2006.
[4] Gonzalez, R.C., Woods, R.E.: Digital Image Processing, SE. Prentice Hall 2002.
[5] Guan L., Kung S-Y., Larsen J., Multimedia Image and Video Processing, Boca Raton: CRC Press 2001.
[6] Johnson N. F., Duric Z., Jajodia S.: Information Hiding: Steganography and Watermarking – Attacks and Countermeasures. Kluwer Academic Publishers 2000.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Kazimierz Choroś, Ph.D.,

kazimierz.choros@pwr.wroc.pl,
Institute of Informatics, Wrocław University of Technology
Wyb. Wyspiańskiego 27, 50-370 Wrocław, Poland
http://www.ii.pwr.wroc.pl/~choros/

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

……

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..

AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)				
PEK_W02				
…				
…				
PEK_U01 (skills)				
PEK_U02				
…				
PEK_K01 (competences)				
PEK_K02				
…				

** - enter symbols for main-field-of-study/specialization educational effects

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT……

SUBJECT CARD

Name in Polish: Rozpoznawanie i synteza mowy

Name in English: Speech Recognition and Synthesis

Main field of study (if applicable): Computer Science

Specialization (if applicable): Information Systems

Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*

Kind of subject: ~~obligatory~~ / optional / ~~university-wide~~*

Subject code INZ3812

Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**		**15**		
Number of hours of total student workload (CNPS)	**90**		**30**		
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points	**3**		**1**		
including number of ECTS points for practical (P) classes	**0**		**1**		
including number of ECTS points for direct teacher-student contact (BK) classes	**1,8**		**0,6**		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

10. Knowledge of basic concepts in the area of Polish language morphology and syntax.
11. Know-how of parsing accomplishment.
12. Knowledge in the area of basic tools used for formal languages description and analysis (formal grammars and automata).

\

CELE PRZEDMIOTU

C1 Acquaintance of essential problems related to speech recognition and synthesis as well as methods of the problems solutions, phases of utterance recognition, tools used at particular stages, methods of utterance generation.

C2 Practice in speech analysis and synthesis using tools supporting automatic analysis of natural language.

C3 Developing ability of analysis and interpretation of its results as well as drawing the conclusions.

C4 Improving ability of preparing a technical documentation.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student is able to formulate problems that occur in speech recognition and synthesis processes; he/she can explain the essence of the problems.

PEK_W02 Student knows and can explain the problem solving methods occuring in speech recognition and synthesis processes.

PEK_W03 Student can enumerate and characterize phases of speech recognition and synthesis.

PEK_W04 Student can enumerate and describe methods used at particular phases of speech recognition and synthesis.

relating to skills:

PEK_U01 Student is able to plan and realize automatic analysis of natural language utterance.

PEK_U02 Student can suitably select and use tools supporting speech analysis.

PEK_U03 Student is able to verify and interpret results of the analysis as well as formulate the conclusions.

PEK_U04 Student can prepare raport (technical documentation) of a task completion.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction to natural language processing. Regular expressions and finie state automata.	2

Lec 2	Morphology. Finite-State Transducer (FST).	2
Lec 3	Computational phonology. Text to speech conversion.	2
Lec 4	Probabilistic models of pronunciation and spelling.	2
Lec 5	N-gramms. Linguistic corpora.	2
Lec 6	Methods and algorithm used in automatic speech recognition an synthesis.	2
Lec 7	Methods of automatic part of speech tagging.	2
Lec 8	Context-free grammars. Parsing and probabilistic parsing.	2
Lec 9	Meaning representation. Methods of meaning unification.	2
Lec 10	Semantic analysis.	2
Lec 11	Lexical semantics.	2
Lec 12	Pragmatics of language.	2
Lec 13	Natural language generation.	2
Lec 14	Machine translation.	2
Lec 15	Colloquium	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Classes organization: substantial introduction to laboratory, organization and schedule of classes, credit conditions, BHP training.	1
Lab 2	Morhological analysis	2
Lab 3	Syntax analysis	2
Lab 4	Semantic analysis	2
Lab 5	Acoustic analysis of speech	2
Lab 6	Speech to text conversion	2
Lab 7	Comparison of methods and tools used in speech generation	2
Lab 8	Comparative analysis of machine translation methods	2
	Total hours	15

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		

Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED

N1. Traditional lecture assisted multimedia presentation.
N2. E-learning: making available lecture teaching aids.
N3. E-learning: colloquium in a form of electronic test.
N4. E-learning organization of laboratory classes, making available exercises instructions, patterns of documentation and other teaching aids, sending completed tasks and reports via e-portal, using forum and e-mail for teacher-student and student-student communication.
N5. Specialist software for natural language processing.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 – task	PEK_U01, PEK_U02, PEK_U03	Grades of tasks completed
F2 – report	PEK_U03, PEK_U04	Grades of reports
P – laboratory	PEK_U01, PEK_U02, PEK_U03, PEK_U04	Mean of all the grades obtained at F1 and F2
P – lecture	PEK_W01, PEK_W02, PEK_W03, PEK_W04	Colloquium in a form of e-test; to pass the test student has to obtain at least 50% of total points.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[253] Jurafsky D., Martin J. H., An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition, Prentice Hall, Inc., 2000,

[254] Handbook of natural language processing, Edited by Dale R., Moisl H, Sumers H. L., New York ; Basel : Marcel Dekker, cop. 2000, (document elektroniczny)

SECONDARY LITERATURE:

[79] Automatic speech and speaker recognition: large margin and kernel methods, Edited by Keshet J., Bengio S., Chichester : John Wiley & Sons, 2009

[80] Furui S., Digital speech processing, synthesis, and recognition, New York : Marcel Dekker, cop. 2003.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Elżbieta Kukla, Elzbieta.Kukla@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Speech recognition and synthesis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Information Systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	S2SI_W09	C1	Wy1, Wy3, Wy9, Wy12, Wy13, Wy14	N1, N2
PEK_W02	S2SI_W09	C1	Wy4, Wy5, Wy6, Wy7	N1, N2
PEK_W03	S2SI_W09	C1	Wy2, Wy3, Wy8, Wy10	N1, N2
PEK_W04	S2SI_W09	C1	Wy2, Wy8, Wy9, Wy11	N1, N2
PEK_U01 (skills)	S2SI_U05, S2SI_U14	C2,	La2, La3, La4, La5, La6, La7, La8	N4, N5
PEK_U02	S2SI_U05, S2SI_U14	C2, C3	La2, La3, La4, La5, La6, La7, La8	N4, N5
PEK_U03	S2SI_U17	C3	La2, La3, La4, La5, La6, La7, La8	N4
PEK_U04	S2SI_U03	C4	La2, La3, La4, La5, La6, La7, La8	N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……
SUBJECT CARD
Name in Polish Seminarium dyplomowe
Name in English Diploma seminar
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005220
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					90
Form of crediting	Examination / crediting with	Examination / crediting with	Examination / crediting with	Examination / crediting with	~~Examination~~ / crediting with

	grade*	grade*	grade*	grade*	grade*
For group of courses mark (X) final course					
Number of ECTS points					2
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes					1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge, skills and competences acquired at Informatics field at second level of study until 3th semester

\

SUBJECT OBJECTIVES

C1 Preparing students to write a master thesis according the internal requirements in Informatics field at Faculty of Computer Science and Management, Wrocław University of Technology,
C2 Providing students with basic skills related to preparation and presentation of scientific texts, beginning from the choice of topic, selection of tasks to be performed, use of literature to interpretation of the results.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
…
relating to skills:
PEK_U01 He is able to acquire information from literature, databases and other sources, also in English or other language used for communication in Informatics field, is able to integrate the information obtained, interpret them, make critical evaluation and also draw conclusions and formulate and justify opinions related to prepared master thesis.
PEK_U02 He can communicate using a variety of techniques in his professional environment and in other environments, also in English or other foreign language used for communication in Informatics field and also to present the results of his master thesis
relating to social competences:
…

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1		
Lec 2		
	Total hours	

	Form of classes - class	**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Familiarization with the principles of master thesis realization at Informatics field. Rules related to student presentations. Determining the schedule of student presentations.	2
Sem 2	Review of basic skills related to preparation and presentation of scientific texts by students, beginning from the choice of topic, selection of tasks to be performed, use of literature and also how to write thesis and how obtained results should be interpret.	2
Sem 3 – Sem15	During semester each student has 2 presentations. The first presentation is related to the general view of the thesis topic, its placement in the literature and in the Informatics field. The student should present the primary aim of thesis, the state of art related to thesis topic, the concept of solution, the initial structure of thesis and timetable for further work. The purpose of the second presentation is preparation to defense and demonstrate presentation skills in English. The second presentation consists of two parts, namely, discussion of the results of the work in English and a short presentation in Polish devoted to the results of the thesis.	26
	Total hours	30

TEACHING TOOLS USED
N1. Multimedia presentations N2. Examples of scientific papers and reports from the field of computer science. N3. E-Learning System used to publish teaching materials and announcements, also used for collection and evaluation of student work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01 PEK_U02	Evaluation of the presentation of the work at the seminar and prepared documentation from the presentation. The evaluation shall be subject to the fulfillment of the requirements for the presentation, including its substantive scope, structure and organization of presentation, techniques of conversation, a form of presentation, compactness of presentation and conclusions reached. Participation in the discussions after presentation is

		also evaluated. In addition, the seminar leader is able to control the cooperation between supervisors and graduate students.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[255] Literature related to the scope of realized project selected by student and recommended by the teacher.

[256] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. inż. Leszek Borzemski, prof. PWr, leszek.borzemski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Diploma seminar
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
AND SPECIALIZATION **every specjalization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3
PEK_U02	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT…

SUBJECT CARD

Name in Polish Systemy informacyjne
Name in English Information systems
Main field of study (if applicable): Informatics
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code INZ3762
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				30
Number of hours of total student workload (CNPS)	60				60
Form of crediting	crediting with grade	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	crediting with grade
For group of courses mark (X) final course					
Number of ECTS points	2				2
including number of ECTS points for practical (P) classes	0				0
including number of ECTS points for direct teacher-student contact (BK) classes	1,2				1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic mathematical knowledge for 1st level of studies.

2. Informatics knowledge background.
3. Algorithms knowledge background.

\

SUBJECT OBJECTIVES

C1 Acquiring knowledge about functions and significance of information systems in contemporary organizations
C2 Acquainting with the functions and development of information systems in information society
C3 Acquainting with the different methods of information retrieval by surfing the Web
C4 Recognizing the problems of passing of contemporary organizations to Internet space
C5 Obtainment of skills to analyze the literature from information systems area and to synthesize the contents from different sources
C6 Application of the obtained knowledge to presentation the problems from information systems area by means of using adequate tools

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Familiarity with basic models of information systems
PEK_W02 Basic knowledge about Web information systems
PEK_W03 Familiarity with common multimedia technologies
PEK_W04 Understanding of the measures of information retrieval efficiency

relating to skills:
PEK_U01 Student can to build information query for different types of information needs
PEK_U02 Can to determine basic features of information system for given organization
PEK_U03Student be able to evaluate the precision of retrieved information
PEK_U04 Can to present basic features of given information system

relating to social competences:
PEK_K01 Can individually to use literature of the subject and to select useful information
PEK_K02 Student is convinced above positive role of information systems in stimulation of the civilization development

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	History of information systems development. Information processing. Theoretical basis of information systems.	2
Lec 2	Main information systems' models. Automation of information flow in organization.	2
Lec 3	Information retrieval on Internet – fundamentals.	2
Lec 4	Web information systems.	2
Lec 5	Multimedia. Importance of multimedia technologies in information systems development.	2
Lec 6	How societies embrace information technology. Digital libraries.	2
Lec 7	Efficiency of information systems. Case study of chosen information system.	2
Lec 8	Test	1
	Total hours	15

Form of classes - class		Number of hours
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1	Introductory seminar.	2
Sem 2	Information systems – definitions, types, features, examples.	2
Sem 3	Information retrieval fundamentals – models, dictionaries, indexes.	2
Sem 4	Evaluation of information systems' efficiency.	2
Sem 5	Analytical retrieval of information.	2
Sem 6	Information retrieval on Internet.	2
Sem 7	ERP class systems.	2
Sem 8	Mobile information systems.	2
Sem 9	Multimedia information systems.	2
Sem 10	Information systems for teleworking.	2
Sem 11	How societies embrace information technology.	2
Sem 12	CRM systems.	2
Sem 13	Knowledge management systems.	2
Sem 14	Information society: e-business, e-administration, e-commerce, e-health	2

Sem 15	Seminar summation and credit.	2
	Total hours	30

TEACHING TOOLS USED

N1. Computerized presentation at the lectures.
N2. Presentation with visualization and using Internet resources during the seminar.
N3. Consultations.
N4. Students' homework with using software packages.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 PEK_U04 PEK_K02	Grade of presentation (quality of slides, oral presentation, relevance, duration), presence and activity.
F2	PEK_K01	Report's grade
P-seminar	PEK_U02	Grade result from F1 and F2
P-lecture	PEK_W01-PEKW04 PEK_U03	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Manning C. D., Raghavan P., Schutze H.: *Introduction to Information Retrieval*, Cambridge University Press, New York, 2009, dostępne także bezpłatnie: www.cambridge.org

[2] Kłopotek M. A.: *Inteligentne wyszukiwarki internetowe* , Akademicka Oficyna Wydawnicza EXIT, Warszawa, 2001.

[3] Wrycza S. (red.): *Informatyka ekonomiczna. Podręcznik akademicki*, PWE, Warszawa, 2010.

[4] Cortada J. W. : How Societies Embrace Information Technology, WILEY-IEEE, NY, 2009.

[5] Baeza-Yates R., Ribeiro-Neto B.: *Modern Information Retrieval*, ACM Press, Adison-Wesley, New York, 1999.

SECONDARY LITERATURE:

[1] Zgrzywa A., Choroś K., Siemiński A.(Eds.): *Multimedia and Internet Systems: Theory and Practice,* Spriger Verlag, Berlin, 2013.

[2] Nguyen N.T., Zgrzywa A., Czyżewski A.(Eds.): *Advances in Multimedia and Network Information System Technology,* Spriger Verlag, Berlin, 2010.

[3] Zawiła-Niedźwiecki J. : *Informatyka gospodarcza*, Wyd. C. H. Beck, 2010.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Aleksander Zgrzywa, Aleksander.Zgrzywa@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INFW03, K2INF_W06	C1	Lec1, Lec 6 Sem 2,Sem 14	N1-4
PEK_W02	K2INF_W04, K2INF_W06	C3,C4	Lec 3, Lec 4 Sem 6,Sem 7, Sem 11	N1-4
PEK_W03	K2INF_W02, K2INF_W06	C2	Lec 5, Lec 6 Sem 13,Sem 14	N1-4
PEK_W04	K2INF_W03	C3	Lec 3, Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U01	K2INF_U01, K2INF_U08	C3	Lec 3,Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U02	K2INF_U05, K2INF_U08	C4	Lec 2,Lec 7 Sem 7,Sem 8,Sem 12,Sem 13	N1-4
PEK_U03	K2INF_U05, K2INF_U08	C3	Lec 2, Lec 5 Sem 3, Sem 5, Se6,Se9	N1-4
PEK_U04	K2INF_U02, K2INF_U03	C5, C6	Lec 5, Lec 6 Sem 3, Sem 5, Sem 6, Sem 9, Sem 10	N1-4

PEK_K01	K2INF_K01, K2INF_U02	C5	Lec 5, Lec 6 Sem 9, Sem 10	N1-4
PEK_K02	K2INF_K02	C1	Lec 1, Lec 6 Sem 2, Sem 14	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: Systemy wspomagania decyzji
Name in English: Decision Support Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Decision Support Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / university-wide*
Subject code: INZ003761
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	15		15	
Number of hours of total student workload (CNPS)	60	30		60	
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / ~~crediting with grade~~*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2	1		2	
including number of ECTS points for practical (P) classes				2	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	0,6		1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None.

\

SUBJECT OBJECTIVES

C1 Getting to know foundations of designing computer science decision support systems using general systemic methods which make it possible to apply unified approaches for analysis and decision making for decision support systems of different nature.
C2 Acquisition of skills to represent in the form of mathematical formulas of decision making plants treated as input-output plants.
C3 Acquisition of skills to analyze of decision making plants treated as input-output plants.
C4 Getting acquainted with methods and algorithms of multi-stage decision making.
C5 Acquisition of skills to apply dynamic programming method.
C6 Getting to know metods and algorithms of multi-criteria decision making.
C7 Acquisition of skills to use AHP method.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Student knows foundations of designing of decision support systems for any kind of plants.
PEK_W02 Student knows foundations of analysis and decision making for input-output plants with logic knowledge representation.
PEK_W03 Student knows selected method of multi-stage and multi-criteria decision making.
relating to skills:
PEK_U01 Student is able to elaborate a mathematical model for an input-output decision making plant in discrete state space as well as with logic knowledge representation.
PEK_U02 Student can solve analysis and decision making tasks for elementary plants with logic knowledge representation.
PEK_U03 Student is able to solve multi-stage decision making problem using Bellman's Principle and dynamic programming.
PEK_U04 Student can use AHP algorithm for the solution od multi-criteria decision making problem
relating to social competences:
PEK_K01 Student can take advantage of professional literature by oneself and can perform the critical analysis of information mined.
PEK_K02 Student can think creatively.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Decision support systems – definitions, structures, problems.	1
Lec 2	Application of discrete state equations and logic expressions for representation of decision making plants.	2
Lec 3	Analysis of decision making plants, in particular logic-algebraic method.	2
Lec 4	Decision making – definition, typology, logic-algebraic plant.	2
Lec 5	Bellman's Principle and multi-stage decision making.	3
Lec 6	Multi-criteria decision making, Pareto sets, AHP method.	3
Lec 7	Examples of computer decision support systems.	2
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Solution of numerical exercises concerning difference equations.	1
Cl 2	Solution of numerical exercises concerning differential equations as well as propositional calculus.	2

Cl 3	Solution of numerical exercises concerning mathematical representations of input-output plants.	2
Cl 4	Solution of numerical exercises concerning analysis using logic-algebraic method.	2
Cl 5	Solution of numerical exercises concerning decision making using logic-algebraic method.	2
Cl 6	Solution of numerical exercises concerning dynamic programming.	2
Cl 7	Solution of numerical exercises concerning AHP method.	2
Cl 8	Final test.	2
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Collecting of indispensable information about selected plant being the decision making plant.	2
Proj 2	Determination of mathematical model of selected decision making plant and decision making problem formulation.	2
Proj 3	Analysis of decision making plant using its mathematical model.	2
Proj 4	Choice of decision making method for further usage as well as elaboration of decision making algorithm.	3
Proj 5	Implementation and alalysis of decision making algorithm.	4
Proj 6	Elaboration of conclusions and written report of the project performed.	2
	Total hours	15

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1 Lecture – traditional method. N2 Classes – traditional method. N3 Consultation. N4 Individual discussion with student. N5 Short test (10 mins.). N6 Self-contained work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Short tests during the classes.
F2	PEK_K01– PEK_K02	Individual discussion with student during the project.
P (Classes)	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Test.
P (Project)	PEK_U01–PEK_U04; PEK_K01–PEK_K02	Evaluation of written report of the project.
P (Lecture)	PEK_W01–PEK_W03; PEK_K02	Exam.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[257] [1] Józefczyk J., Wybrane problemy podejmowania decyzji w kompleksach operacji, Oficyna Wydawnicza PWr, Wrocław 2001.

[258] Bubnicki Z., Podstawy informatycznych systemów zarządzania, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1993.

[259] Roy B., Wielokryterialne podejmowanie decyzji, WNT, Warszawa 1990.

SECONDARY LITERATURE:

[1] Techniki informacyjne w badaniach systemowych, P. Kulczycki, O. Hryniewicz, J. Kacprzyk (red.), WNT, Warszawa 2007.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Jerzy Józefczyk, Jerzy.Jozefczyk@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Decision Support systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Decision Support systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1	Lec1, Lec 2, Lec 7, Cl1, Cl 2, Pr1	N1, N3, N6
PEK_W02	K2INF_W02	C1	Lec3, Lec4	N1, N3, N6
PEK_W03	K2INF_W02	C4, C6	Lec5, Lec6	N1, N3, N6
PEK_U01 (skills)	K2INF_U05; K2INF_U06	C2	Lec2, Cl 3, Proj2	N2–N6
PEK_U02	K2INF_U05; K2INF_U06	C3	Cl 4, Cl 5, Proj3, Pro4	N2–N6
PEK_U03	K2INF_U05; K2INF_U06	C5	Cl 6, Proj4	N2–N6
PEK_U04	K2INF_U05; K2INF_U06	C7	Cl 7, Proj4	N2–N6
PEK_K01 (competences)	K2INF_K01	C1, C4, C6	Lec1– Lec7, Proj1, Proj4	N2–N6
PEK_K02	K2INF_K01	C1–C7	Proj1–Proj6	N2–N6

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: Teoria i inżynieria ruchu teleinformatycznego

Name in English: Theory and engineering of teletraffic

Main field of study (if applicable): Computer science

Specialization (if applicable): Teleinformatics

Level and form of studies: 2nd level, full-time

Kind of subject: obligatory

Subject code INZ3759

Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload	30			90	

(CNPS)					
Form of crediting	Crediting with grade			Crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	1			3	
including number of ECTS points for practical (P) classes				3	
including number of ECTS points for direct teacher-student contact (BK) classes	0,6			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

43. Has a basic knowledge of ICT systems and computer communication networks (K1INF_W11).
44. Knows the basic methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_W16)
45. Can use the right tools to build a simple model of the process (the object), to formulate specific task analysis and decision making (K1INF_U15)
46. Can effectively use the methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_U16)
47. It has the ability to self-education, including in order to improve the professional competence (K1INF_U05)
48. Understands the need and knows the possibility of lifelong learning and to improve their professional and social competences (K1INF_K01)

SUBJECT OBJECTIVES

C1. Ordered, underpinned by theoretical knowledge of methods and techniques for transmitting signals using different modulation techniques, methods and techniques of information transmission, methods of organization and management of data communications traffic in the tasks of design and analysis of communication systems, methods of delivering service quality of ICT systems, analysis of quantitative and qualitative requirements and methods for sizing of distributed IT systems.

C2. Skills about the differences and benefits of the use of analog and digital data transmission techniques, the differences and benefits of the use of wired and wireless signal transmission techniques, developing the concept of using wired and wireless technologies in the basic applications of ICT systems, defining the qualitative and quantitative requirements of the user information and communication systems range of data, designing ICT solutions needed to achieve the qualitative and quantitative requirements of the user, using standards and solutions available on the market, estimating the cost of preparing and maintaining ICT solutions needed to achieve the qualitative and quantitative requirements, designing modernization of IT solutions needed to achieve the qualitative and quantitative requirements, identifying differences and similarities between solutions in a variety of applications (e-health, e-government and e-learning, in real-time systems, etc.).

C3. Skills for the design and analysis of complex, distributed ICT systems providing network services for distributed computer communication systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

K2INF_W02: Has a structured, theoretically founded essential knowledge of business modeling and requirements specification systems.

K2INF_W03: Has a structured, theoretically founded essential knowledge in the delivery of information distributed systems

K2INF_W06: Achieves results in the category of knowledge for specialty data communications

relating to skills:

K2INF_U05: Can - in formulating and solving engineering tasks - integrate knowledge of the fields of science and scientific disciplines relevant to the study being studied and applied a systemic approach, taking into account the non-technical aspects

K2INF_U06: Can solve the modeling, analysis and decision making for different types of objects

K2INF_U08: Achieves results and skills in areas of data exchange and computer communications systems

relating to social competences:

K2INF_K01: Can think and act in a creative and enterprising

K2INF_K02: Has aware of the social role of technical graduating, especially understands the need for the formulation and communication to the public, especially through the mass media, information and opinion on the achievements of technology and other aspects of engineering, shall endeavor to provide such information and opinions in a widely understood the reasons for the different points of view

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Classification of ICT systems from different points of view. Quality of Experience (QoE) and Quality of Service (QoS) in ICT systems with elastic and streaming traffic.	2
Lec 2	Introduction to queuing. Open and close networks of queues.	2
Lec 3	Queuing models of circuit-switched and packet-switched computer communication systems. Burke's theorem and Kleinrock approximation.	2
Lec 4	Access control, flow control and routing tasks formulation and solution in distributed environments.	2
Lec 5	Requirements analysis	1
Lec 6	Models (Poisson, Markov modulated, self-similarity, etc) of teletraffic and its application in traffic engineering tasks.	2
Lec 7	QoS delivery concepts: best effort, integrated services and differentiated services	2
Lec 8	New concepts of systems and networks - NXGN (Next Generation Networks) i NWGN (New Generation Network). Summary.	2
	Total hours	15

PROGRAMME CONTENT

Form of classes - project		Number of hours
Proj 1	Formulation design task based on the analysis of the literature, documentation, etc.	2
Proj 2	Justification for the choice task and purpose of the task design - an analysis of the expected benefits of the project task.	2
Proj 3	Quantitative requirements analysis for the communication system under design	2
Proj 4	Qualitative requirements analysis for the communication system under design	2
Proj 5	Analysis of state of the art on how to solve the task design	2
Proj 6	Analysis and selection of the task design methodology	2
Proj 7	Tools (methods, algorithms, procedures, software and hardware) analysis and selection required for the implementation of the project task	2
Proj 8	Implementation of prototype of modules solve the task	2
Proj 9	Prototype testing and evaluation	2
Proj 10	Modification of solutions using prototype test results	2
Proj 11	Integration of modules distinguished at the stages of requirements analysis and prototyping	2
Proj 12	Verification and testing of an integrated solution design task	2
Proj 13	Analysis of the possibility of extending the project tasks	2
Proj 14	Preparation of the presentation and documentation of the design task	2
Proj 15	Presentation of the results of the design task	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture supported by whole class multimedia presentations based on literature and open access and commercial sources.
N2. Student's own works – solving experiments and tasks in laboratory as well as homework.
N3. Student's own works – literature and open access sources studies.
N5. Collective works in laboratory
N5. Student's own works – preparation of presentations and technical documentations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05	Observation and verification of student activity. Solving the sample jobs.

	K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	
F1 – F15 (project)	K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and assessment of student autonomy.
P (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	Colloquium (course credit) in the evaluation of forming F1 (lecture)
P (project)	K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Total weighted ratings F1 - F15 (project) and the assessment for the presentation of the final results of the project.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[260] A.S. Tanenbaum, „Computer networks", Prentice Hall; 1996
[261] G. Pujolle, D. Seret, D. Dromard, E. Horlait, „Integrated Digital Communication Networks", J. Wiley & Sons
[262] B. Russell, „The art of computer networks", Prentice Hall; 2009
[263] V.S. Bagad, I.A. Dhotre, „Computer networks", Technical Publications, 2009.
[264] M. Roden, „Analog and digital communication systems", Prentice Hall
[265] http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

SECONDARY LITERATURE:

[81] S. Haykin, „Telecommunication systems", Prentice Hall, 1999.
[82] MIT Free Open Course Materials (http://ocw.mit.edu/index.htm)
[83] CCNA Exploration Network Fundamentals, Cisco Academy, PWN, 2008

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Adam Grzech, adam.grzech@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Theory and engineering of teletraffic

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer science

AND SPECIALIZATION
Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1, C2, C3	Lec 1 – Lec 8	N1, N4
PEK_W02	K2INF_W03	C1	Lec 1 – Lec 8	N1,N2, N4
PEK_W03	K2INF_W06	C1	Lec 1 – Lec 8	N1, N4
PEK_U01 (skills)	K2INF_U05	C1, C2, C3	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_U02	K2INF_U06	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_U03	K2INF_U08	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_K01 (competences)	K2INF_K01	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_K02	K2INF_K02	C1, C2	Lec 1 – Lec 8	N1, N2, N3, N4, N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Zaawansowane metody i techniki analizy danych
Name in English Advanced Methods and Techniques of Data Analysis
Main field of study (if applicable): computer science
Specialization (if applicable): …….
Level and form of studies: 2nd* level, full-time
Kind of subject: obligatory
Subject code INZ003758
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	crediting with grade*		crediting with grade*		

For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes	0		4		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of mathematics and mathematical statistics

\

SUBJECT OBJECTIVES

C1 Introduce the methods and techniques of the statistical data analysis to students
C2 Gather knowledge for Knowledge Discovery (Data Mining)
C3 Applying the gathered knowledge to drawing conclusions based on data analysis

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has a basic knowledge of Knowledge Discovery (Data Mining)
PEK_W02 student has a basic knowledge of statistical data analysis
PEK_W03 student is able to present differences between parametric and non-parametric tests

relating to skills:
PEK_U01 student is able to choose a proper statistical test
PEK_U02 student is able to draw conclusion from data analysis
PEK_U03 student is able to select a proper data mining method

relating to social competences:
PEK_K01 student is able to search and reuse the primary and secondary literature listed below and is able to gather the proper knowledge
PEK_K02 student understands the need for systematic and individual work in order to cover the scope of the course

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to knowledge discovery	2
Lec 2	Classification and Data Clustering	2
Lec 3	Clustering Algorithms	2
Lec 4	Discovering association rules	2
Lec 5	Statistics - basic notions	2
Lec 6	The selected problems of estimation theory	2
Lec 7	Introduction to verification of statistical hypothesis	2
Lec 8	Parametric tests for one population	2
Lec 9	Non-parametric tests for one population	2
Lec 10	Parametric tests for two populations	2
Lec 11	Non-parametric tests for two populations	2

Lec 12	Parametric tests for more than 2 populations	2
Lec 13	Non-parametric tests for more than 2 population	2
Lec 14	Correlation and regression methods	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Introduction to WEKA	2
Lab 2	Knowledge discovery in WEKA	8
Lab 3	Introduction to MATLAB	2
Lab 4	Statistical data analysis in MATLAB	8
Lab 5	Introduction to R	2
Lab 6	Statistical data analysis in R	8
	Total hours	30

Form of classes - project		**Number of**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Traditional lecture N2. Labs N3. One-to-one consultancy during stuff hours

N4. Student self-study

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P -laboratory	PEK_U01-PEK_U03, PEK_K01-PEK_K02	Evaluation of the prepared tasks during labs, oral test
P-lecture	PEK_W01-PEK_W03 PEK_K01-PEK_K02	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[266] M. Sobczyk: Statystyka, Wydawnictwo Naukowe PWN, 2007

[267] W.Krysicki, J.Bartos, W. Dyczka, K. Królikowska, M. Wasilewski: Statystyka, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, cz. 2 Statystyka matematyczna, Wydawnictwo Naukowe PWN, 2007

[268] Marek Walesiak, Eugeniusz Gatnar (Red. nauk.) :Statystyczna analiza danych z wykorzystaniem programu R, Wydawnictwo Naukowe PWN, 2009

[269] M. Korzyński: Metodyka eksperymentu Planowanie realizacja i statystyczne opracowanie wyników eksperymentów technologicznych, Wydawnictwo Naukowo-Techniczne 2006

[270] Nong Ye, : The Handbook of Data Mining, Lawrence Erlbaum Associates, Publishers, 2003

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Prof. dr hab. inż Ngoc Thanh Nguyen, Ngoc-Thanh.Nguyen@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Advanced Methods and Techniques of Data Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY computer science
AND SPECIALIZATION **……**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C2	Lec1-4 Lab1-2	N1-4
PEK_W02	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_W03	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_U01	K2INF_U01, K2INF_W06, K2INF_W08	C1	Lec5-14 Lab3-6	N1-4
PEK_U02	K2INF_U01, K2INF_W06, K2INF_W08	C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_U03	K2INF_U01, K2INF_W06, K2INF_W08	C2	Lec1-4 Lab1-2	N1-4
PEK_K01		C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_K02		C1, C2, C3	Lec1-14 Lab1-6	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT / DEPARTMENT……

SUBJECT CARD

Name in Polish Implementacja Systemów Wspomagania Decyzji
Name in English Implementation of Decision Support Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): decision support systems
Level and form of studies: ~~1st/~~ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide~~*
Subject code INZ3830
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		15	30	
Number of hours of total student workload (CNPS)	60		30	90	
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2		1	3	
including number of ECTS points for practical (P) classes			1	3	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		0,6	1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Ability to program in at least one programming language.
2 Knowledge of methods and algorithms for decision support systems

\

SUBJECT OBJECTIVES

C1 Acquisition of knowledge covering aspects related to the implementation of decision support systems
C2 Acquiring skills related to the developing distributed mobile applications for the implementation of decision support systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 A student is able to identify the software development methods useful in the implementation of information systems, decision-making

PEK_W02 A student is able to describe the structure and architecture typical of decision support systems.

PEK_W03 A student is able to characterize and describe technologies for developing distributed applications for mobile devices and to apply information systems for decision-making.

relating to skills:

PEK_U01 A student can choose the decision support algorithms to solve practical problems and implement it in a decision support system.

PEK_U02 A student can develop software for contemporary mobile devices when applied to information systems for decision support.

PEK_U03 A student can develop distributed applications and combine applications written in different technologies to implement a system for decision support.

PEK_U04 A student can prepare user documentation and technical support for the implemented application.

relating to social competences:

PEK_K01 A student is able to think in a creative way.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction. Architectures of decision support systems.	2
Lec 2	Design Patterns. MVC.	2
Lec 3	Developing applications for mobile platforms.	2
Lec 4	Storage and transmission of data. Using XML files.	2
Lec 5	Developing distributed applications.	2
Lec 6	Combining applications written in different technologies.	2
Lec 7	Source code documentation.	2
Lec 8	Final test.	1
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Introductory classes. Health and Safety Training.	1
Lab 2-4	Implementation of programs for various mobile platforms (using different operating systems).	6
Lab 5-	Developing distributed applications using communication between mobile devices	4

6	and PCs.	
Lab 7-8	Exercises on integration process of applications written in different technologies	4
	Total hours	15

Form of classes - project		**Number of hours**
Proj 1	Choosing a simple decision support system for implementation. Discussion of the basic assumptions of the software under development	2
Proj 2-4	Preparation of application's project.	6
Proj 5-10	Implementation of the application (the implementation of the user interface, the implementation of the relevant decision-making algorithms, combining the elements of the system under development)	12
Proj 11-14	Qualitative and quantitative tests of the prepared software.	8
Proj15	Presentation of the final version of the application	2
	Total hours	30

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Traditional lecture with slides N2. PCs (laboratory) N3. Consultation N4. Own work - preparing for laboratories and project N5. Own work - self-study and preparation for the final test N6. Own work - programming N7. Own work - designing

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01	individual questioning, report
F2	PEK_U02	individual questioning, test, report
F3	PEK_U03	individual questioning, test, report
F4	PEK_U04	individual questioning, test, report
F5	PEK_K01	individual questioning, test, report
F6	PEK_W01 PEK_W02 PEK_W03	Final test

P1 (Lec)	PEK_W01 PEK_W02 PEK_W03	F6
P2 (Lab)	PEK_U01 – PEK_U04	F1 – F4
P3 (Proj)	PEK_U01 – PEK_U04	F1 – F5
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] B. McLauglin: Rusz głową. Analiza i programowanie obiektowe. Helion, 2010.
[2] K. Sierra: Rusz głową! Wzorce projektowe, Helion, 2010.
[3] O. Iliescu, Java ME: tworzenie zaawansowanych aplikacji na smartfony, 2012

SECONDARY LITERATURE:

[1] A. Hunt, D. Thomas: Pragmatyczny programista: od czeladnika do mistrza. Helion, 2011.
[2] Conder, Shane, Android : programowanie aplikacji na urządzenia przenośne, Helion 2011
[3] K. Beck: Wydajne programowanie. wyd. II. Mikom, 2006.
[4] E. Gamma i in.: Wzorce projektowe, WNT 2005.
[5] A. Hunt, J. Thomas: JUnit. Pragmatyczne testy jednostkowe w Javie. Helion, 2006.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dariusz Gąsior, dariusz.gasior@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Implementation of Decision Support Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION **Decision Support Systems**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2_INS_O_W05	C1	Lec1-Lec7	N1, N3, N5
PEK_W02	K2_INS_O_W05	C1	Lec1	N1, N3, N5
PEK_W03	K2_INS_O_W05	C1	Lec3-Lec6	N1, N3, N5
PEK_U01	K2_INS_U15	C2	Proj1-Proj14	N2, N3, N4, N5, N6, N7
PEK_U02	K2_INS_U16	C2	Lab2-Lab4 Proj1-Proj14	N2, N3, N4, N5, N6, N7
PEK_U03	K2_INS_U16	C2	Lab5-Lab8 Proj1-Proj14	N2, N3, N4, N5, N6, N7
PEK_U04	K2_INS_U03	C2	Self	N4, N5
PEK_K01	K2_INS_O_K02	C2	Proj1 – Proj3	N7

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish … Inteligentne systemy wspomagania decyzji
Name in English … Intelligent decision support systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Decision support systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide~~*
Subject code INZ3828
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	15	15	30	
Number of hours of total student workload (CNPS)	40	60	60	110	
Form of crediting	~~Examination~~ / crediting with grade*	~~Examination~~ / crediting with grade*	~~Examination~~ / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points	1	2	2	4	
including number of ECTS points for practical (P) classes	0	0	2	4	
including number of ECTS points for direct teacher-student contact (BK) classes	0,6	1,2	1,2	2,4	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Student understands the notion of a decision problem and is familiar with basic models of decision plants.
2. Student is able to formulate a decision problem as well as to determine and implement simple decision algorithms.

\

SUBJECT OBJECTIVES

C1 Acquiring basic knowledge of problems in the area of intelligent decision support systems.
C2 Acquiring skills in analysis, design and implementation of intelligent decision support systems with the application of modern methods and techniques.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student is able to explain differences between traditional mathematical models and knowledge representations, and to present definitions of a relational and a logical representations of knowledge on a decision plant or on a decision making.

PEK_W02 Student is able to characterize concepts and paradigms of learning, and to present selected algorithms for learning of a decision strategy and for learning of decision rules.

PEK_W03 Student is familiar with a mathematical model of a multilayer neural network, and understands the concept of a backpropagation method.

PEK_W04 Student is able to explain chosen methods of evolutionary systems, used for coding, crossing-over and selection.

PEK_W05 Student knows knowledge representations based on fuzzy or uncertain variables, and the methods for solving decision problems under uncertainty.

relating to skills:

PEK_U01 Student is able to determine solutions to simple numerical examples of analysis and decision problems based on knowledge representations, learning or under uncertainty.

PEK_U02 Student is able to implement a logic-algebraic method, the AHC and ID3 algorithms, an evolutionary algorithm and a fuzzy reasoning algorithm – in a chosen software environment.

PEK_U03 Student is able to design and carry out computer simulations to evaluate intelligent decision algorithms and properly adjust their parameters.

PEK_U04 Student can search for research papers, read them with understanding and evaluate applicability of the presented methods to the design task under consideration.

PEK_U05 Student is able to perform analysis of a decision problem, work out the problem formulation, design a decision support system, properly indicate software implementation tools and assess strong and weak aspects of the designed system.

relating to social competences:

PEK_K01 Student can think in a creative way.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Introduction. Supplementing and extending basic information on decision support systems	2
Lec 2	Knowledge-based decision making.	1
Lec 2, Lec 3	- using a relational knowledge representation	2
Lec 3, Lec 4	- using a logical knowledge representation	3
Lec 5	Adaptation and learning in decision support systems	2
Lec 6	Self-learning decision support systems – using knowledge on the decision plant	1
Lec 6, Lec 7	Self-learning decision support systems – using knowledge on the decision making	3
Lec 8, Lec 9	Automated knowledge acquisition from data (clustering, association rules, decision trees)	4
Lec 10, Lec 11	Nature-inspired approaches and soft computing in decision support systems - application of neural networks	3
Lec 11, Lec 12	- application of evolutionary algorithms	3
Lec 13	- application of methods based on fuzzy logics	2
Lec 14	- application of models involving the uncertain variables	2
Lec 15	Lecture test	2
	Total hours	30
Form of classes - class		**Number of hours**
Cl 1, Cl 2	Solving computational exercises concerning: - analysis and decision making based on the relational knowledge representation	2
Cl 2, Cl 3	- analysis and decision making based on the logical knowledge representation	2
Cl 3, Cl 4	- reinforcement learning algorithms	2
Cl 4, Cl 5	- data mining algorithms	2
Cl 5, Cl 6	- determination of neural networks learning algorithms and evaluation of their properties	2
Cl 6, Cl 7	- determination of decisions based on a fuzzy rule base	2
Cl 7, Cl 8	- analysis and decision making based on certainty distributions	2
Cl 8	Classes test	1
	Total hours	15
Form of classes - laboratory		**Number of hours**

Lab1	Explaining safety rules (BHP training). Introduction	1
Lab2 – Lab8	Implementation and simulated testing of chosen intelligent decision making algorithms. There are 5 task to be completed, concerning the algorithms dealt with during classes.	14
	Total hours	15

Form of classes - project		**Number of hours**
Proj1	Introduction	1
Proj1 – Proj5	Choosing and analyzing a decision problem. Formulating the adequate design task. Analyzing assumptions, requirements and constraints	9
Proj6	Students' presentations, part I.	2
Proj7 – Proj13	Elaborating alternative variants of the problem solution, in particular – using soft computing methods, selecting a variant satisfying the chosen criteria, designing systems structure and analyzing issues related to its implementation	14
Proj14	Students' presentations, part II.	2
Proj15	Discussion on students' presentations and project reports. Conclusions	2
	Total hours	30

Form of classes - seminar		**Number of hours**
Sem1		
Sem2		
Sem3		
…		
	Total hours	

TEACHING TOOLS USED

N1. Traditional lecture.
N2. Student's individual work – solving computational exercises.
N3. Group work – discussion, conversation with an individual student.
N4. Student's individual work – programming.
N5. Student's individual work – performing computer simulations.
N6. Student's individual work – studying literature.
N7. Student's individual work – analyzing, designing.
N8. Student's individual work – presenting.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation(F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 – F5	PEK_U02, PEK_U03	Short (ca. 4 min) conversation with individual students concerning current laboratory exercises (incl. presentation of computer programs, computed results and conclusions), a report.
F6	PEK_U04, PEK_U05	Based on a presentation given during project classes, part I

F7	PEK_U04, PEK_U05, PEK_K01	Based on a presentation given during project classes, part II
F8	PEK_U04, PEK_U05, PEK_K01	Reading students' project reports
P1 (Lec)	PEK_W01 – PEK_W05	Lecture test
P2 (Cl)	PEK_U01	Classes test
P3 (Lab)	PEK_U02, PEK_U03	F1 – F5
P4 (Proj)	PEK_U04, PEK_U05, PEK_K01	F6 – F8

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Bubnicki Z.: *Modern control theory*, Springer Verlag, Heidelberg-Oxford-N. York, 2005.
[2]

SECONDARY LITERATURE:

[1] Zilouchian A., Jamshidi M.: *Intelligent Control Systems Using Soft Computing Methodologies*, CRC Press, Boca Raton, London, 2001.
[2]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Donat Orski, donat.orski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Intelligent decision support systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Decision Support Systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2SWD_W02	C1	Lec 1 – Lec 4	N1
PEK_W02	K2INF_W06_S2SWD_W02	C1	Lec 5 – Lec 9	N1
PEK_W03	K2INF_W06_S2SWD_W02	C1	Lec 10, Lec 11	N1
PEK_W04	K2INF_W06_S2SWD_W03	C1	Lec 11, Lec 12	N1
PEK_W05	K2INF_W06_S2SWD_W03	C1	Lec 13, Lec 14	N1
PEK_U01 (skills)	K2INF_U08_S2SDW_U01, K2INF_U08_S2SDW_U06	C2	Cl 1 – Cl 8	N2, N3
PEK_U02	K2INF_U08_S2SDW_U01	C2	Lab 2 – Lab 8	N3, N4, N5, N6
PEK_U03	K2INF_U08_S2SDW_U01	C2	Lab 2 – Lab 8	N3, N4, N5, N6
PEK_U04	K2INF_U08_S2SDW_U06, K2INF_U08_S2SDW_U10	C2	Proj7 – Proj15	N3, N6, N7, N8
PEK_U05	K2INF_U08_S2SDW_U06, K2INF_U08_S2SDW_U10	C2	Proj1 – Proj15	N3, N6, N7, N8
PEK_K01 (competences)	K2INF_U08_S2SDW_K01	C2	Proj7 – Proj15	N3, N6, N7, N8

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8/ DEPARTMENT……

SUBJECT CARD

Name in Polish … Komputerowe systemy identyfikacji i rozpoznawania.
Name in English … System identification and pattern recognition techniques in computer science.
Main field of study (if applicable): … Computer Science .
Specialization (if applicable): … Decision support systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code ..INZ3768
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	30	30		
Number of hours of	120	90	90		

total student workload (CNPS)					
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	**4**	3	3		
including number of ECTS points for practical (P) classes	0	0	3		
including number of ECTS points for direct teacher-student contact (BK) classes	2,4	1,8	1,8		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of basic ideas and methods of mathematical analysis
2. Knowledge of basic ideas and methods of algebra
3. Knowledge of basic ideas and methods of probability theory and statistics

\

SUBJECT OBJECTIVES

C1 Learning how to develop computer models using measurement data
C2 Ability to design and develop modern computer recognition systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Knowledge of modern system identification and pattern recognition techniques

relating to skills:
PEK_U01 Knows how to develop the model of a process and pattern recognition system for decision support and analysis tasks
PEK_U02 Knows how to design and develop computer identification and pattern recognition systems using MATLAB

relating to social competences:
PEK_K01 Knows how to make documentation of their own work and knows how to apply computer identification systems for other areas of science and technology (e.g. medicine and life sciences, sport, economy)

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	The role of mathematical model in systems analysis. System identification task.	2
Lec 2	Basic tasks of static system identification – deterministic setting. Parametric identification and the choice of optimal model.	2

Lec 3	Estimation of static system identification: a) the least squares method, b) maximum likelihood method, c) the Bayes rule.	4
Lec 4	Parametric identification – nondeterministic case. Regression task.	2
Lec 5	Nonparametric identification. Parzen window density estimator. Orthonormal basis functions.	2
Lec 6	Time-variant system identification.	2
Lec 7	Dynamic systems identification described by differential equations. Parametric identification and the choice of the best model. Analysis of impulse responses.	2
Lec 8	Estimation of dynamic systems parameters: a) the least squares method, b) the noise correlation method, c) instrumental variables methods, d) maximum likelihood method, e) Kalman filter, f) correlation function method and spectral analysis, g) recursive estimation methods.	4
Lec 9	Selected problems of complex systems identification.	2
Lec 10	Pattern recognition tasks – introduction. Graphical interpretation of pattern recognition and feature selection tasks. Pattern recognition for decision support systems.	2
Lec 11	Statistical pattern recognition. Bayesian classifier. The nearest neighbour algorithms.	2
Lec 12	Supervised and unsupervised learning. The k-nearest neighbours algorithm.	2
Lec 13	Application of neural networks for system identification and pattern recognition.	2
	Total hours	**30**

Form of classes - class		**Number of hours**
Cl 1	Selected concepts of statistics: a) expected value, variance, probability distribution and probability density function b) correlation and covariance, c) conditional probability and the Bayes rule.	4
Cl 2	Parametric identification – deterministic setting.	2
Cl 3	Parametric identification and the choice of the best model. Approximation.	4
Cl 4	Parametric identification – nondeterministic setting: a) the least squares method, b) maximum likelihood method, c) the Bayes rule.	4
Cl 5	Regression task.	2
Cl 6	Kalman filter.	2
Cl 7	Stochastic approximation method.	2

Cl 8	Optimal Bayes classifier	2
Cl 9	Supervised learning. The k-nearest neighbour method.	2
Cl 10	Application of neural networks for system identification.	2
Cl 11	Application of neural networks for pattern recognition.	2
Cl 12	Feature selection.	2
	Total hours	**30**
Form of classes - laboratory		**Number of hours**
Lab 1	Health and safety training (BHP). Statistical methods of data processing.	2
Lab 2	Development of selected mathematical models for system identification purposes.	2
Lab 3	Implementation of parametric identification algorithms. Simulation study and report.	4
Lab 4	Implementation of identification algorithms for nondeterministic setting. Simulation study and report.	4
Lab 5	Development of a computer identification system for a real process.	4
Lab 6	Simulation study on the developed identification system. Report.	2
Lab 7	Implementation of basic classifiers: k-nearest neighbours, linear classifier. Simulation study and report.	4
Lab 8	Development of a computer pattern recognition with use of real life dataset and MATLAB Toolboxes.	4
Lab 9	Simulation study on the developed pattern recognition system. Report.	4
	Total hours	**30**

TEACHING TOOLS USED
N1. Traditional lecture. Multimedia presentation. N2. Tutorials. N3. Literature study. N4. Implementation of algorithms. N5. Simulation studies. N6. Reports.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1-F8	PEK_W01, PEK_U01, PEK_U02, PEK_K01	Observing student's activity. Discussion about current tasks. Reports.
F9-F13	PEK_W01, PEK_U01, PEK_U02, PEK_K01	Observing student's activity. Discussion about current tasks. Reports.
P1(Lec)	PEK_W01	Exam.
P2(Cl)	PEK_U01	F1 – F13

P3(Lab)	PEK_U02 PEK_K01	F1 – F13
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Ljung L., *System Identification: Theory for the User*, Prentice Hall, 1999.

[2] Isermann R., Münchhof M., *Identification of Dynamic Systems: An Introduction with Applications*, Springer-Verlag, 2010.

[3] Świątek J., *Wybrane zagadnienia identyfikacji statycznych systemów złożonych*, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2009.

[4] Bishop C.M., *Pattern Recognition and Machine Learning*, Springer, 2006.

[5] Duda R.O., Hart P.E., Stork D.G., *Pattern Classification*, John Wiley & Sons, 2001.

SECONDARY LITERATURE:

[6] Gustafsson F, *Adaptive Filtering and Change Detection*, Wiley, 2000.

[7] Theodoridis S., Koutroumbas K., *Pattern Recognition*, Elsevier, 2009.

[8] Webb A.R., Copsey K.D., *Statistical Pattern Recognition*, John Wiley & Sons, 2011.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

prof. Jerzy Świątek, jerzy.swiatek@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2SWD_W04	C1	Wy1-Wy16	N1, N4
PEK_U01 (skills)	K2INF_U08_S2SDW_U04	C1	Ćw1-Ćw12	N2, N4
PEK_U02	K2INF_U08_S2SDW_U03	C2	La1-La9	N3,N5, N6
PEK_K01 (competences)	K2INF_U08_S2SDW_U03 K2INF_U08_S2SDW_U04	C1,C2	La3,La4,La5,La7	N7

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Metodologia badań naukowych
Name in English Methodology of empirical sciences…….
Main field of study (if applicable): Informatics……..
Specialization (if applicable): ……..
Level and form of studies: 2nd* level, full-time /
Kind of subject: obligatory /
Subject code INZ003763……
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	0	0	0	0
Number of hours of total student workload (CNPS)	90	0	0	0	0
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3				
including number of	0				

ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,8				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Competence in basic algebra
2. Competence in mathematical analysis
3. Differential equations

\

SUBJECT OBJECTIVES

C1 Knowledge on the methodological postulates
C2Competence in mathematical modeling on the base of methodology of empirical sciences
C3Competence in hypothesis testing
C4Competence in creation of homogeneous and invariant in relation to the system of units models

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01Knowledge on methodological postulates
PEK_W02Logical postulates of mathematical models construction (invariance and homogeneity)
PEK_WOO3Logical base of hypothesis testing

…
relating to skills:
PEK_U01Competence in mathematical modeling with accordance to methodological postulates
PEK_U02Competence in hypothesis and empirical models testing
…
relating to social competences:
PEK_K01Competence in the exactness of process description
PEK_K02Competence on ability of studying and reflection on experiment

PROGRAMME CONTENT

Form of classes - lecture		**Number of**
Lec 1Methods of scientific and technical project validation on the base of citation analysis	2	
Lec 2Methodological postulates of determinism, closed system, interconnectedness, simplicity and Popper's condition of falsification	2	
Lec 3Classical theory of measurements and the postulate of uniquenes	2	
Lec 4Dimensionally invariant description of a process, dimensional space	2	
Lec 5Theorem Pi of dimensional analysis and examples of its applications	2	
Lec 6Applications of theorem Pi in: models construction, experiment planning, identification	2	
Lec 7Theory of similarity	2	

Lec 8Invariance of models in relation to rotations group, tensors homogeneity Lec 9 Models testing and falsification of hypothesis Lec 10Identification of mathematical models Lec 11Multistage identification, models interpretability Lec 12Description of models construction Lec 13Models testing	2 2 2 2 2 2 2	
	Total hours26	Plus 2 colloqiums

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1.Literature N2.Examples analysis N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1P-1colloquium evaluation	WO1,WO2	Evaluation of students work
F2P-2colloquium evaluation	UO1,UO2	Evaluation of examples solving
F3		
C		

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [1] J.M. Bochenski The methods of contemporary thought. Harper Torchbooks, NY,1968 [2] W.Kasprzak, B. Lysik, M.Rybaczuk Measurements, Dimensions, Invariant Models and Fractals Spolom Wroclaw Lviv 2004 [3] [4] **SECONDARY LITERATURE:** [1] K. R. Popper The logic of Scientific Discovery. Hutchinson Publ. Comp. 1959 [2] [3]
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
Waclaw Kasprzak waclaw.kasprzak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Methodology of empirical sciences……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_WO1	Methodology basis	K1,K2,K3	N1,N2,P1
PEK_W02	K2INF_WO6	Models testing	K4,K13	P1
…				
…				
PEK_U01 (skills)	K2INF_UO6	Construction of models	K5,K6,K7	N1,N2,P2
PEK_U02	K2INF_UO8	Hyothesis testing	K8,K13	N1,N2,P2
…				
PEK_K01 (competences)	K_2SWD_KO1		K2	N1,N2
PEK_K02	K2_SWD_KO2		K13	N1,N2,P2
…				

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: Informatics and Management

SUBJECT CARD

Name in Polish: Modelowanie i analiza biznesowa
Name in English: Modeling and business analysis
Main field of study (if applicable): Informatics
Specialization (if applicable): Computer Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ3760
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	30			
Number of hours of total student workload (CNPS)	60	90			
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points	2	3			
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	1,8			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

22. Practice in object-oriented programming.
23. Basic knowledge of software engineering.

\

SUBJECT OBJECTIVES

C1. Basic knowledge in the area of software system modeling with the stress on business modeling as the initial phase of the software development process.
C2. Basic knowledge in the area of the requirements specification.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEK_W01: Students have basic knowledge on business modeling.
PEK_W02: Students know and understand the role of specification requirements.
PEK_W03: Students have basic knowledge on selected modeling languages.

Relating to skills:
PEK_U01: Students, in cooperation with domain experts, can construct and analyze business models.
PEK_U02: Students can build models of system requirements.

Relating to social competences:
PEK_K01: Students are able to cooperate with representatives of application domain.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Basic notions for software development cycle. Survey of modeling languages – UML and BPMN.	2
Lec 2	Class diagrams – classes, associations, generalizations.	2
Lec 3	Validation and verification.	1
Lec 4	Object Constraint Language.	2
Lec 5	UML activity diagrams.	2
Lec 6	BPMN process diagrams.	2
Lec 7	UML statechart diagrams.	2
Lec 8	System requirements; use case diagrams.	2

	Total hours	15

Form of classes - class		Number of hours
Cl 1	Construction and analysis of simple class diagrams.	2
Cl 2	Construction and analysis of advanced class diagrams.	2
Cl 3	Analysis of textual descriptions of exemplary application domains – structural aspect (1).	2
Cl 4	Analysis of textual descriptions of exemplary application domains – structural aspect (2).	2
Cl 5	Case study – an example of structural modeling.	2
Cl 6	Construction and analysis of OCL constraints imposed on diagrams.	2
Cl 7	Test 1.	2
Cl 8	Analysis of textual descriptions of exemplary application domains – structural and behavior aspect.	2
Cl 9	Analysis of simple BPMN diagrams.	2
Cl 10	Construction of simple BPMN diagrams.	2
Cl 11	Construction and analysis of advanced BPMN diagrams.	2
Cl 12	Construction and analysis of simple state diagrams.	2
Cl 12	Construction and analysis of advanced state diagrams..	2
Cl 13	Construction and analysis of use case diagrams.	2
Cl 14	Test 2.	2
Cl 15	Corrective test.	2
	Total hours	30

TEACHING TOOLS USED

N1. Lecturer's presentation at a blackboard, supported by a multimedia presentation using a laptop and a projector.
N2. Individual search and study of literature and Internet sources.
N3. Access to teaching materials published in the local area network.
N4. Individual consultations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 PEK_U01 PEK_K01	Each student gets 1 point for own solution of a problem from the list of problems for the given class.

<table>
<tr><td>F2</td><td>PEK_W01
PEK_W02
PEK_U01
PEK_U02
PEK_K01</td><td>Each student gets up to 10 points for own solution of problems for the given test (intermediate and final).</td></tr>
<tr><td>F3</td><td>PEK_W01
PEK_W02
PEK_W03
PEK_U01
PEK_U02
PEK_K01</td><td>The final evaluation for the classes is determined on the basis of total marks obtained by the student's activity for exercise (F1) and colloquia (F2). Positive mark is awarded to a student who has obtained at least 4 points for each of the symposia and has won a total of 10 points.
If this condition is met, the number of points P is the basis for evaluation in accordance with the following table:
<table>
<tr><td>P</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table>
Students who get at least a very good grade are exempt from the examination with the same mark as for the classes.</td></tr>
<tr><td colspan="3">C: The final evaluation of the course is determined based on the results of the examination. The examination lasts two hours and consists of a set of tasks, the total number of 20 points. The condition for a positive assessment of the final exam is to get 10 points and a positive final evaluation of the exercise.
The final evaluation of the examination is determined in accordance with the following table:
<table>
<tr><td>Points</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table></td></tr>
</table>

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[41] Rumbaugh J., Jacobson I., Booch G., *The Unified Modeling Language – Reference Manual*. Second edition, Addison-Wesley, 2005.

[42] Weilkiens T., Oestereich B., *UML 2 Certification Guide. Fundamental and Intermediate Exams*, Elsevier 2007.

[43] Maciaszek L. A., *Requirements Analysis and System Design*, Second edition, Pearson, Addison-Wesley, 2005.

[44] Adolph S., Bramble P., *Patterns for Effective Use Cases,* Addison-Wesley, 2003

[45] Gašević D., Djurić D., Devedžić V., *Model Driven Architecture and Ontology Development*, Springer, 2006.

SECONDARY LITERATURE:

[271] Graessle P., Baumann H., Baumann P., *UML 2.0 w akcji. Przewodnik oparty na projektach*, Helion, 2006.

[272] Object Management Group, Unified Modeling Language (available on the website: www.omg.com).

[273] Object Management Group, System Modeling Language SysML (available on the website: www.omg.com).

[274] Object Management Group, Business Process Modeling Notation BPMN (available on the website: www.omg.com).

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Zbigniew Huzar, zbigniew.huzar@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems Modeling and Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION
Computer Engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W02	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W03	K2INF_W03		Lec1-Lec8	N1, N2, N3, N4
PEK_U01 (skills)	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_U02	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_K01 (competences)	K2_SWD_K01	C1, C2	Lec1-Lec15 Cl1-Cl15	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from the table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: Podejmowanie decyzji w kompleksach operacji
Name in English: Decision Making in Operation Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Decision Support Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ 003773
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			15	30
Number of hours of total student workload (CNPS)	120			90	60
Form of crediting	Examination / ~~crediting with grade~~*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points	4			3	2
including number of ECTS points for practical (P) classes				3	
including number of ECTS points for direct teacher-student contact (BK) classes	2,4			1,8	1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Passing subject „Decision Support Systems"

\

SUBJECT OBJECTIVES

Celem ogólnym jest nabycie umiejętności i pozyskanie podstawowej wiedzy w zakresie podejmowania decyzji w systemach typu kompleks operacji, czyli systemach złożonych z operacji powiązanych za pomocą kolejności czasowych, a także opisu i analizy takich systemów. Przedmiot ten rozszerza treści programowe przedmiotu kierunkowego „Systemy wspomagania decyzji" na obiekty (przedmioty) podejmowania decyzji, jakimi są kompleksy operacji. Cele szczegółowe to:

General objective deals with the acquisition of skills and indispensable knowledge concerning decision making for complex operation systems (complexes of operations), i.e. systems composed of operations connected via time relationships, as well as mathematical representation and analysis of such systems. This subject widens the main field subject "Decision Support Systems" onto complexes of operations.

Particular objectives are as follows:

C1 Getting to know and acquisition of skills to determine mathematical models for complexes of operations.

C2 Getting acquainted with application areas of complexes of operations.

C3 Acquisition of skills to formulate optimal and satisfactory decision making problems for complexes of operations, in general and for specific oriented systems.

C4 Getting acquainted with methods and algorithms for solution selected decision making problems in complexes of operations, e.g.: allocation, task scheduling, optimization in networks, transportation, routing, and packing.

C5 Getting possibilities of application of metaheuristics and artificial intelligence based methods for solving decision making problems in complexes of operations.

C6 Getting skills of designing and implementation of computer decision support systems for complexes of operations.

C7 Learning of development directions of computer decision support systems in the scope of the subject.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student knows foundations of decision making for complexes of operations as well as their areas of application.

PEK_W02 Student is familiar with different ways for modeling and analysis of complexes od operations.

PEK_W03 Student knows solution algorithm to selected decision making problems for complexes of operations.

relating to skills:

PEK_U01 Student is able to elaborate a mathematical model for the complex of operations, to analyze it, and to formulate the corresponding decision making problem.

PEK_U02 Student can apply a known algorithm to solve formulated case-study decision making problem.
PEK_U03 Student can implement selected decision making algorithm, analyze it, formulate conclusions as well as present results in a form of written report.

PEK_U04 On the basis of selected literature sources, student is able to prepare and present proper presentation concerning selected decision making algorithm for complexes of operations as well as abstract of this presentation in English.
relating to social competences:
PEK_K01 Student can take advantage of professional literature by oneself and can perform the critical analysis of information mined.
PEK_K02 Student can think creatively.

PROGRAMME CONTENT

Form of classes - lecture		**Number**
Lec 1	Specificity and models of complexes of operations in comparison with other decision making plants.	2
Lec 2	Description and examples of applications of complexes of operations, in particular in computer science.	2
Lec 3	Optimization problems in networks - selected decision making algorithms, Part I.	2
Lec 4	Optimization problems in networks - selected decision making algorithms, Part II.	2
Lec 5	Resource allocation in complexes of operations.	2
Lec 6	Task allocation in complexes of operations.	2
Lec 7	Decision making in complexes of operations nondeterministic case.	2
Lec 8	Selected task scheduling problems on parallel executors, Part I.	2
Lec 9	Selected task scheduling problems on parallel executors, Part II.	2
Lec 10	Selected task scheduling problems on dedicated executors.	2
Lec 11	Methods and algorithms for NP-hard combinatorial problems.	2
Lec 12	Application of artificial intelligence based techniques for combinatorial problems.	2
Lec 13	Application of metaheuristics for combinatorial problems.	2
Lec 14	Development directions of decision making as well as computer decision making systems for complexes of operations.	2
Lec 15	Application of computer engineering tools for decision making for complexes of operations.	2
	Total hours	**30**

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		

..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
...		
	Total hours	

Form of classes - project		Number of
Proj 1	Getting acquainted with a case study plant (complex of operation).	2
Proj 2	Elaboration of mathematical model and decision making problem formulation.	2
Proj 3	Analysis of the plant on the basis of mathematical model.	2
Proj 4	Choice of the decision making method and eleboration of solution algorithm.	3
Proj 5	Implementation and experimental study of the decision making algorithm.	4
Proj 6	Drawing conclusions and elaboration of the project results in the form of written report.	2
	Total hours	**15**

Form of classes - seminar		Number of hours
Sem 1	Organization of seminars.	2
Sem 2	Solution algorithms of selected travelling salesman problems.	2
Sem 3	Solution algorithms of transportation problem.	2
Sem 4	Solution algorithms of vehicle routing problems, Part I.	2
Sem 5	Solution algorithms of vehicle routing problems, Part II.	2
Sem 6	Solution algorithms of selected packing problems.	2
Sem 7	Solution algorithms of selected location problems	2
Sem 8	Solution algorithms of selected complex decision making problem for complex of operations, Part I.	2
Sem 9	Solution algorithms of selected complex decision making problem for complex of operations, Part II.	2
Sem 10	Presentation of selected solvers intended to operations research problems.	2
Sem 11	Solution algorithm for congestion control in computer networks.	2
Sem 12	Solution algorithm for rate control in computer networks.	2
Sem 13	Solution algorithm for routing problem in computer networks.	2
Sem 14	Solution algorithm for selected decision making problem in logistic systems.	2
Sem 15	Solution algorithm for selected decision making problem in sensor networks.	2

	Total hours	**30**

TEACHING TOOLS USED

N1 Lecture – traditional method.
N2 Consultation.
N3 Individual discussion with student.
N4 Preparation for seminar.
N5 Presentation and discussion during seminar.
N6 Self-contained work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P (seminar)	PEK_U01–PEK_U04	Individual discussion with student during the project.
P (project)	PEK_W03; PEK_U04; PEK_K01; PEK_K02	Evaluation of the presentation as well as the participation in seminar discussion.
P (lecture)	PEK_W01; PEK_W02; PEK_U01–PEK_U04; PEK_K01; PEK_K02	Evaluation of written report of the project.
	PEK_W01–PEK_W03; PEK_K02	Examination

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[275] Józefczyk J., Selected Decision Making Problems in Complexes of Operations (in Polish), Oficyna Wydawnicza PWr, Wrocław 2001.
[276] Operations Research for Computers Engineers (in Polish), J. Błażewicz, W. Cellary, R. Słowiński, J. Węglarz (red.), WNT, Warszawa 1983.
[277] Algorithms of Discrete Optimization (in Polish), M. M. Sysło, W. Deo, J.S. Kowalik (red.), PWN 1993.
[278] Current scientific and research articles from specialist journals, in particular in English.

SECONDARY LITERATURE:

[84] Bubnicki Z., Foundations of Computer Management Systems (in Polish), Wrocław, Wyd. PWr 1993.
[85] Walukiewicz S., Discrete Programing (in Polish), Warszawa, PWN, 1986.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Jerzy Józefczyk, Jerzy.Jozefczyk@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives ***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2SWD_W05	C2, C3, C7	Lec2, Lec 11, Lec 14, Lec 15	N1, N2, N6
PEK_W02	K2INF_W06_S2SWD_W05	C1	Lec 1, Proj2, Proj 3	N1, N2, N6
PEK_W03	K2INF_W06_S2SWD_W05	C4, C5	Lec 3– Lec 10, Lec 12, Lec 13, Sem2–Sem9, Sem11–Sem15	N1, N2, N6
PEK_U01 (skills)	K2INF_W06_S2SWD_W05 K2INF_U08_S2SWD_U01 K2INF_U08_S2SWD_U02	C1, C3	Proj 2– Proj 4	N3, N6
PEK_U02	K2INF_U08_S2SWD_U01 K2INF_U08_S2SWD_U02	C5, C6	Proj 4	N3, N6
PEK_U03	K2INF_U08_S2SWD_U01 K2INF_U08_S2SWD_U02	C6	Proj 5, Sem10	N3, N6
PEK_U04	K2INF_U08_S2SWD_U09 K2INF_U08_S2SWD_U10	C4, C7	Proj 6, Sem2–Sem15	N3, N6, N5
PEK_K01 (competences)	K2INF_U08_S2SWD_U09 K2INF_U08_S2SWD_U10	C4	Sem2–Sem15, Proj 6	N4, N2, N6
PEK_K02	K2INF_U08_S2SWD_U10	C3, C5, C6	Proj 1– Proj 6	N4, N5, N6, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa I
Name in English MSc Thesis I
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part time~~*
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code INZ003818
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of				60	

total student workload (CNPS)					
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points				2	
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes				0,6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 2rd semester

\

SUBJECT OBJECTIVES

C1 Preparation of students to write a master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology, with special attention of all stages of writing a thesis.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		

Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Preparation of students to write a master thesis according the internal requirements of Faculty of Computer Science and Management (Computer Science field of study), Wrocław University of Technology, with special attention of all stages of writing a thesis. Literature studies, selection and learning of systems, tools, methods and algorithms needed for the realization of the chosen subject of thesis. The preparation of an outline of work and schedule of future work. Basic work on the research, design and implementation. Familiarization with the research works carried out at the Institute of Informatics. Final results: the initial solution and / or the prototype of developed system, knowledge about the current state of art in the field of thesis, an outline of future work and timetable for further works documented in English and Polish languages.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED

N1. Literature study - analysis of publications (including websites) related to subject of thesis, including the research works of the Institute of Informatics.
N2. Own work, independent research on the tasks defined in the master's thesis
N3. Student consultation with the supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessment based on the final results achieved

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[279] Literature related to the scope of realized project selected by student and recommended by the teacher.

[280] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis I
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U03, K2INF_U08	C1	Pr1	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa II
Name in English MSc Thesis II
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005221
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				540	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points				18	
including number of ECTS points for practical (P) classes				18	
including number of ECTS points for direct teacher-student contact (BK) classes				6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 4th semester

\

SUBJECT OBJECTIVES

C1 Preparation of master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish language, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes – project		**Number of hours**
Proj 1	Subject is the main component of the process of realization the master thesis and involves the preparation by the student his master thesis. Master thesis is done under the direction of his supervisor, with whom student defines its scope, goals, tasks and timetable for implementation.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED

N1. Preparation of master thesis N2. The text of the master thesis N3. Thesis review prepared by the supervisor N4. Students consultation with supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of master thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessed is the final text of the diploma thesis. The assessment is carried out in the form of a review done by the promoter. The condition to pass the course is delivering the final text of master thesis before the defined deadline. The second review, which does not, however the condition for pass the course is done by the reviewer appointed by the Faculty Dean. Reviews are made according to the standard format. The student is admitted to the defense (final exam) if both reviews are positive

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[281] Literature related to the scope of realized project selected by student and recommended by the teacher.

[282] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis II
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K1INF_U03, K2INF_U08	C1	Proj1	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Seminarium dyplomowe
Name in English Diploma seminar
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005220
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					90
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points					2
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes					1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge, skills and competences acquired at Informatics field at second level of study until 3th semester

\

SUBJECT OBJECTIVES

C1 Preparing students to write a master thesis according the internal requirements in Informatics field at Faculty of Computer Science and Management, Wrocław University of Technology,

C2 Providing students with basic skills related to preparation and presentation of scientific texts, beginning from the choice of topic, selection of tasks to be performed, use of literature to interpretation of the results.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He is able to acquire information from literature, databases and other sources, also in English or other language used for communication in Informatics field, is able to integrate the information obtained, interpret them, make critical evaluation and also draw conclusions and formulate and justify opinions related to prepared master thesis.

PEK_U02 He can communicate using a variety of techniques in his professional environment and in other environments, also in English or other foreign language used for communication in Informatics field and also to present the results of his master thesis

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
	Total hours	

Form of classes - seminar	**Number of hours**

Sem 1	Familiarization with the principles of master thesis realization at Informatics field. Rules related to student presentations. Determining the schedule of student presentations.	2
Sem 2	Review of basic skills related to preparation and presentation of scientific texts by students, beginning from the choice of topic, selection of tasks to be performed, use of literature and also how to write thesis and how obtained results should be interpret.	2
Sem 3 – Sem15	During semester each student has 2 presentations. The first presentation is related to the general view of the thesis topic, its placement in the literature and in the Informatics field. The student should present the primary aim of thesis, the state of art related to thesis topic, the concept of solution, the initial structure of thesis and timetable for further work. The purpose of the second presentation is preparation to defense and demonstrate presentation skills in English. The second presentation consists of two parts, namely, discussion of the results of the work in English and a short presentation in Polish devoted to the results of the thesis.	26
	Total hours	30

TEACHING TOOLS USED

N1. Multimedia presentations
N2. Examples of scientific papers and reports from the field of computer science.
N3. E-Learning System used to publish teaching materials and announcements, also used for collection and evaluation of student work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01 PEK_U02	Evaluation of the presentation of the work at the seminar and prepared documentation from the presentation. The evaluation shall be subject to the fulfillment of the requirements for the presentation, including its substantive scope, structure and organization of presentation, techniques of conversation, a form of presentation, compactness of presentation and conclusions reached. Participation in the discussions after presentation is also evaluated. In addition, the seminar leader is able to control the cooperation between supervisors and graduate students.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[283] Literature related to the scope of realized project selected by student and recommended by the teacher.

[284] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. inż. Leszek Borzemski, prof. PWr, leszek.borzemski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Diploma seminar
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
AND SPECIALIZATION **every specjalization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3
PEK_U02	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Sterowanie systemami komputerowymi
Name in English Control of Computer Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable):
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time~~*
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code INZ3831
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			15	
Number of hours of total student workload (CNPS)	60			60	
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2			2	
including number of ECTS points for practical (P) classes	0			2	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2			1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. A basic knowledge of decision support systems.
2. A basic knowledge of information and telecommunication theory and engineering.

\

SUBJECT OBJECTIVES

C1 Acquisition of knowledge on the following control issues in computer systems: traffic control in computer networks, task and resource allocation, task scheduling and application of nondeterministic descriptions and artificial intelligence for selected control problems in computer networks.
C2 Developing skills in implementation of control algorithms and performing systems analysis.
C3 Acquisition of skills related to project development and presentation.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 A student has knowledge in an area of control systems.
PEK_W02 A student knows analysis methodology and methodology of designing control algorithms in computer systems.
PEK_W03 A student knows selected methods of control under uncertainty.
relating to skills:
PEK_U01 A student has an ability of the formulation of selected control problems in computer systems.
PEK_U02 A student is able to design the control algorithm for selected computer systems.
PEK_U03 A student is able to analyse the properties of control systems.

relating to social competences:
PEK_K01 A student is able to independent search for information about the object, and subject information to critical analysis.
PEK_K02 A student is able to think in a creative way.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction to the basic problems of control in computer systems.	2
Lec 2	Computer system as a control object and an executor of control algorithm.	2
Lec 3	Computer system as a control system – properties and requirements.	2
Lec 4	An operating system as a complex executor of control algorithms.	2
Lec 5	Basic issues of the traffic control in computer networks (congestion control, admission control, routing, rate control).	2
Lec 6	Flow control in computer networks.	2
Lec 7	Congestion control.	2
Lec 8	Routing in computer networks.	2
Lec 9	Task allocation in computer systems.	2
Lec 10	Resource allocation in computer systems.	2
Lec	Task scheduling in computer systems.	2

11		
Lec 12	Application of nondeterministic descriptions for selected control problems in computer systems.	4
Lec 13	Selected problems related to control of complex and distributed systems.	2
Lec 14	Final test.	2
	Total hours	30

Form of classes - project		**Number of hours**
Proj 1	Formulation of the design task.	2
Proj 2	Analysis of assumptions, objectives, requirements and restrictions.	2
Proj 3	The development of alternative solutions, choice of solution that fulfills the criterion.	3
Proj 4	The elaboration of the system structure.	2
Proj 5	Analysis of the way of implementation.	3
Proj 6	Conclusions and preparation of a written report.	3
	Total hours	15

TEACHING TOOLS USED

N1. Traditional lecture.
N2. Sample case study.
N3. Consultations.
N4. Conversations with an individual student.
N5. Test.
N6. Students' individual work.
N7. Multimedia presentation.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F	PEK_U01-PEK_U03 PEK_K01-PEK_K02	Individual consultations.
P (lecture)	PEK_W01-PEK_W03 PEK_K01	Test
P (project)	PEK_U01-PEK_U03 PEK_K01-PEK_K02	Evaluation of the written report and multimedia presentation.
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Bubnicki Z. Modern Control Theory, Springer 2005.

SECONDARY LITERATURE:

[1] Bubnicki Z., Analysis and Decision Making in Uncertain Systems, Springer 2004.
[2] Bubnicki Z., Uncertain Logics, Variables and Systems, Springer 2002.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr. Magdalena Turowska (Magdalena.Turowska@pwr.wroc.pl)

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Control of Computer Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Decision Support Systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2_INF_W06_S2_SWD_W05	C1	Lec1, Lec2	N1 - N5
PEK_W02	K2_INF_W06_S2_SWD_W05	C1	Lec3-Lec11, Lec13	N1 - N5
PEK_W03	K2_INF_W06_S2_SWD_W05	C1	Lec12, Lec13	N1 - N5
PEK_U01 (skills)	K2_INF_W06_S2_SWD_U05	C2, C3	Lec5-Lec15 Proj1, Proj2	N3, N4, N6
PEK_U02	K2_INF_W06_S2_SWD_U05	C2, C3	Proj3 – Proj5	N3, N4, N6
PEK_U03	K2_INF_W06_S2_SWD_U05	C2, C3	Lec3, Proj2, Proj3, Proj6	N3 – N7
PEK_K01 (competences)	K2_INF_K01	C2, C3	Lec1 – Lec14 Proj1 – Proj6	N1 - N7
PEK_K02	K2_INF_K01	C2, C3	Proj1 – Proj6	N2 - N7

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT…

SUBJECT CARD

Name in Polish Systemy informacyjne
Name in English Information systems
Main field of study (if applicable): Informatics
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code INZ3762
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				30
Number of hours of total student workload (CNPS)	60				60
Form of crediting	crediting with grade	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	crediting with grade
For group of courses mark (X) final course					

Number of ECTS points	2				2
including number of ECTS points for practical (P) classes	0				0
including number of ECTS points for direct teacher-student contact (BK) classes	1,2				1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic mathematical knowledge for 1st level of studies.
2. Informatics knowledge background.
3. Algorithms knowledge background.

\

SUBJECT OBJECTIVES

C1 Acquiring knowledge about functions and significance of information systems in contemporary organizations
C2 Acquainting with the functions and development of information systems in information society
C3 Acquainting with the different methods of information retrieval by surfing the Web
C4 Recognizing the problems of passing of contemporary organizations to Internet space
C5 Obtainment of skills to analyze the literature from information systems area and to synthesize the contents from different sources
C6 Application of the obtained knowledge to presentation the problems from information systems area by means of using adequate tools

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Familiarity with basic models of information systems
PEK_W02 Basic knowledge about Web information systems
PEK_W03 Familiarity with common multimedia technologies
PEK_W04 Understanding of the measures of information retrieval efficiency

relating to skills:
PEK_U01 Student can to build information query for different types of information needs
PEK_U02 Can to determine basic features of information system for given organization
PEK_U03Student be able to evaluate the precision of retrieved information
PEK_U04 Can to present basic features of given information system

relating to social competences:
PEK_K01 Can individually to use literature of the subject and to select useful information
PEK_K02 Student is convinced above positive role of information systems in stimulation of the civilization development

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	History of information systems development. Information processing. Theoretical basis of information systems.	2
Lec 2	Main information systems' models. Automation of information flow in organization.	2
Lec 3	Information retrieval on Internet – fundamentals.	2

Lec 4	Web information systems.	2
Lec 5	Multimedia. Importance of multimedia technologies in information systems development.	2
Lec 6	How societies embrace information technology. Digital libraries.	2
Lec 7	Efficiency of information systems. Case study of chosen information system.	2
Lec 8	Test	1
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1	Introductory seminar.	2
Sem 2	Information systems – definitions, types, features, examples.	2
Sem 3	Information retrieval fundamentals – models, dictionaries, indexes.	2
Sem 4	Evaluation of information systems' efficiency.	2
Sem 5	Analytical retrieval of information.	2
Sem 6	Information retrieval on Internet.	2

Sem 7	ERP class systems.	2
Sem 8	Mobile information systems.	2
Sem 9	Multimedia information systems.	2
Sem 10	Information systems for teleworking.	2
Sem 11	How societies embrace information technology.	2
Sem 12	CRM systems.	2
Sem 13	Knowledge management systems.	2
Sem 14	Information society: e-business, e-administration, e-commerce, e-health	2
Sem 15	Seminar summation and credit.	2
	Total hours	30

TEACHING TOOLS USED

N1. Computerized presentation at the lectures.
N2. Presentation with visualization and using Internet resources during the seminar.
N3. Consultations.
N4. Students' homework with using software packages.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 PEK_U04 PEK_K02	Grade of presentation (quality of slides, oral presentation, relevance, duration), presence and activity.
F2	PEK_K01	Report's grade
P-seminar	PEK_U02	Grade result from F1 and F2
P-lecture	PEK_W01-PEKW04 PEK_U03	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Manning C. D., Raghavan P., Schutze H.: *Introduction to Information Retrieval*, Cambridge University Press, New York, 2009, dostępne także bezpłatnie: www.cambridge.org

[2] Kłopotek M. A.: *Inteligentne wyszukiwarki internetowe* , Akademicka Oficyna Wydawnicza EXIT, Warszawa, 2001.

[3] Wrycza S. (red.): *Informatyka ekonomiczna. Podręcznik akademicki*, PWE, Warszawa, 2010.

[4] Cortada J. W. : How Societies Embrace Information Technology, WILEY-IEEE, NY, 2009.

[5] Baeza-Yates R., Ribeiro-Neto B.: *Modern Information Retrieval*, ACM Press, Adison-Wesley, New York, 1999.

SECONDARY LITERATURE:

[1] Zgrzywa A., Choroś K., Siemiński A.(Eds.): *Multimedia and Internet Systems: Theory and Practice,* Spriger Verlag, Berlin, 2013.

[2] Nguyen N.T., Zgrzywa A., Czyżewski A.(Eds.): *Advances in Multimedia and Network Information System Technology,* Spriger Verlag, Berlin, 2010.

[3] Zawiła-Niedźwiecki J. : *Informatyka gospodarcza*, Wyd. C. H. Beck, 2010.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Aleksander Zgrzywa, Aleksander.Zgrzywa@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INFW03, K2INF_W06	C1	Lec1, Lec 6 Sem 2,Sem 14	N1-4
PEK_W02	K2INF_W04, K2INF_W06	C3,C4	Lec 3, Lec 4 Sem 6,Sem 7, Sem 11	N1-4
PEK_W03	K2INF_W02, K2INF_W06	C2	Lec 5, Lec 6 Sem 13,Sem 14	N1-4
PEK_W04	K2INF_W03	C3	Lec 3, Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U01	K2INF_U01, K2INF_U08	C3	Lec 3,Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U02	K2INF_U05, K2INF_U08	C4	Lec 2,Lec 7 Sem 7,Sem 8,Sem 12,Sem 13	N1-4
PEK_U03	K2INF_U05, K2INF_U08	C3	Lec 2, Lec 5 Sem 3, Sem 5, Se6,Se9	N1-4
PEK_U04	K2INF_U02, K2INF_U03	C5, C6	Lec 5, Lec 6 Sem 3, Sem 5, Sem 6, Sem 9, Sem 10	N1-4

PEK_K01	K2INF_K01, K2INF_U02	C5	Lec 5, Lec 6 Sem 9, Sem 10	N1-4
PEK_K02	K2INF_K02	C1	Lec 1, Lec 6 Sem 2, Sem 14	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: Systemy wspomagania decyzji
Name in English: Decision Support Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Decision Support Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / university-wide*
Subject code: INZ003761
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	15		15	
Number of hours of total student workload (CNPS)	60	30		60	
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / ~~crediting with grade~~*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2	1		2	
including number of ECTS points for practical (P) classes				2	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	0,6		1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None.

\

SUBJECT OBJECTIVES

C1 Getting to know foundations of designing computer science decision support systems using general systemic methods which make it possible to apply unified approaches for analysis and decision making for decision support systems of different nature.
C2 Acquisition of skills to represent in the form of mathematical formulas of decision making plants treated as input-output plants.
C3 Acquisition of skills to analyze of decision making plants treated as input-output plants.
C4 Getting acquainted with methods and algorithms of multi-stage decision making.
C5 Acquisition of skills to apply dynamic programming method.
C6 Getting to know metods and algorithms of multi-criteria decision making.
C7 Acquisition of skills to use AHP method.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Student knows foundations of designing of decision support systems for any kind of plants.
PEK_W02 Student knows foundations of analysis and decision making for input-output plants with logic knowledge representation.
PEK_W03 Student knows selected method of multi-stage and multi-criteria decision making.
relating to skills:
PEK_U01 Student is able to elaborate a mathematical model for an input-output decision making plant in discrete state space as well as with logic knowledge representation.
PEK_U02 Student can solve analysis and decision making tasks for elementary plants with logic knowledge representation.
PEK_U03 Student is able to solve multi-stage decision making problem using Bellman's Principle and dynamic programming.
PEK_U04 Student can use AHP algorithm for the solution od multi-criteria decision making problem
relating to social competences:
PEK_K01 Student can take advantage of professional literature by oneself and can perform the critical analysis of information mined.
PEK_K02 Student can think creatively.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Decision support systems – definitions, structures, problems.	1
Lec 2	Application of discrete state equations and logic expressions for representation of decision making plants.	2
Lec 3	Analysis of decision making plants, in particular logic-algebraic method.	2
Lec 4	Decision making – definition, typology, logic-algebraic plant.	2
Lec 5	Bellman's Principle and multi-stage decision making.	3
Lec 6	Multi-criteria decision making, Pareto sets, AHP method.	3
Lec 7	Examples of computer decision support systems.	2
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Solution of numerical exercises concerning difference equations.	1
Cl 2	Solution of numerical exercises concerning differential equations as well as propositional calculus.	2

Cl 3	Solution of numerical exercises concerning mathematical representations of input-output plants.	2
Cl 4	Solution of numerical exercises concerning analysis using logic-algebraic method.	2
Cl 5	Solution of numerical exercises concerning decision making using logic-algebraic method.	2
Cl 6	Solution of numerical exercises concerning dynamic programming.	2
Cl 7	Solution of numerical exercises concerning AHP method.	2
Cl 8	Final test.	2
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Collecting of indispensable information about selected plant being the decision making plant.	2
Proj 2	Determination of mathematical model of selected decision making plant and decision making problem formulation.	2
Proj 3	Analysis of decision making plant using its mathematical model.	2
Proj 4	Choice of decision making method for further usage as well as elaboration of decision making algorithm.	3
Proj 5	Implementation and alalysis of decision making algorithm.	4
Proj 6	Elaboration of conclusions and written report of the project performed.	2
	Total hours	15

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1 Lecture – traditional method. N2 Classes – traditional method. N3 Consultation. N4 Individual discussion with student. N5 Short test (10 mins.). N6 Self-contained work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Short tests during the classes.
F2	PEK_K01– PEK_K02	Individual discussion with student during the project.
P (Classes)	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Test.
P (Project)	PEK_U01–PEK_U04; PEK_K01–PEK_K02	Evaluation of written report of the project.
P (Lecture)	PEK_W01–PEK_W03; PEK_K02	Exam.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[285] [1] Józefczyk J., Wybrane problemy podejmowania decyzji w kompleksach operacji, Oficyna Wydawnicza PWr, Wrocław 2001.

[286] Bubnicki Z., Podstawy informatycznych systemów zarządzania, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1993.

[287] Roy B., Wielokryterialne podejmowanie decyzji, WNT, Warszawa 1990.

SECONDARY LITERATURE:

[1] Techniki informacyjne w badaniach systemowych, P. Kulczycki, O. Hryniewicz, J. Kacprzyk (red.), WNT, Warszawa 2007.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Jerzy Józefczyk, Jerzy.Jozefczyk@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Decision Support systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Decision Support systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1	Lec1, Lec 2, Lec 7, Cl1, Cl 2, Pr1	N1, N3, N6
PEK_W02	K2INF_W02	C1	Lec3, Lec4	N1, N3, N6
PEK_W03	K2INF_W02	C4, C6	Lec5, Lec6	N1, N3, N6
PEK_U01 (skills)	K2INF_U05; K2INF_U06	C2	Lec2, Cl 3, Proj2	N2–N6
PEK_U02	K2INF_U05; K2INF_U06	C3	Cl 4, Cl 5, Proj3, Pro4	N2–N6
PEK_U03	K2INF_U05; K2INF_U06	C5	Cl 6, Proj4	N2–N6
PEK_U04	K2INF_U05; K2INF_U06	C7	Cl 7, Proj4	N2–N6
PEK_K01 (competences)	K2INF_K01	C1, C4, C6	Lec1– Lec7, Proj1, Proj4	N2–N6
PEK_K02	K2INF_K01	C1–C7	Proj1–Proj6	N2–N6

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: Teoria i inżynieria ruchu teleinformatycznego

Name in English: Theory and engineering of teletraffic

Main field of study (if applicable): Computer science

Specialization (if applicable): Teleinformatics

Level and form of studies: 2nd level, full-time

Kind of subject: obligatory

Subject code INZ3759

Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload	30			90	

(CNPS)					
Form of crediting	Crediting with grade			Crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	1			3	
including number of ECTS points for practical (P) classes				3	
including number of ECTS points for direct teacher-student contact (BK) classes	0,6			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

49. Has a basic knowledge of ICT systems and computer communication networks (K1INF_W11).
50. Knows the basic methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_W16)
51. Can use the right tools to build a simple model of the process (the object), to formulate specific task analysis and decision making (K1INF_U15)
52. Can effectively use the methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_U16)
53. It has the ability to self-education, including in order to improve the professional competence (K1INF_U05)
54. Understands the need and knows the possibility of lifelong learning and to improve their professional and social competences (K1INF_K01)

SUBJECT OBJECTIVES

C1. Ordered, underpinned by theoretical knowledge of methods and techniques for transmitting signals using different modulation techniques, methods and techniques of information transmission, methods of organization and management of data communications traffic in the tasks of design and analysis of communication systems, methods of delivering service quality of ICT systems, analysis of quantitative and qualitative requirements and methods for sizing of distributed IT systems.

C2. Skills about the differences and benefits of the use of analog and digital data transmission techniques, the differences and benefits of the use of wired and wireless signal transmission techniques, developing the concept of using wired and wireless technologies in the basic applications of ICT systems, defining the qualitative and quantitative requirements of the user information and communication systems range of data, designing ICT solutions needed to achieve the qualitative and quantitative requirements of the user, using standards and solutions available on the market, estimating the cost of preparing and maintaining ICT solutions needed to achieve the qualitative and quantitative requirements, designing modernization of IT solutions needed to achieve the qualitative and quantitative requirements, identifying differences and similarities between solutions in a variety of applications (e-health, e-government and e-learning, in real-time systems, etc.).

C3. Skills for the design and analysis of complex, distributed ICT systems providing network services for distributed computer communication systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

K2INF_W02: Has a structured, theoretically founded essential knowledge of business modeling and requirements specification systems.

K2INF_W03: Has a structured, theoretically founded essential knowledge in the delivery of information distributed systems

K2INF_W06: Achieves results in the category of knowledge for specialty data communications

relating to skills:

K2INF_U05: Can - in formulating and solving engineering tasks - integrate knowledge of the fields of science and scientific disciplines relevant to the study being studied and applied a systemic approach, taking into account the non-technical aspects

K2INF_U06: Can solve the modeling, analysis and decision making for different types of objects

K2INF_U08: Achieves results and skills in areas of data exchange and computer communications systems

relating to social competences:

K2INF_K01: Can think and act in a creative and enterprising

K2INF_K02: Has aware of the social role of technical graduating, especially understands the need for the formulation and communication to the public, especially through the mass media, information and opinion on the achievements of technology and other aspects of engineering, shall endeavor to provide such information and opinions in a widely understood the reasons for the different points of view

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Classification of ICT systems from different points of view. Quality of Experience (QoE) and Quality of Service (QoS) in ICT systems with elastic and streaming traffic.	2
Lec 2	Introduction to queuing. Open and close networks of queues.	2
Lec 3	Queuing models of circuit-switched and packet-switched computer communication systems. Burke's theorem and Kleinrock approximation.	2
Lec 4	Access control, flow control and routing tasks formulation and solution in distributed environments.	2
Lec 5	Requirements analysis	1
Lec 6	Models (Poisson, Markov modulated, self-similarity, etc) of teletraffic and its application in traffic engineering tasks.	2
Lec 7	QoS delivery concepts: best effort, integrated services and differentiated services	2
Lec 8	New concepts of systems and networks - NXGN (Next Generation Networks) i NWGN (New Generation Network). Summary.	2
	Total hours	15

PROGRAMME CONTENT

Form of classes - project		Number of hours
Proj 1	Formulation design task based on the analysis of the literature, documentation, etc.	2
Proj 2	Justification for the choice task and purpose of the task design - an analysis of the expected benefits of the project task.	2
Proj 3	Quantitative requirements analysis for the communication system under design	2
Proj 4	Qualitative requirements analysis for the communication system under design	2
Proj 5	Analysis of state of the art on how to solve the task design	2
Proj 6	Analysis and selection of the task design methodology	2
Proj 7	Tools (methods, algorithms, procedures, software and hardware) analysis and selection required for the implementation of the project task	2
Proj 8	Implementation of prototype of modules solve the task	2
Proj 9	Prototype testing and evaluation	2
Proj 10	Modification of solutions using prototype test results	2
Proj 11	Integration of modules distinguished at the stages of requirements analysis and prototyping	2
Proj 12	Verification and testing of an integrated solution design task	2
Proj 13	Analysis of the possibility of extending the project tasks	2
Proj 14	Preparation of the presentation and documentation of the design task	2
Proj 15	Presentation of the results of the design task	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture supported by whole class multimedia presentations based on literature and open access and commercial sources.
N2. Student's own works – solving experiments and tasks in laboratory as well as homework.
N3. Student's own works – literature and open access sources studies.
N5. Collective works in laboratory
N5. Student's own works – preparation of presentations and technical documentations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05	Observation and verification of student activity. Solving the sample jobs.

	K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	
F1 – F15 (project)	K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and assessment of student autonomy.
P (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	Colloquium (course credit) in the evaluation of forming F1 (lecture)
P (project)	K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Total weighted ratings F1 - F15 (project) and the assessment for the presentation of the final results of the project.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[288] A.S. Tanenbaum, „Computer networks", Prentice Hall; 1996
[289] G. Pujolle, D. Seret, D. Dromard, E. Horlait, „Integrated Digital Communication Networks", J. Wiley & Sons
[290] B. Russell, „The art of computer networks", Prentice Hall; 2009
[291] V.S. Bagad, I.A. Dhotre, „Computer networks", Technical Publications, 2009.
[292] M. Roden, „Analog and digital communication systems", Prentice Hall
[293] http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

SECONDARY LITERATURE:

[86] S. Haykin, „Telecommunication systems", Prentice Hall, 1999.
[87] MIT Free Open Course Materials (http://ocw.mit.edu/index.htm)
[88] CCNA Exploration Network Fundamentals, Cisco Academy, PWN, 2008

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Adam Grzech, adam.grzech@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Theory and engineering of teletraffic

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer science

AND SPECIALIZATION
Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1, C2, C3	Lec 1 – Lec 8	N1, N4
PEK_W02	K2INF_W03	C1	Lec 1 – Lec 8	N1,N2, N4
PEK_W03	K2INF_W06	C1	Lec 1 – Lec 8	N1, N4
PEK_U01 (skills)	K2INF_U05	C1, C2, C3	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_U02	K2INF_U06	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_U03	K2INF_U08	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_K01 (competences)	K2INF_K01	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_K02	K2INF_K02	C1, C2	Lec 1 – Lec 8	N1, N2, N3, N4, N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Zaawansowane metody i techniki analizy danych
Name in English Advanced Methods and Techniques of Data Analysis
Main field of study (if applicable): computer science
Specialization (if applicable): …….
Level and form of studies: 2nd* level, full-time
Kind of subject: obligatory
Subject code INZ003758
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	crediting with grade*		crediting with grade*		

For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes	0		4		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of mathematics and mathematical statistics

\

SUBJECT OBJECTIVES

C1 Introduce the methods and techniques of the statistical data analysis to students
C2 Gather knowledge for Knowledge Discovery (Data Mining)
C3 Applying the gathered knowledge to drawing conclusions based on data analysis

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has a basic knowledge of Knowledge Discovery (Data Mining)
PEK_W02 student has a basic knowledge of statistical data analysis
PEK_W03 student is able to present differences between parametric and non-parametric tests

relating to skills:
PEK_U01 student is able to choose a proper statistical test
PEK_U02 student is able to draw conclusion from data analysis
PEK_U03 student is able to select a proper data mining method

relating to social competences:
PEK_K01 student is able to search and reuse the primary and secondary literature listed below and is able to gather the proper knowledge
PEK_K02 student understands the need for systematic and individual work in order to cover the scope of the course

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to knowledge discovery	2
Lec 2	Classification and Data Clustering	2
Lec 3	Clustering Algorithms	2
Lec 4	Discovering association rules	2
Lec 5	Statistics - basic notions	2
Lec 6	The selected problems of estimation theory	2
Lec 7	Introduction to verification of statistical hypothesis	2
Lec 8	Parametric tests for one population	2
Lec 9	Non-parametric tests for one population	2
Lec 10	Parametric tests for two populations	2
Lec 11	Non-parametric tests for two populations	2

Lec 12	Parametric tests for more than 2 populations	2
Lec 13	Non-parametric tests for more than 2 population	2
Lec 14	Correlation and regression methods	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Introduction to WEKA	2
Lab 2	Knowledge discovery in WEKA	8
Lab 3	Introduction to MATLAB	2
Lab 4	Statistical data analysis in MATLAB	8
Lab 5	Introduction to R	2
Lab 6	Statistical data analysis in R	8
	Total hours	30

Form of classes - project		**Number of**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Traditional lecture N2. Labs N3. One-to-one consultancy during stuff hours

N4. Student self-study

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P -laboratory	PEK_U01-PEK_U03, PEK_K01-PEK_K02	Evaluation of the prepared tasks during labs, oral test
P-lecture	PEK_W01-PEK_W03 PEK_K01-PEK_K02	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[294] M. Sobczyk: Statystyka, Wydawnictwo Naukowe PWN, 2007

[295] W.Krysicki, J.Bartos, W. Dyczka, K. Królikowska, M. Wasilewski: Statystyka, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, cz. 2 Statystyka matematyczna, Wydawnictwo Naukowe PWN, 2007

[296] Marek Walesiak, Eugeniusz Gatnar (Red. nauk.) :Statystyczna analiza danych z wykorzystaniem programu R, Wydawnictwo Naukowe PWN, 2009

[297] M. Korzyński: Metodyka eksperymentu Planowanie realizacja i statystyczne opracowanie wyników eksperymentów technologicznych, Wydawnictwo Naukowo-Techniczne 2006

[298] Nong Ye, : The Handbook of Data Mining, Lawrence Erlbaum Associates, Publishers, 2003

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Prof. dr hab. inż Ngoc Thanh Nguyen, Ngoc-Thanh.Nguyen@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Advanced Methods and Techniques of Data Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY computer science
AND SPECIALIZATION **……**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C2	Lec1-4 Lab1-2	N1-4
PEK_W02	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_W03	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_U01	K2INF_U01, K2INF_W06, K2INF_W08	C1	Lec5-14 Lab3-6	N1-4
PEK_U02	K2INF_U01, K2INF_W06, K2INF_W08	C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_U03	K2INF_U01, K2INF_W06, K2INF_W08	C2	Lec1-4 Lab1-2	N1-4
PEK_K01		C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_K02		C1, C2, C3	Lec1-14 Lab1-6	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: Bezpieczeństwo systemów

Name in English: Systems Security and Safety

Main field of study (if applicable): ……..
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time / ~~part-time~~*
Kind of subject: obligatory
Subject code INZ3807
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			30	
Number of hours of total student workload (CNPS)	120			30	
Form of crediting	Crediting with grade			Crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	4			1	
including number of ECTS points for practical (P) classes	0			1	
including number of ECTS points for direct teacher-student contact (BK) classes	2,4			0,6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of computer communication systems
2. Basic knowledge of applied cryptography

SUBJECT OBJECTIVES

C1 Skills and knowledge of security risk assessment and knowledge of the norms and methods used during security systems design.
C2 Skills of selecting strategy and technical solutions for appropriate security architecture design.
C3. Social competence and skills in organizational leadership, management and collaboration. Ability to work well in teams, self-motivate and understand conflict management. Understanding of organizational mission, governance and administrative systems. Understanding how to use decision making to support mission.

SUBJECT EDUCATIONAL EFFECTS
relating to knowledge:
PEK_W01Has a basic knowledge of data and information security management.
PEK_W02 Has a knowledge of mandatory norms and standards related to IT security
PEK_W03 Has a knowledge of risk management in IT systems
relating to skills:
PEK_U01Able to design security architecture for IT systems
PEK_U02 Able to recognize the security requirements of IT system
PEK_U03 Able to assess the risk level for IT system components
relating to social competences:
PEK_K01Unerstands the need of risk sources identification in IT systems
PEK_K02 Understands the role of security policy in achieving the required security level

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Introduction to systems security	2
Lec 2	Introduction to information security management	2
Lec 3	Norms, standards and recommendations	2
Lec 4	General and technical risk	2
Lec 5	Risk analysis and risk management strategies	2
Lec 6	Selected approaches and tools improving risk analysis	2
Lec 7	Three layered model: goals, strategy, policy	2
Lec 8	Security systems of institutions	2
Lec 9	High level risk analysis and recognizing the areas of special security demands.	2
Lec 10	Detailed IT systems risk analysis	2
Lec 11	Patterns of security requirements	2
Lec 12	Strategy of countermeasures selection	2
Lec 13	Methods of defining security architecture and protecting systems in accordance with the identified requirements	2
Lec 14	Information security policy	2
Lec 15	Final exam	2
	Total hours	

PROGRAMME CONTENT		
Form of classes - project		**Number of hours**
Pr 1	Introduction. The subjects and problems of project description	2
Pr 2	The goals and scope definition for project problems.	2
Pr 3	The overview of the subject literature	2
Pr 4	Methods, tools and algorithms selection and specification	2

Pr 5	The first mid-semester reports	2
Pr 6	Plan of experiments and evaluation of the project results	2
Pr 7	Project work documentation	2
Pr 8	Developer guideline	2
Pr 9	User guideline	2
Pr 10	The second mid-semester reports	2
Pr 11	Quantitative proprieties evaluation	2
Pr 12	Qualitative proprieties evaluation	2
Pr 13	The final evaluation of the project results	2
Pr 14	The idea for future work. The next steps to improve and extend product.	2
Pr 15	Project summary.	2
	Total hours	

TEACHING TOOLS USED
N1. Tradnitional and multimedia lectures N2. Sudent's own work – project preparation N3. Project – methods of security related project preparation N4. Tutorials N5. Student's own work – literature study

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01-PEK_W03, PEK_U01-PEK_U03, PEK_K01-PEK_K02,	Oral presentations and mid semestral reports of work progress
P PEK_W01- PEK_W02- Final test		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Ayyub, Bilal M., Vulnerability, Uncertainty, and Risk - Analysis, Modeling, and Management, 2011 American Society of Civil Engineers
[2] Narayan, V, Effective Maintenance Management - Risk and Reliability Strategies for Optimizing Performance, 2012 Industrial Pres
[3] Stallings W., Business data communications : infrastructure, networking and security

SECONDARY LITERATURE:

[1] Information Security and Risk Management in Context, https://www.coursera.org/course/inforiskman
[2] Building an Information Risk Management Toolkit, https://www.coursera.org/course/inforisk
[3] Designing and Executing Information Security Strategies, https://www.coursera.org/course/infosec

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Grzegorz Kołaczek, Grzegorz.Kolaczek@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Systems Security and Safety
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W04, K2INF_W06_S2TEL_W05	C1	Lec1,Lec2 Lec7,Lec8, Lec11-Lec13	N1,N4-N5
PEK_W02	K2INF_W06_S2TEL_W05	C1	Lec1-Lec3,Lec14	N1,N5
PEK_W03	K2INF_W06_S2TEL_W05	C1	Lec4- Lec6, Lec9, Lec10	N1,N5
PEK_U01 (skils)	K2INF_U08_S2TEL_U07	C2,C3	Lec13 ,Pr2-Pr14	N2-N4
PEK_U02	K2INF_U08_S2TEL_U04	C2,C3	Lec11-Lec12, Pr2-Pr14	N2-N4
PEK_U03	K2INF_U08_S2TEL_U03	C1,C2	Lec4-Lec6,Lec9,Lec10 Pr2-Pr14	N2-N4
PEK_K01 (comptences)	K2INF_U08_S2TEL_U07	C3	Lec4-Lec6,Lec9,Lec10, Pr2-Pr14	N1,N4,N5
PEK_K02	K2INF_U08_S2TEL_U07	C3	Lec1-Lec2,Lec14, Pr2-Pr14	N1,N4,N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: *Infrastruktura budynku inteligentnego*

Name in English: *Intelligent building infrastructure*

Main field of study (if applicable): Computer science
Specialization (if applicable): Teleinformatics

Level and form of studies: 2nd level, full-time / ~~part-time*~~
Kind of subject: obligatory
Subject code INZ3806
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			30	
Number of hours of total student workload (CNPS)	120			60	
Form of crediting	Crediting with grade			Crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	4			2	
including number of ECTS points for practical (P) classes	0			2	
including number of ECTS points for direct teacher-student contact (BK) classes	2,4			1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge and skills in the field of teleinformatics confirmed by positive grade fromcourse "Fundamentals of computer networks"
2. Basic knowledge and skills in the field of computer networks confirmed by positive grade from course "Computer networks"
3. Basic knowledge and skills in the field of computer control systems confirmed by positive grade from course "Computer control systems"

SUBJECT OBJECTIVES

C1 Knowledge of current trends in technology development and application of methods for the collection, storage, transmission, processing and presentation of information in integrated ICT systems and automation on an example of intelligent building infrastructure..

C2 Acquiring knowledge and skills in the design and integration of heterogeneous ICT systems and automation systems.

C3 Acquiring knowledge and skills in providing the required level of quality, safety and accessibility of services in heterogeneous ICT systems.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:

PEK_W01 – knows the current trends in technology development and application of methods for collecting, storing, transmitting, processing and presentation of information in integrated ICT systems and automation on an example of intelligent building infrastructure.

PEK_W02 – has knowledge of the design and integration of heterogeneous IT systems and automation systems.

PEK_W03 – has expertise in providing the required level of quality, safety and accessibility of services

in heterogeneous ICT systems.

Relating to skills:

PEK_U01 – has skills necessary to select proper architecture for the communication system in accordance with the non-functional requirements.

PEK_U02 – is able to select the technologies and techniques in the field of ICT and automation in order to ensure the required level of quality, safety and accessibility of services in a heterogeneous environment of intelligent building.

PEK_U03 – can design a computer system for the integration of subsystems in an intelligent building.

Relating to social competences:

PEK_K01 – has the ability to work in a team

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	The concept of the intelligent building	2
Lec 2	Energy management subsystem	2
Lec 3	Heating, ventilation and air-conditioning subsystems	2
Lec 4	Security and safety subsystems	2
Lec 5	Fire protection and other safety issues	2
Lec 6	Lighting management and sound system (teleconferencing system, closed-circuit television) subsystems	2
Lec 7	Control and monitoring - integration and management IB subsystems	2
Lec 8, Lec 9	Intelligent building ICT infrastructure	4
Lec 10	Data transmission protocols in an intelligent building	2
Lec 11	Exemplary infrastructure standards in an intelligent building	2
Lec 12	Methods for information and knowledge collection, processing and sharing in telemetry systems on the example of intelligent building	2
Lec 13	A case study - an exemplary implementation	2
Lec 14	Development trends in the integration of automation and ICT in the intelligent building domain	2
Lec 15	Test	2
	Total hours	**30**

PROGRAMME CONTENT		
Form of classes – project		**Number of hours**
Pr 1 - Pr 3	Design of two selected subsystems of intelligent building	6
Pr 4, Pr 5	Design of ICT infrastructure	4
Pr 6, Pr 7	Design of processes carried out in the examplary intelligent building, including the collection and processing of data, decision making, alarm, etc.	4
Pr 8	Design of testbed and test scenarios for the purpose of verifying the accuracy of the proposed solutions	2
Pr 9 – Pr 14	Implementation of intelligent building simulation and verification of the proposed solutions, including a quantitative analysis of the quality, safety and accessibility of services in an intelligent building.	12
Pr 15	Presentation of the project's results	2
	Total hours	**30**

TEACHING TOOLS USED
N1. Traditional lectures using multimedia presentations N2. Own work - preparation of the project N3. Group work in classes

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 - PEK_U03, PEK_K01	Evaluation of effects of the group project
F2	PEK_W01 - PEK_W03	Test
C=(F1+F2)/2		

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [299] NIEZABITOWSKA E. (red.), Budynek inteligentny. Potrzeby użytkownika a standard budynku inteligentnego, Wydawnictwo PŚl, Gliwice 2005. [300] WISZNIEWSKI A., SZAFRAN J., Algorytmy pomiarowe i decyzyjne cyfrowej automatyki elektroenergetycznej, WNT, Warszawa 2001 SECONDARY LITERATURE: [1] PEŁCZEWSKI W., Teoria Sterowania, WNT. Warszawa 1980.
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
Paweł Świątek, pawel.swiatek@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Intelligent building infrastructure
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer science
AND SPECIALIZATION

Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2TEL_W03	C1	Lec 1- Lec 15	N1
PEK_W02	K2INF_W06_S2TEL_W03	C2	Lec 8- Lec 15	N1
PEK_W03	K2INF_W06_S2TEL_W03	C3	Lec 8- Lec 15	N1
PEK_U01 (skills)	K2INF_W06_S2TEL_W03, K2INF_U08_S2TEL_U06	C2, C3	Pr 1- Pr 15	N2, N3
PEK_U02	K2INF_W06_S2TEL_W03, K2INF_U08_S2TEL_U06	C2, C3	Pr 1- Pr 15	N2, N3
PEK_U03	K2INF_W06_S2TEL_W03, K2INF_U08_S2TEL_U06	C2, C3	Pr 1- Pr 15	N2, N3
PEK_K01 (competence)	K2INF_W06_S2TEL_W03	C2	Pr 1- Pr 15	N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish Inteligentne systemy informacyjne – usługi i zastosowania
Name in English Intelligent information systems – services and applications
Main field of study (if applicable): Information technology
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code INZ3832
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar

Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	120		60		
Form of crediting	Crediting with grade		Crediting with grade		
For group of courses mark (X) final course					
Number of ECTS points	4		2		
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	2,4		1,2		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

55. K1INF_W11
56. K1INF_W16
57. K1INF_U16
58. K1INF_U05
59. K1INF_K01

\

SUBJECT OBJECTIVES

C1. Gaining knowledge about standards for Web knowledge representation

C2. Gaining knowledge about Web knowledge representation languages

C3. Gaining knowledge about methodologies of service systems development

C4. Gaining knowledge about quality standards and evaluation in service systems

C5. Gaining knowledge about service systems management

C6. Gaining practical knowledge and competencies about developing and management of service systems

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

K2INF_W06_S2TEL_W04

K2INF_W03

K2INF_W04

K2INF_W06

relating to skills:

K2INF_U05

K2INF_U06

K2INF_U08

relating to social competences:

K2INF_K02

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	World Wide Web Consortium data and matadata representation standards	2
Lec 2	Domain ontologies	2
Lec 3	Semantic Web	2
Lec 4	Semantic Web – application scenarios	2
Lec 5	Inteligent service systems	2
Lec 6	Web data and metadata standards applied to service description	2
Lec 7	Requirements analysis in service systems	2
Lec 8	Service composition	2
Lec 9	Quality and security of composite services	2
Lec 10	Composite services and service applications	2
Lec 11	Designing of complex service systems	2
Lec 12	User activity analysis and data mining in service systems	2
Lec 13	Networks of services, social user models for service systems	2
Lec 14	Resource prediction problem in service systems	2
Lec 15	Evolution and future trends in service systems	2
	Total hours	30

Form of classes - laboratory		**Number of hours**
La1	Introduction. Security in lab. Software configuration.	2
La2	Ontology development – software tools.	2

La3	Languages – XML, RDF, OWL	2
La4	Development of sample ontology	2
La5	Axioms and rules in ontologies	2
La6	Exemplery domain ontology	2
La7	Web services	2
La8	Web services – description using domain ontology	2
La9	Composite Web services – description using domain ontology	2
La10	Service management software	2
La11	Composite services – quality requirements	2
La12	Web service composition	2
La13	Testing of Web services	2
La14	Service composition with optimalization	2
La15	Monitoring and data processing in service systems	2
	Total hours	30

TEACHING TOOLS USED
N1. Lectures with multimedia presentations. N2. Literature studies – student's work N3. Implementation and analysis of lab tasks N4. Preparation of documentation and evaluation reports for lab tasks

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 (lecture)	K2INF_W06_S2TEL_W04 K2INF_W03 K2INF_W04	Evaluation of student activity and his ability to solve illustratory tasks and problems.

	K2INF_U05 K2INF_U08 K2INF_K02	
F1 – F15 (lab)	K2INF_W06_S2TEL_W04 K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K02	Evaluation of student preparedness, presence, activity, and completedness of presented solutions. Evaluation of the lab reports.
P (lab)	K2INF_W06_S2TEL_W04 K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K02	Weighted sum of F1 – F15
P (lecture)	K2INF_W06_S2TEL_W04 K2INF_W03 K2INF_W04 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K02	Exam, taking into account the F1
PRIMARY AND SECONDARY LITERATURE		

PRIMARY LITERATURE:

[1] Staab, S., Domingos, P., Mika, P., Golbeck, J., Ding, L., Finin, T., Joshi, A., Nowak, A. and Vallacher, R.R. (2005) 'Social networks applied', IEEE Intelligent Systems, Vol. 20, No. 1, pp.80–93.

[2] Hendler, J.A. (2001) 'Agents and the semantic web', IEEE Intelligent Systems, Vol. 16, No. 2, pp.30–37.

[3] Jiang, G., Cybenko, G. and Hendler, J. (2003) 'Semantic depth and markup complexity', Proceedings of the IEEE International Conference on Systems, Man and Cybernetics, Washington DC, USA, Vol. 3, pp.2138–2143.

[4] Mika, P. (2005) 'Ontologies are us: a unified model of social networks and semantics', in Gil, Y.,Motta, E., Benjamins, V.R. and Musen, M.A. (Eds.): Proceedings of the 4th International Semantic Web Conference (ISWC 2005), Lecture Notes in Computer Science, Springer, Galway, Ireland, Vol. 3729, 6–10 November, pp.522–536.

SECONDARY LITERATURE:

[1] Alani, H., Dasmahapatra, S., O'Hara, K. and Shadbolt, N. (2003) 'Identifying communities of practice through ontology network analysis', IEEE Intelligent Systems, Vol. 18, No. 2, pp.18–25.

[2] Bailin, S.C. and Truszkowski, W. (2001) 'Ontology negotiation between agents supporting intelligent information management', in Cranefield, S., Finin, T. and Willmott, S. (Eds.): Proceedings of the Workshop on Ontologies in Agent Systems, CEUR Workshop Proceedings, Montreal, Canada, Vol. 52, pp.13–20.

[3] Euzenat, J. and Valtchev, P. (2004) 'Similarity-based ontology alignment in OWL-Lite', in de Mántaras, R.L. and Saitta, L. (Eds.): Proceedings of the 16th European Conference on Artificial Intelligence (ECAI 2004), IOS Press, Valencia, Spain, 22–27 August, pp.333–337.

[4] Harary, F. (1994) Graph Theory, Addison-Wesley, Reading, MA.

[5] Jung, J.J. (2005) 'Collaborative web browsing based on semantic extraction of user interests with bookmarks', Journal of Universal Computer Science, Vol. 11, No. 2, pp.213–228.

[6] Kleinberg, J.M. (2001) 'Small-world phenomena and the dynamics of information', in Dietterich, T.G., Becker, S. and Ghahramani, Z. (Eds.): Advances in Neural Information Processing Systems 14, Neural Information Processing Systems: Natural and Synthetic,

[7] NIPS 2001, Vancouver, British Columbia, Canada, MIT Press, 3–8 December, pp.431–438.

[8] Nguyen, N.T. (2006) 'Conflicts of ontologies – classification and consensus-based methodsfor resolving', in Khosla, R., Howlett, R.J. and Jain, L.C. (Eds.): Proceedings of the 9th International Conference on Knowledge-Based Intelligent Information and Engineering Systems, Lecture Notes in Computer Science, Springer, Bournemouth, UK, Vol. 3682, pp.520–526.

[9] Sabidussi, G. (1966) 'The centrality index of a graph', Psychometirka, Vol. 31, pp.581–603.

[10] Shimbel, A. (1953) 'Structural parameters of communication networks', Bulletin of Mathematical Biophysics, Vol. 15, pp.501–507.

[11] Silva, N., Maio, P. and Rocha, J. (2005) 'An approach to ontology mapping negotiation',in Ashpole, B., Ehrig, M., Euzenat, J. and Stuckenschmidt, H. (Eds.): Proceedings of theK-CAP 2005 Workshop on Integrating Ontologies, CEUR Workshop Proceedings, Banff,Alberta, Canada, Vol. 156, pp.73–78.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Krzysztof Juszczyszyn, PhD, krzysztof.juszczyszyn@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Intelligent information systems – services and applications
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W06_S2TEL_W04	C1-C5	Lec1-Lec15 La1 – La15	N1-N4
PEK_W02	K2INF_W03	C1-C5	Lec1-Lec15 La1 – La15	N1-N3
PEK_W02	K2INF_W04	C1-C6	Lec1-Lec15 La1 – La15	N1-N3
PEK_W02	K2INF_W06	C1-C6	La1 – La15	N1-N4
PEK_U01	K2INF_U05	C1-C6	Lec1-Lec15 La1 – La15	N1-N3
PEK_U02	K2INF_U06	C1-C5	Lec1-Lec15 La1 – La15	N1-N3
PEK_U02	K2INF_U08	C1-C6	Lec1-Lec15 La1 – La15	N1-N3
PEK_K01	K2INF_K02	C1-C5	Lec1-Lec15 La1 – La15	N1-N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Metodologia badań naukowych
Name in English Methodology of empirical sciences…….
Main field of study (if applicable): Informatics…….
Specialization (if applicable): …….

Level and form of studies: 2nd* level, full-time /
Kind of subject: obligatory /
Subject code INZ003763…….
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	0	0	0	0
Number of hours of total student workload (CNPS)	90	0	0	0	0
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3				
including number of ECTS points for practical (P) classes	0				
including number of ECTS points for direct teacher-student contact (BK) classes	1,8				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Competence in basic algebra
2. Competence in mathematical analysis
3. Differential equations

\

SUBJECT OBJECTIVES

C1 Knowledge on the methodological postulates
C2Competence in mathematical modeling on the base of methodology of empirical sciences
C3Competence in hypothesis testing
C4Competence in creation of homogeneous and invariant in relation to the system of units models

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01Knowledge on methodological postulates
PEK_W02Logical postulates of mathematical models construction (invariance and homogeneity)
PEK_WOO3Logical base of hypothesis testing

…
relating to skills:
PEK_U01Competence in mathematical modeling with accordance to methodological postulates
PEK_U02Competence in hypothesis and empirical models testing
…
relating to social competences:
PEK_K01Competence in the exactness of process description
PEK_K02Competence on ability of studying and reflection on experiment

PROGRAMME CONTENT		
Form of classes - lecture		**Number of**
Lec 1Methods of scientific and technical project validation on the base of citation analysis	2	
Lec 2Methodological postulates of determinism, closed system, interconnectedness, simplicity and Popper's condition of falsification	2	
Lec 3Classical theory of measurements and the postulate of uniquenes	2	
Lec 4Dimensionally invariant description of a process, dimensional space	2	
Lec 5Theorem Pi of dimensional analysis and examples of its applications	2	
Lec 6Applications of theorem Pi in: models construction, experiment planning, identification Lec 7Theory of similarity Lec 8Invariance of models in relation to rotations group, tensors homogeneity Lec 9 Models testing and falsification of hypothesis Lec 10Identification of mathematical models Lec 11Multistage identification, models interpretability Lec 12Description of models construction Lec 13Models testing	2 2 2 2 2 2 2 2 2 2	
	Total hours26	Plus 2 colloqiums

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
...		
	Total hours	

Form of classes - project	**Number of h o**

		urs
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1.Literature N2.Examples analysis N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1P-1colloquium evaluation	WO1,WO2	Evaluation of students work
F2P-2colloquium evaluation	UO1,UO2	Evaluation of examples solving
F3		
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J.M. Bochenski The methods of contemporary thought. Harper Torchbooks, NY,1968
[2] W.Kasprzak, B. Lysik, M.Rybaczuk Measurements, Dimensions, Invariant Models and Fractals Spolom Wroclaw Lviv 2004
[3]
[4]

SECONDARY LITERATURE:

[1] K. R. Popper The logic of Scientific Discovery. Hutchinson Publ. Comp. 1959
[2]
[3]

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Waclaw Kasprzak waclaw.kasprzak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Methodology of empirical sciences……
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_WO1	Methodology basis	K1,K2,K3	N1,N2,P1
PEK_W02	K2INF_WO6	Models testing	K4,K13	P1
…				
…				
PEK_U01 (skills)	K2INF_UO6	Construction of models	K5,K6,K7	N1,N2,P2
PEK_U02	K2INF_UO8	Hyothesis testing	K8,K13	N1,N2,P2
…				
PEK_K01 (competences)	K_2SWD_KO1		K2	N1,N2
PEK_K02	K2_SWD_KO2		K13	N1,N2,P2
…				

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT/ DEPARTMENT OF COMPUTER SCIENCE

SUBJECT CARD

Name in Polish Metody integracji wiedzy
Name in English The Methods for Knowledge Integration
Main field of study (if applicable): Computer Science
Specialization (if applicable): Information and Communications Technology
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code INZ3803
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30				
Number of hours of total student workload (CNPS)	120				
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points	**4**				
including number of ECTS points for practical (P) classes	0				
including number of ECTS points for direct teacher-student contact (BK) classes	2,4				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Logic basics

\

SUBJECT OBJECTIVES

C1 Knowledge acquisition of the methods for knowledge representation, knowledge conflicts and the problems of distributed knowledge integration.

C2 Knowledge acquisition of the methods for knowledge inconsistency measure and different structures of knowledge integration, together with examples of applications.

C3 Acquiring the ability of knowledge integration by using certain algorithms for knowledge integration.

C4 Understanding the need of applying the methods for conflicts resolution of integrated knowledge.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 He knows the methods for knowledge representation, the model of knowledge conflict and the measures for knowledge inconsistency.

PEK_W02 He knows the methods for inconsistency measure of integrated knowledge.

PEK_W03 He knows consensus postulates and methods for conflict resolution of integrated knowledge.

PEK_W04 He has knowledge of inconsistency of integrated knowledge on the syntactic and semantic level.

PEK_W05 He knows the methods for knowledge integration of different knowledge structures.

PEK_W06 He knows examples of information systems for which it is necessary to integrate knowledge.

relating to skills:

PEK_U01 He can measure of consistency of integrated knowledge.

PEK_U02 He can apply the algorithms for knowledge integration.

relating to social competences:

PEK_K01 He understands what the conflicts and knowledge inconsistency on the semantic and syntactic level are.

PEK_K02 He understands the necessity of knowledge conflicts resolution.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Conditions of the course completion. An introduction to the subject.	2

Lec 2	The methods for knowledge representation.	2
Lec 3	Knowledge conflicts.	2
Lec 4	Knowledge consistency measures.	2
Lec 5	The model of knowledge integration.	2
Lec 6	Consensus methods for knowledge integration.	2
Lec 7	Consensus algorithms for knowledge integration.	2
Lec 8	Knowledge conflicts resolution in a agent system.	2
Lec 9	Knowledge inconsistency on the syntactic level.	2
Lec 10	Knowledge inconsistency on the semantic level.	2
Lec 11	Ontology integration.	2
Lec 12	Expert knowledge integration.	2
Lec 13	Knowledge integration in fuzzy models.	2
Lec 14	Knowledge integration in a information system.	2
Lec 15	Test of knowledge.	2
	Total hours	**30**

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		

Proj 4		
…		
	Total hours	

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Lecture using slides. N2. Consultations for students. N3. Own work, preparing for a test of knowledge.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_W01-PEK_W06	Test of knowledge

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[301] Ngoc Nguyen N.T., Advanced Methods for Inconsistent Knowledge Management, Springer-Verlag, London, 2008.
[302] Ngoc Nguyen N.T., Metody wyboru consensusu i ich zastosowanie w rozwiązywaniu konfliktów w systemach rozproszonych, Oficyna Wydawnicza Politechniki Wrocławskiej, 2002.
[303] Wiesław Traczyk, Inżynieria wiedzy, Akademicka Oficyna Wydawnicza EXIT, 2010
[304] Krzysztof Goczyła, Ontologie w systemach informatycznych, Akademicka Oficyna Wydawnicza EXIT, 2011.

SECONDARY LITERATURE:

[1] Ching-Hung Wang, Tzung-Pei Hong, Shian-Shyong Tseng, Integrating membership functions and fuzzy rule sets from multiple knowledge sources, Fuzzy Sets and Systems, Volume 112, Issue 1, 16 May 2000, Pages 141-154.
[2] Ling Ling, Yujin Hu, Xuelin Wang and Chenggang Li, An ontology-based method for knowledge integration in a collaborative design environment, The International Journal of Advanced Manufacturing Technology, Volume 34, Numbers 9-10.
[3] Ojelanki K. Ngwenyama, Noel Bryson, A formal method for analyzing and integrating the rule-sets of multiple experts, Information Systems, Volume 17, Issue 1, January 1992, Pages 1-16.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Agnieszka Prusiewicz, agnieszka.prusiewicz@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
The Methods for Knowledge Integration
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Computer Science
AND SPECIALIZATION Information and Communications Technology

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K1INF_W17	C1, C4	Lec 2- Lec 3	N1-N3
PEK_W02	K1INF_W17	C2	Lec 4	N1-N3
PEK_W03	K1INF_W17	C2-C3	Lec 5-Lec 7	N1-N3
PEK_W04	K1INF_W17	C1-C2, C4	Lec 9-Lec 10	N1-N3
PEK_W05	K1INF_W17	C2-C3	Lec 8, Lec 11-Lec 14	N1-N3
PEK_W06	K1INF_W17	C2	Lec 8, Lec 12-Lec 14	N1-N3
PEK_U01 (skills)	K1INF_U16, K1INF_U05	C2	Lec 4	N1-N3
PEK_U02	K1INF_U16, K1INF_U05	C3	Lec 6-Lec 8, Lec 11-Lec 14	N1-N3
PEK_K01 (competencies)	K1INF_K01	C1,C4	Lec 3, Lec 9-Lec 10	N1,N3
PEK_K02	K1INF_K01	C1,C4	Lec 1,Lec 3	N1,N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: Informatics and Management

SUBJECT CARD

Name in Polish: Modelowanie i analiza biznesowa
Name in English: Modeling and business analysis
Main field of study (if applicable): Informatics
Specialization (if applicable): Computer Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ3760
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	30			

Number of hours of total student workload (CNPS)	60	90			
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2	3			
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	1,8			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

24. Practice in object-oriented programming.
25. Basic knowledge of software engineering.

\

SUBJECT OBJECTIVES

C1. Basic knowledge in the area of software system modeling with the stress on business modeling as the initial phase of the software development process.
C2. Basic knowledge in the area of the requirements specification.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEK_W01: Students have basic knowledge on business modeling.
PEK_W02: Students know and understand the role of specification requirements.
PEK_W03: Students have basic knowledge on selected modeling languages.

Relating to skills:
PEK_U01: Students, in cooperation with domain experts, can construct and analyze business models.
PEK_U02: Students can build models of system requirements.

Relating to social competences:
PEK_K01: Students are able to cooperate with representatives of application domain.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Basic notions for software development cycle. Survey of modeling languages – UML and BPMN.	2
Lec 2	Class diagrams – classes, associations, generalizations.	2

Lec 3	Validation and verification.	1
Lec 4	Object Constraint Language.	2
Lec 5	UML activity diagrams.	2
Lec 6	BPMN process diagrams.	2
Lec 7	UML statechart diagrams.	2
Lec 8	System requirements; use case diagrams.	2
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Construction and analysis of simple class diagrams.	2
Cl 2	Construction and analysis of advanced class diagrams.	2
Cl 3	Analysis of textual descriptions of exemplary application domains – structural aspect (1).	2
Cl 4	Analysis of textual descriptions of exemplary application domains – structural aspect (2).	2
Cl 5	Case study – an example of structural modeling.	2
Cl 6	Construction and analysis of OCL constraints imposed on diagrams.	2
Cl 7	Test 1.	2
Cl 8	Analysis of textual descriptions of exemplary application domains – structural and behavior aspect.	2
Cl 9	Analysis of simple BPMN diagrams.	2
Cl 10	Construction of simple BPMN diagrams.	2
Cl 11	Construction and analysis of advanced BPMN diagrams.	2
Cl 12	Construction and analysis of simple state diagrams.	2
Cl 12	Construction and analysis of advanced state diagrams..	2
Cl 13	Construction and analysis of use case diagrams.	2
Cl 14	Test 2.	2
Cl 15	Corrective test.	2
	Total hours	30

TEACHING TOOLS USED

N1. Lecturer's presentation at a blackboard, supported by a multimedia presentation using a laptop and a projector.
N2. Individual search and study of literature and Internet sources.
N3. Access to teaching materials published in the local area network.
N4. Individual consultations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P –	Educational effect number	Way of evaluating educational effect achievement

<table>
<tr><td>concluding (at semester end)</td><td></td><td></td></tr>
<tr><td>F1</td><td>PEK_W01
PEK_U01
PEK_K01</td><td>Each student gets 1 point for own solution of a problem from the list of problems for the given class.</td></tr>
<tr><td>F2</td><td>PEK_W01
PEK_W02
PEK_U01
PEK_U02
PEK_K01</td><td>Each student gets up to 10 points for own solution of problems for the given test (intermediate and final).</td></tr>
<tr><td>F3</td><td>PEK_W01
PEK_W02
PEK_W03
PEK_U01
PEK_U02
PEK_K01</td><td>The final evaluation for the classes is determined on the basis of total marks obtained by the student's activity for exercise (F1) and colloquia (F2). Positive mark is awarded to a student who has obtained at least 4 points for each of the symposia and has won a total of 10 points.
If this condition is met, the number of points P is the basis for evaluation in accordance with the following table:
<table>
<tr><td>P</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table>
Students who get at least a very good grade are exempt from the examination with the same mark as for the classes.</td></tr>
<tr><td colspan="3">C: The final evaluation of the course is determined based on the results of the examination. The examination lasts two hours and consists of a set of tasks, the total number of 20 points. The condition for a positive assessment of the final exam is to get 10 points and a positive final evaluation of the exercise.
The final evaluation of the examination is determined in accordance with the following table:
<table>
<tr><td>Points</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td></tr>
<tr><td>Mark</td><td>3.0</td><td>3.5</td><td>4.0</td><td>4.5</td><td>5.0</td></tr>
</table></td></tr>
</table>

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[46] Rumbaugh J., Jacobson I., Booch G., *The Unified Modeling Language – Reference Manual*. Second edition, Addison-Wesley, 2005.

[47] Weilkiens T., Oestereich B., *UML 2 Certification Guide. Fundamental and Intermediate Exams*, Elsevier 2007.

[48] Maciaszek L. A., *Requirements Analysis and System Design*, Second edition, Pearson, Addison-Wesley, 2005.

[49] Adolph S., Bramble P., *Patterns for Effective Use Cases,* Addison-Wesley, 2003

[50] Gašević D., Djurić D., Devedžić V., *Model Driven Architecture and Ontology Development*, Springer, 2006.

SECONDARY LITERATURE:

[305] Graessle P., Baumann H., Baumann P., *UML 2.0 w akcji. Przewodnik oparty na projektach*, Helion, 2006.

[306] Object Management Group, Unified Modeling Language (available on the website: www.omg.com).

[307] Object Management Group, System Modeling Language SysML (available on the website: www.omg.com).
[308] Object Management Group, Business Process Modeling Notation BPMN (available on the website: www.omg.com).

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Zbigniew Huzar, zbigniew.huzar@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems Modeling and Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION
Computer Engineering

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W02	K2INF_W03	C1, C2	Lec1-Lec8	N1, N2, N3, N4
PEK_W03	K2INF_W03		Lec1-Lec8	N1, N2, N3, N4
PEK_U01 (skills)	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_U02	K2INF_U05, K2INF_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_K01 (competences)	K2_SWD_K01	C1, C2	Lec1-Lec15 Cl1-Cl15	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from the table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa I
Name in English MSc Thesis I
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code INZ003818
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				60	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses					

mark (X) final course					
Number of ECTS points				2	
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes				0,6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 2rd semester

\

SUBJECT OBJECTIVES

C1 Preparation of students to write a master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology, with special attention of all stages of writing a thesis.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Preparation of students to write a master thesis according the internal	

	requirements of Faculty of Computer Science and Management (Computer Science field of study), Wrocław University of Technology, with special attention of all stages of writing a thesis. Literature studies, selection and learning of systems, tools, methods and algorithms needed for the realization of the chosen subject of thesis. The preparation of an outline of work and schedule of future work. Basic work on the research, design and implementation. Familiarization with the research works carried out at the Institute of Informatics. Final results: the initial solution and / or the prototype of developed system, knowledge about the current state of art in the field of thesis, an outline of future work and timetable for further works documented in English and Polish languages.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED
N1. Literature study - analysis of publications (including websites) related to subject of thesis, including the research works of the Institute of Informatics. N2. Own work, independent research on the tasks defined in the master's thesis N3. Student consultation with the supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessment based on the final results achieved

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[309] Literature related to the scope of realized project selected by student and recommended by the teacher.

[310] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis I
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U03, K2INF_U08	C1	Pr1	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Praca dyplomowa II
Name in English MSc Thesis II
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005221
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					
Number of hours of total student workload (CNPS)				540	
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points				18	
including number of ECTS points for practical (P) classes				18	
including number of ECTS points for direct teacher-student contact (BK) classes				6	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge, skills and competences acquired at Informatics field of study until 4th semester

\

SUBJECT OBJECTIVES

C1 Preparation of master thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He can take advantage of the skills acquired during study on selected specialization for the purpose of preparation his master thesis and can prepare an elaboration in English language and short report in Polish language, presenting the results of their research

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes – project		**Number of hours**
Proj 1	Subject is the main component of the process of realization the master thesis and involves the preparation by the student his master thesis. Master thesis is done under the direction of his supervisor, with whom student defines its scope, goals, tasks and timetable for implementation.	
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
	Total hours	

TEACHING TOOLS USED

N1. Preparation of master thesis N2. The text of the master thesis N3. Thesis review prepared by the supervisor N4. Students consultation with supervisor

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01	The student chooses a subject of master thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessed is the final text of the diploma thesis. The assessment is carried out in the form of a review done by the promoter. The condition to pass the course is delivering the final text of master thesis before the defined deadline. The second review, which does not, however the condition for pass the course is done by the reviewer appointed by the Faculty Dean. Reviews are made according to the standard format. The student is admitted to the defense (final exam) if both reviews are positive

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[311] Literature related to the scope of realized project selected by student and recommended by the teacher.

[312] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Tutor of specialization

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis II
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **every specialization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K1INF_U03, K2INF_U08	C1	Proj1	N1, N2, N3, N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT……

SUBJECT CARD

Name in Polish Seminarium dyplomowe
Name in English Diploma seminar
Main field of study (if applicable): Informatics
Specialization (if applicable): every specialization
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ005220
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)					30
Number of hours of total student workload (CNPS)					90
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points					2
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes					1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge, skills and competences acquired at Informatics field at second level of study until 3th semester

\

SUBJECT OBJECTIVES

C1 Preparing students to write a master thesis according the internal requirements in Informatics field at Faculty of Computer Science and Management, Wrocław University of Technology,

C2 Providing students with basic skills related to preparation and presentation of scientific texts, beginning from the choice of topic, selection of tasks to be performed, use of literature to interpretation of the results.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

…

relating to skills:

PEK_U01 He is able to acquire information from literature, databases and other sources, also in English or other language used for communication in Informatics field, is able to integrate the information obtained, interpret them, make critical evaluation and also draw conclusions and formulate and justify opinions related to prepared master thesis.

PEK_U02 He can communicate using a variety of techniques in his professional environment and in other environments, also in English or other foreign language used for communication in Informatics field and also to present the results of his master thesis

relating to social competences:

…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
	Total hours	

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
	Total hours	

Form of classes - seminar	**Number of hours**

Sem 1	Familiarization with the principles of master thesis realization at Informatics field. Rules related to student presentations. Determining the schedule of student presentations.	2
Sem 2	Review of basic skills related to preparation and presentation of scientific texts by students, beginning from the choice of topic, selection of tasks to be performed, use of literature and also how to write thesis and how obtained results should be interpret.	2
Sem 3 – Sem15	During semester each student has 2 presentations. The first presentation is related to the general view of the thesis topic, its placement in the literature and in the Informatics field. The student should present the primary aim of thesis, the state of art related to thesis topic, the concept of solution, the initial structure of thesis and timetable for further work. The purpose of the second presentation is preparation to defense and demonstrate presentation skills in English. The second presentation consists of two parts, namely, discussion of the results of the work in English and a short presentation in Polish devoted to the results of the thesis.	26
	Total hours	30

TEACHING TOOLS USED

N1. Multimedia presentations
N2. Examples of scientific papers and reports from the field of computer science.
N3. E-Learning System used to publish teaching materials and announcements, also used for collection and evaluation of student work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_U01 PEK_U02	Evaluation of the presentation of the work at the seminar and prepared documentation from the presentation. The evaluation shall be subject to the fulfillment of the requirements for the presentation, including its substantive scope, structure and organization of presentation, techniques of conversation, a form of presentation, compactness of presentation and conclusions reached. Participation in the discussions after presentation is also evaluated. In addition, the seminar leader is able to control the cooperation between supervisors and graduate students.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[313] Literature related to the scope of realized project selected by student and recommended by the teacher.

[314] Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. inż. Leszek Borzemski, prof. PWr, leszek.borzemski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Diploma seminar
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
AND SPECIALIZATION **every specjalization**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3
PEK_U02	K2INF_U01, K2INF_U02	C1, C2	Se1-15	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: *Systemy informatyczne i telekomunikacyjne*

Name in English: *Information and telecommunication systems*

Main field of study (if applicable): Computer science
Specialization (if applicable): Teleinformatics
Level and form of studies: 2nd level, full-time / ~~part-time~~*
Kind of subject: obligatory
Subject code INZ3808
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30				15
Number of hours of total student workload (CNPS)	90				60
Form of crediting	Crediting with grade				Crediting with grade
For group of courses mark (X) final course					
Number of ECTS points	4				1
including number of ECTS points for practical (P) classes	0				1
including number of ECTS points for direct teacher-student contact (BK) classes	2,4				0,6

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge and skills in the field of teleinformatics confirmed by positive grade from course "Fundamentals of computer networks"

2. Basic knowledge and skills in the field of computer networks confirmed by positive grade from course “Computer networks”

SUBJECT OBJECTIVES

C1 Knowledge of current development trends in technology and applications: telecommunications, computer science, information systems.
C2 Acquiring knowledge and skills in the design of ICT systems architectures using:
C2.1 service-oriented systems (SOA),
C2.2 systems with quality of service (QoS) assurance (DiffServ, IntServ),
C2.3 Next Generation Networks (NGN).

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEK_W01 – knows the current trends in technology development and application of telecommunication, computer science and information systems
PEK_W02 – has knowledge of the design of service oriented systems.
PEK_W03 – has knowledge of the design of systems with quality of service assurance
PEK_W04 – have knowledge of the design and application of NGN systems
Relating to skills:
PEK_U01 – has skills necessary to select proper architecture for the communication system in accordance with the functional and non-functional requirements.
PEK_U02 – can design an ICT system with use of the service-oriented architecture
PEK_U03 – can design an ICT system with quality of service guaranties
PEK_U04 – can design an ICT system with use of the NGN signaling system

Relating to social competences:
PEK_K01 – has the ability to collect and analyze user requirements for ICT systems
PEK_K02 – has the ability to work in a team

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	New developments in the field of information systems and information technology	2
Lec 2	Distributed service-based systems	2
Lec 3	Resources virtualization in computer communication systems	2
Lec 4	Quality of service (QoS) assurance architectures	2
Lec 5	Information and knowledge processing – new concepts	2
Lec 6	Artificial intelligence methods in information systems and information technology	2
Lec 7	ICT systems modeling	2
Lec 8	Modeling of users in ICT systems	2
Lec 9	Cooperative systems and their application to the analysis and modeling of information systems	2
Lec 10	Information systems for information society	2

Lec 11	Integrated systems for knowledge processing and sharing	2
Lec 12	New information and telecommunication technologies – innovations	2
Lec 13	Analysis of an exemplary ICT system – Triple Play services provider	2
Lec 14	Analysis of an exemplary ICT system – e-Health	2
Lec 15	Test	2
	Total hours	**30**

PROGRAMME CONTENT		
Form of classes - seminar		**Number of hours**
Se1	Collection and analysis of user requirements in the context of distributed IT systems	1
Se1, Se2	Designing of service-oriented systems	4
Se3, Se4	Designing of ICT systems with quality of service assurance	4
Se5, Se6	Designing of systems and networks basing on NGN architecture	4
Se7	Integration of systems with different architectures	2
	Total hours	**15**

TEACHING TOOLS USED
N1. Traditional lectures using multimedia presentations N2. Own work - preparation of the seminars N3. Interactive lecture on the seminar N3. Group work in classes

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01, PEK_U02, PEK_K01, PEK_K02	Evaluation of effects of the group work on the seminar
F2	PEK_U03, PEK_K01, PEK_K02	Evaluation of effects of the group work on the seminar
F3	PEK_U04, PEK_K01,	Evaluation of effects of the group work on the

	PEK_K02	seminar
F4	PEK_W01 - PEK_W04	Test
P=[(F1+F2+F3)/3+F4]/2		

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [315] T. Czachórski, „Modele kolejkowe systemów komputerowych”, PKJS, Gliwice, 1999. [316] A. Grzech, „Sterowanie ruchem w sieciach teleinformatycznych”, Oficyna PWr, Wrocław 2002, [317] M. Krzyśko, W. Wołyński, T. Górecki, M. Skorzybut, „Systemy uczące się Rozpoznawanie wzorców analiza skupień i redukcja wymiarowości”, WNT, Warszawa, 2008. SECONDARY LITERATURE: [1] J. Woźniak, K. Nowicki, „Sieci LAN, MAN i WAN – protokoły komunikacyjne”, Wydawnictwo FPT, Kraków 1998
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
Paweł Świątek, pawel.swiatek@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Intelligent building infrastructure
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer science
AND SPECIALIZATION

Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W06_S2TEL_W04	C1	Lec1- Lec 15	N1
PEK_W02	K2INF_W06_S2TEL_W04	C1	Lec1- Lec 15	N1
PEK_W03	K2INF_W06_S2TEL_W04	C1	Lec1- Lec 15	N1
PEK_W04	K2INF_W06_S2TEL_W04	C1	Lec1- Lec 15	N1
PEK_U01 (skills)	K2INF_W06_S2TEL_W04 K2INF_U08_S2TEL_U03 K2INF_U08_S2TEL_U04	C2	Se1, Se7	N2-N4
PEK_U02	K2INF_W06_S2TEL_W04 K2INF_U08_S2TEL_U01 K2INF_U08_S2TEL_U10	C2.1	Se1-Se2, Se7	N2-N4
PEK_U03	K2INF_W06_S2TEL_W04 K2INF_U08_S2TEL_U01 K2INF_U08_S2TEL_U10	C2.2	Se3-Se4, Se7	N2-N4
PEK_U04	K2INF_W06_S2TEL_W04 K2INF_U08_S2TEL_U01 K2INF_U08_S2TEL_U10	C2.3	Se5-Se7	N2-N4
PEK_K01 (competence)	K2INF_W06_S2TEL_W04 K2INF_U08_S2TEL_U03 K2INF_U08_S2TEL_U04	C2	Se1-Se7	N2-N4
PEK_K02	K2INF_W06_S2TEL_W04	C2	Se1-Se7	N2-N4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT…

SUBJECT CARD

Name in Polish Systemy informacyjne
Name in English Information systems
Main field of study (if applicable): Informatics
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code …….
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				30
Number of hours of total student workload (CNPS)	60				60
Form of crediting	crediting with grade	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	crediting with grade
For group of courses mark (X) final course					
Number of ECTS points	2				2
including number of ECTS points for practical (P) classes	0				0
including number of ECTS points for direct teacher-student contact (BK) classes	1,2				1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic mathematical knowledge for 1st level of studies.
2. Informatics knowledge background.
3. Algorithms knowledge background.

\

SUBJECT OBJECTIVES

C1 Acquiring knowledge about functions and significance of information systems in contemporary organizations
C2 Acquainting with the functions and development of information systems in information society
C3 Acquainting with the different methods of information retrieval by surfing the Web
C4 Recognizing the problems of passing of contemporary organizations to Internet space
C5 Obtainment of skills to analyze the literature from information systems area and to synthesize the contents from different sources
C6 Application of the obtained knowledge to presentation the problems from information systems area by means of using adequate tools

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Familiarity with basic models of information systems
PEK_W02 Basic knowledge about Web information systems
PEK_W03 Familiarity with common multimedia technologies
PEK_W04 Understanding of the measures of information retrieval efficiency

relating to skills:
PEK_U01 Student can to build information query for different types of information needs
PEK_U02 Can to determine basic features of information system for given organization
PEK_U03Student be able to evaluate the precision of retrieved information
PEK_U04 Can to present basic features of given information system

relating to social competences:
PEK_K01 Can individually to use literature of the subject and to select useful information

PEK_K02 Student is convinced above positive role of information systems in stimulation of the civilization development

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	History of information systems development. Information processing. Theoretical basis of information systems.	2
Lec 2	Main information systems' models. Automation of information flow in organization.	2
Lec 3	Information retrieval on Internet – fundamentals.	2
Lec 4	Web information systems.	2
Lec 5	Multimedia. Importance of multimedia technologies in information systems development.	2
Lec 6	How societies embrace information technology. Digital libraries.	2
Lec 7	Efficiency of information systems. Case study of chosen information system.	2
Lec 8	Test	1
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
...		
	Total hours	

Form of classes - project	**Number of h o**

		urs
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1	Introductory seminar.	2
Sem 2	Information systems – definitions, types, features, examples.	2
Sem 3	Information retrieval fundamentals – models, dictionaries, indexes.	2
Sem 4	Evaluation of information systems' efficiency.	2
Sem 5	Analytical retrieval of information.	2
Sem 6	Information retrieval on Internet.	2
Sem 7	ERP class systems.	2
Sem 8	Mobile information systems.	2
Sem 9	Multimedia information systems.	2
Sem 10	Information systems for teleworking.	2
Sem 11	How societies embrace information technology.	2
Sem 12	CRM systems.	2
Sem 13	Knowledge management systems.	2
Sem 14	Information society: e-business, e-administration, e-commerce, e-health	2
Sem 15	Seminar summation and credit.	2
	Total hours	30

TEACHING TOOLS USED

N1. Computerized presentation at the lectures.
N2. Presentation with visualization and using Internet resources during the seminar.
N3. Consultations.
N4. Students' homework with using software packages.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 PEK_U04 PEK_K02	Grade of presentation (quality of slides, oral presentation, relevance, duration), presence and activity.
F2	PEK_K01	Report's grade
P-seminar	PEK_U02	Grade result from F1 and F2
P-lecture	PEK_W01-PEKW04	test

PEK_U03

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Manning C. D., Raghavan P., Schutze H.: *Introduction to Information Retrieval*, Cambridge University Press, New York, 2009, dostępne także bezpłatnie: www.cambridge.org

[2] Kłopotek M. A.: *Inteligentne wyszukiwarki internetowe* , Akademicka Oficyna Wydawnicza EXIT, Warszawa, 2001.

[3] Wrycza S. (red.): *Informatyka ekonomiczna. Podręcznik akademicki*, PWE, Warszawa, 2010.

[4] Cortada J. W. : How Societies Embrace Information Technology, WILEY-IEEE, NY, 2009.

[5] Baeza-Yates R., Ribeiro-Neto B.: *Modern Information Retrieval*, ACM Press, Adison-Wesley, New York, 1999.

SECONDARY LITERATURE:

[1] Zgrzywa A., Choroś K., Siemiński A.(Eds.): *Multimedia and Internet Systems: Theory and Practice,* Spriger Verlag, Berlin, 2013.

[2] Nguyen N.T., Zgrzywa A., Czyżewski A.(Eds.): *Advances in Multimedia and Network Information System Technology,* Spriger Verlag, Berlin, 2010.

[3] Zawiła-Niedźwiecki J. : *Informatyka gospodarcza*, Wyd. C. H. Beck, 2010.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Aleksander Zgrzywa, Aleksander.Zgrzywa@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INFW03, K2INF_W06	C1	Lec1, Lec 6 Sem 2,Sem 14	N1-4
PEK_W02	K2INF_W04, K2INF_W06	C3,C4	Lec 3, Lec 4 Sem 6,Sem 7, Sem 11	N1-4
PEK_W03	K2INF_W02, K2INF_W06	C2	Lec 5, Lec 6 Sem 13,Sem 14	N1-4
PEK_W04	K2INF_W03	C3	Lec 3, Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U01	K2INF_U01, K2INF_U08	C3	Lec 3,Lec 5 Sem 4, Sem 5,Sem 6,Sem 9	N1-4
PEK_U02	K2INF_U05, K2INF_U08	C4	Lec 2,Lec 7 Sem 7,Sem 8,Sem 12,Sem 13	N1-4
PEK_U03	K2INF_U05, K2INF_U08	C3	Lec 2, Lec 5 Sem 3, Sem 5, Se6,Se9	N1-4
PEK_U04	K2INF_U02, K2INF_U03	C5, C6	Lec 5, Lec 6 Sem 3, Sem 5, Sem 6, Sem 9, Sem 10	N1-4

PEK_K01	K2INF_K01, K2INF_U02	C5	Lec 5, Lec 6 Sem 9, Sem 10	N1-4
PEK_K02	K2INF_K02	C1	Lec 1, Lec 6 Sem 2, Sem 14	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: Systemy wspomagania decyzji
Name in English: Decision Support Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Decision Support Systems
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / university-wide*
Subject code: INZ003761
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	15		15	
Number of hours of total student workload (CNPS)	60	30		60	
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / ~~crediting with grade~~*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2	1		2	
including number of ECTS points for practical (P) classes				2	
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	0,6		1,2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

None.

\

SUBJECT OBJECTIVES

C1 Getting to know foundations of designing computer science decision support systems using general systemic methods which make it possible to apply unified approaches for analysis and decision making for decision support systems of different nature.
C2 Acquisition of skills to represent in the form of mathematical formulas of decision making plants treated as input-output plants.
C3 Acquisition of skills to analyze of decision making plants treated as input-output plants.
C4 Getting acquainted with methods and algorithms of multi-stage decision making.
C5 Acquisition of skills to apply dynamic programming method.
C6 Getting to know metods and algorithms of multi-criteria decision making.
C7 Acquisition of skills to use AHP method.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Student knows foundations of designing of decision support systems for any kind of plants.
PEK_W02 Student knows foundations of analysis and decision making for input-output plants with logic knowledge representation.
PEK_W03 Student knows selected method of multi-stage and multi-criteria decision making.
relating to skills:
PEK_U01 Student is able to elaborate a mathematical model for an input-output decision making plant in discrete state space as well as with logic knowledge representation.
PEK_U02 Student can solve analysis and decision making tasks for elementary plants with logic knowledge representation.
PEK_U03 Student is able to solve multi-stage decision making problem using Bellman's Principle and dynamic programming.
PEK_U04 Student can use AHP algorithm for the solution od multi-criteria decision making problem
relating to social competences:
PEK_K01 Student can take advantage of professional literature by oneself and can perform the critical analysis of information mined.
PEK_K02 Student can think creatively.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Decision support systems – definitions, structures, problems.	1
Lec 2	Application of discrete state equations and logic expressions for representation of decision making plants.	2
Lec 3	Analysis of decision making plants, in particular logic-algebraic method.	2
Lec 4	Decision making – definition, typology, logic-algebraic plant.	2
Lec 5	Bellman's Principle and multi-stage decision making.	3
Lec 6	Multi-criteria decision making, Pareto sets, AHP method.	3
Lec 7	Examples of computer decision support systems.	2
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Solution of numerical exercises concerning difference equations.	1
Cl 2	Solution of numerical exercises concerning differential equations as well as propositional calculus.	2

Cl 3	Solution of numerical exercises concerning mathematical representations of input-output plants.	2
Cl 4	Solution of numerical exercises concerning analysis using logic-algebraic method.	2
Cl 5	Solution of numerical exercises concerning decision making using logic-algebraic method.	2
Cl 6	Solution of numerical exercises concerning dynamic programming.	2
Cl 7	Solution of numerical exercises concerning AHP method.	2
Cl 8	Final test.	2
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Collecting of indispensable information about selected plant being the decision making plant.	2
Proj 2	Determination of mathematical model of selected decision making plant and decision making problem formulation.	2
Proj 3	Analysis of decision making plant using its mathematical model.	2
Proj 4	Choice of decision making method for further usage as well as elaboration of decision making algorithm.	3
Proj 5	Implementation and alalysis of decision making algorithm.	4
Proj 6	Elaboration of conclusions and written report of the project performed.	2
	Total hours	15

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1 Lecture – traditional method. N2 Classes – traditional method. N3 Consultation. N4 Individual discussion with student. N5 Short test (10 mins.). N6 Self-contained work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Short tests during the classes.
F2	PEK_K01– PEK_K02	Individual discussion with student during the project.
P (Classes)	PEK_W02; PEK_W03; PEK_U01–PEK_U04	Test.
P (Project)	PEK_U01–PEK_U04; PEK_K01–PEK_K02	Evaluation of written report of the project.
P (Lecture)	PEK_W01–PEK_W03; PEK_K02	Exam.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[318] [1] Józefczyk J., Wybrane problemy podejmowania decyzji w kompleksach operacji, Oficyna Wydawnicza PWr, Wrocław 2001.

[319] Bubnicki Z., Podstawy informatycznych systemów zarządzania, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1993.

[320] Roy B., Wielokryterialne podejmowanie decyzji, WNT, Warszawa 1990.

SECONDARY LITERATURE:

[1] Techniki informacyjne w badaniach systemowych, P. Kulczycki, O. Hryniewicz, J. Kacprzyk (red.), WNT, Warszawa 2007.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Jerzy Józefczyk, Jerzy.Jozefczyk@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Decision Support systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Decision Support systems

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1	Lec1, Lec 2, Lec 7, Cl1, Cl 2, Pr1	N1, N3, N6
PEK_W02	K2INF_W02	C1	Lec3, Lec4	N1, N3, N6
PEK_W03	K2INF_W02	C4, C6	Lec5, Lec6	N1, N3, N6
PEK_U01 (skills)	K2INF_U05; K2INF_U06	C2	Lec2, Cl 3, Proj2	N2–N6
PEK_U02	K2INF_U05; K2INF_U06	C3	Cl 4, Cl 5, Proj3, Pro4	N2–N6
PEK_U03	K2INF_U05; K2INF_U06	C5	Cl 6, Proj4	N2–N6
PEK_U04	K2INF_U05; K2INF_U06	C7	Cl 7, Proj4	N2–N6
PEK_K01 (competences)	K2INF_K01	C1, C4, C6	Lec1– Lec7, Proj1, Proj4	N2–N6
PEK_K02	K2INF_K01	C1–C7	Proj1–Proj6	N2–N6

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: Teoria i inżynieria ruchu teleinformatycznego

Name in English: Theory and engineering of teletraffic

Main field of study (if applicable): Computer science

Specialization (if applicable): Teleinformatics

Level and form of studies: 2nd level, full-time

Kind of subject: obligatory

Subject code …….

Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload	30			90	

(CNPS)					
Form of crediting	Crediting with grade			Crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	1			3	
including number of ECTS points for practical (P) classes				3	
including number of ECTS points for direct teacher-student contact (BK) classes	0,6			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

60. Has a basic knowledge of ICT systems and computer communication networks (K1INF_W11).
61. Knows the basic methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_W16)
62. Can use the right tools to build a simple model of the process (the object), to formulate specific task analysis and decision making (K1INF_U15)
63. Can effectively use the methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_U16)
64. It has the ability to self-education, including in order to improve the professional competence (K1INF_U05)
65. Understands the need and knows the possibility of lifelong learning and to improve their professional and social competences (K1INF_K01)

SUBJECT OBJECTIVES

C1. Ordered, underpinned by theoretical knowledge of methods and techniques for transmitting signals using different modulation techniques, methods and techniques of information transmission, methods of organization and management of data communications traffic in the tasks of design and analysis of communication systems, methods of delivering service quality of ICT systems, analysis of quantitative and qualitative requirements and methods for sizing of distributed IT systems.

C2. Skills about the differences and benefits of the use of analog and digital data transmission techniques, the differences and benefits of the use of wired and wireless signal transmission techniques, developing the concept of using wired and wireless technologies in the basic applications of ICT systems, defining the qualitative and quantitative requirements of the user information and communication systems range of data, designing ICT solutions needed to achieve the qualitative and quantitative requirements of the user, using standards and solutions available on the market, estimating the cost of preparing and maintaining ICT solutions needed to achieve the qualitative and quantitative requirements, designing modernization of IT solutions needed to achieve the qualitative and quantitative requirements, identifying differences and similarities between solutions in a variety of applications (e-health, e-government and e-learning, in real-time systems, etc.).

C3. Skills for the design and analysis of complex, distributed ICT systems providing network services for distributed computer communication systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

K2INF_W02: Has a structured, theoretically founded essential knowledge of business modeling and requirements specification systems.

K2INF_W03: Has a structured, theoretically founded essential knowledge in the delivery of information distributed systems

K2INF_W06: Achieves results in the category of knowledge for specialty data communications

relating to skills:

K2INF_U05: Can - in formulating and solving engineering tasks - integrate knowledge of the fields of science and scientific disciplines relevant to the study being studied and applied a systemic approach, taking into account the non-technical aspects

K2INF_U06: Can solve the modeling, analysis and decision making for different types of objects

K2INF_U08: Achieves results and skills in areas of data exchange and computer communications systems

relating to social competences:

K2INF_K01: Can think and act in a creative and enterprising

K2INF_K02: Has aware of the social role of technical graduating, especially understands the need for the formulation and communication to the public, especially through the mass media, information and opinion on the achievements of technology and other aspects of engineering, shall endeavor to provide such information and opinions in a widely understood the reasons for the different points of view

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Classification of ICT systems from different points of view. Quality of Experience (QoE) and Quality of Service (QoS) in ICT systems with elastic and streaming traffic.	2
Lec 2	Introduction to queuing. Open and close networks of queues.	2
Lec 3	Queuing models of circuit-switched and packet-switched computer communication systems. Burke's theorem and Kleinrock approximation.	2
Lec 4	Access control, flow control and routing tasks formulation and solution in distributed environments.	2
Lec 5	Requirements analysis	1
Lec 6	Models (Poisson, Markov modulated, self-similarity, etc) of teletraffic and its application in traffic engineering tasks.	2
Lec 7	QoS delivery concepts: best effort, integrated services and differentiated services	2
Lec 8	New concepts of systems and networks - NXGN (Next Generation Networks) i NWGN (New Generation Network). Summary.	2
	Total hours	15

PROGRAMME CONTENT

Form of classes - project		Number of hours
Proj 1	Formulation design task based on the analysis of the literature, documentation, etc.	2
Proj 2	Justification for the choice task and purpose of the task design - an analysis of the expected benefits of the project task.	2
Proj 3	Quantitative requirements analysis for the communication system under design	2
Proj 4	Qualitative requirements analysis for the communication system under design	2
Proj 5	Analysis of state of the art on how to solve the task design	2
Proj 6	Analysis and selection of the task design methodology	2
Proj 7	Tools (methods, algorithms, procedures, software and hardware) analysis and selection required for the implementation of the project task	2
Proj 8	Implementation of prototype of modules solve the task	2
Proj 9	Prototype testing and evaluation	2
Proj 10	Modification of solutions using prototype test results	2
Proj 11	Integration of modules distinguished at the stages of requirements analysis and prototyping	2
Proj 12	Verification and testing of an integrated solution design task	2
Proj 13	Analysis of the possibility of extending the project tasks	2
Proj 14	Preparation of the presentation and documentation of the design task	2
Proj 15	Presentation of the results of the design task	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture supported by whole class multimedia presentations based on literature and open access and commercial sources.
N2. Student's own works – solving experiments and tasks in laboratory as well as homework.
N3. Student's own works – literature and open access sources studies.
N5. Collective works in laboratory
N5. Student's own works – preparation of presentations and technical documentations.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05	Observation and verification of student activity. Solving the sample jobs.

	K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	
F1 – F15 (project)	K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and assessment of student autonomy.
P (lecture)	K2INF_W03 K2INF_W04 K2INF_W06 K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01 K2INF_K02	Colloquium (course credit) in the evaluation of forming F1 (lecture)
P (project)	K2INF_U05 K2INF_U06 K2INF_U08 K2INF_K01	Total weighted ratings F1 - F15 (project) and the assessment for the presentation of the final results of the project.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[321] A.S. Tanenbaum, „Computer networks", Prentice Hall; 1996
[322] G. Pujolle, D. Seret, D. Dromard, E. Horlait, „Integrated Digital Communication Networks", J. Wiley & Sons
[323] B. Russell, „The art of computer networks", Prentice Hall; 2009
[324] V.S. Bagad, I.A. Dhotre, „Computer networks", Technical Publications, 2009.
[325] M. Roden, „Analog and digital communication systems", Prentice Hall
[326] http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

SECONDARY LITERATURE:

[89] S. Haykin, „Telecommunication systems", Prentice Hall, 1999.
[90] MIT Free Open Course Materials (http://ocw.mit.edu/index.htm)
[91] CCNA Exploration Network Fundamentals, Cisco Academy, PWN, 2008

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Adam Grzech, adam.grzech@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Theory and engineering of teletraffic

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer science

AND SPECIALIZATION
Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1, C2, C3	Lec 1 – Lec 8	N1, N4
PEK_W02	K2INF_W03	C1	Lec 1 – Lec 8	N1,N2, N4
PEK_W03	K2INF_W06	C1	Lec 1 – Lec 8	N1, N4
PEK_U01 (skills)	K2INF_U05	C1, C2, C3	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_U02	K2INF_U06	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_U03	K2INF_U08	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N2, N3, N5
PEK_K01 (competences)	K2INF_K01	C1, C2	Lec 1 – Lec 8 Proj 1 – Proj 15	N1, N2, N3, N4, N5
PEK_K02	K2INF_K02	C1, C2	Lec 1 – Lec 8	N1, N2, N3, N4, N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Zaawansowane metody i techniki analizy danych
Name in English Advanced Methods and Techniques of Data Analysis
Main field of study (if applicable): computer science
Specialization (if applicable): …….
Level and form of studies: 2nd* level, full-time
Kind of subject: obligatory
Subject code INZ003758
Group of courses NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	crediting with grade*		crediting with grade*		

For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes	0		4		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of mathematics and mathematical statistics

\

SUBJECT OBJECTIVES

C1 Introduce the methods and techniques of the statistical data analysis to students
C2 Gather knowledge for Knowledge Discovery (Data Mining)
C3 Applying the gathered knowledge to drawing conclusions based on data analysis

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has a basic knowledge of Knowledge Discovery (Data Mining)
PEK_W02 student has a basic knowledge of statistical data analysis
PEK_W03 student is able to present differences between parametric and non-parametric tests

relating to skills:
PEK_U01 student is able to choose a proper statistical test
PEK_U02 student is able to draw conclusion from data analysis
PEK_U03 student is able to select a proper data mining method

relating to social competences:
PEK_K01 student is able to search and reuse the primary and secondary literature listed below and is able to gather the proper knowledge
PEK_K02 student understands the need for systematic and individual work in order to cover the scope of the course

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to knowledge discovery	2
Lec 2	Classification and Data Clustering	2
Lec 3	Clustering Algorithms	2
Lec 4	Discovering association rules	2
Lec 5	Statistics - basic notions	2
Lec 6	The selected problems of estimation theory	2
Lec 7	Introduction to verification of statistical hypothesis	2
Lec 8	Parametric tests for one population	2
Lec 9	Non-parametric tests for one population	2
Lec 10	Parametric tests for two populations	2
Lec 11	Non-parametric tests for two populations	2

Lec 12	Parametric tests for more than 2 populations	2
Lec 13	Non-parametric tests for more than 2 population	2
Lec 14	Correlation and regression methods	2
Lec 15	Test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1	Introduction to WEKA	2
Lab 2	Knowledge discovery in WEKA	8
Lab 3	Introduction to MATLAB	2
Lab 4	Statistical data analysis in MATLAB	8
Lab 5	Introduction to R	2
Lab 6	Statistical data analysis in R	8
	Total hours	30

Form of classes - project		**Number of**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Traditional lecture N2. Labs N3. One-to-one consultancy during stuff hours

N4. Student self-study

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P -laboratory	PEK_U01-PEK_U03, PEK_K01-PEK_K02	Evaluation of the prepared tasks during labs, oral test
P-lecture	PEK_W01-PEK_W03 PEK_K01-PEK_K02	test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[327] M. Sobczyk: Statystyka, Wydawnictwo Naukowe PWN, 2007

[328] W.Krysicki, J.Bartos, W. Dyczka, K. Królikowska, M. Wasilewski: Statystyka, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, cz. 2 Statystyka matematyczna, Wydawnictwo Naukowe PWN, 2007

[329] Marek Walesiak, Eugeniusz Gatnar (Red. nauk.) :Statystyczna analiza danych z wykorzystaniem programu R, Wydawnictwo Naukowe PWN, 2009

[330] M. Korzyński: Metodyka eksperymentu Planowanie realizacja i statystyczne opracowanie wyników eksperymentów technologicznych, Wydawnictwo Naukowo-Techniczne 2006

[331] Nong Ye, : The Handbook of Data Mining, Lawrence Erlbaum Associates, Publishers, 2003

SECONDARY LITERATURE:

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Prof. dr hab. inż Ngoc Thanh Nguyen, Ngoc-Thanh.Nguyen@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Advanced Methods and Techniques of Data Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY computer science
AND SPECIALIZATION **……**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C2	Lec1-4 Lab1-2	N1-4
PEK_W02	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_W03	K2INF_W01, K2INF_W05, K2INF_W02, K2INF_W06	C1	Lec5-14 Lab3-6	N1-4
PEK_U01	K2INF_U01, K2INF_W06, K2INF_W08	C1	Lec5-14 Lab3-6	N1-4
PEK_U02	K2INF_U01, K2INF_W06, K2INF_W08	C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_U03	K2INF_U01, K2INF_W06, K2INF_W08	C2	Lec1-4 Lab1-2	N1-4
PEK_K01		C1, C2, C3	Lec1-14 Lab1-6	N1-4
PEK_K02		C1, C2, C3	Lec1-14 Lab1-6	N1-4

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Zarządzanie projektami informatycznymi

Name in English Software Project Management
Main field of study (if applicable):
Specialization (if applicable):
Level and form of studies: 2nd level, full-time
Kind of subject: optional
Subject code INZ003804
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			30	
Number of hours of total student workload (CNPS)	90			90	
Form of crediting	Exam			Crediting with marks	
For group of courses mark (X) final course					
Number of ECTS points					
including number of ECTS points for practical (P) classes	3			3	
including number of ECTS points for direct teacher-student contact (BK) classes	1,8			1,8	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

13. Basic knowledge in management

\

SUBJECT OBJECTIVES

C1. Obtainment of a detailed knowledge about traditional project management methods according to PMI;

C2. Obtainment of a detailed knowledge of software sizing.

C3. Obtainment of a basic knowledge of Agile project management methods

C4. Obtainment of knowledge about the significance of people in project management, especially about the leadership and the project team, about resistance, conflict and crisis management,

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – student knows how to formulate the goal, how to verify the feasibility and how to plan a project in case traditional project management methods are used;

PEK_W02 – student knows traditional project realization control methods;

PEK_W03 – student has ordered knowledge of the measuring the software size and complexity.

PEK_W04 – student has a basic knowledge of Agile project management methods.

PEK_W05 – student knows the role and the tasks of project manager

PEK_W6 - student knows the role of the project team, methods of its building, the dynamics of its development;

PEK_W7 – student knows the essence of resistance, conflict and crisis and methods of their management;

relating to skills:

PEK_U01 – student is able to prepare a project chart and elaborate its plan (traditional and agile methods)

PEK_U02 – student is able to control the realization of simple projects (traditional and agile methods)

Relating to social competences:

PEK_K01 – student understands the essence of project management and its role in the contemporary world;

PEK_K02 – student is aware of the existing barriers and constraints in implementing PM.

PEK_K03 – student knows how to work in group

PEK_K04 – student is able to critically assess method proposed to him.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Project goal, basic document of project planning	2
Lec 2	Project scheduling	2
Lec 3	Project cost estimation, project risk management	2
Lec 4	Project realization control	2
Lec 5	Exam – 1. Part	2
Lec 6	Basic definitions. The evolution of software sizing requirements.	2
Lec 7	Case study for use FP and UCP method.	2
Lec 8	MOOSE metrics.	2
Lec 9	Basic knowledge of Adaptive and Agile project management methods. Scrum method.	2
Lec 10	Exam -2. part	2
Lec 11	Introduction in soft project management, leadership	2
Lec 12	Management styles, selection of team members, motivation, stimulation of cooperation	2
Lec 13	Roles in project team, structures, dynamics of team development	2
Lec 14	Resistance management	2
Lec 15	Conflict and crisis management. Exam – 3.part	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		

Lab 4		
Lab 5		
Lab 6		
Lab 7		
Lab 8		
	Total hours	

Form of classes - project		Number of hours
Proj 1	Explaining the requirements and the principles of getting credits	2
Proj 2	Preparation of project charter for a new, proposed by the team IT project – explanation of the task	2
Proj 3	Preparation of project charter for a new, proposed by the team IT project – discussion and evaluation of the results	2
Proj 4	Creating a schedule for the proposed project, managed by means of the Waterfall model of software development – explanation of the task	2
Proj 5	Creating a schedule for the proposed project, managed by means of the Waterfall model of software development– discussion and evaluation of the results	2
Proj 6	Creating a schedule for the proposed project, managed by means of the Scrum Agile software development method– explanation of the task	2
Proj 7	Creating a schedule for the proposed project, managed by means of the Scrum Agile software development method– discussion and evaluation of the results	2
Proj 8	Creating Risk Register showing the results of risk identification, its analysis and risk responses planning – explanation of the task	2
Proj 9	Creating Risk Register showing the results of risk identification, its analysis and risk responses planning– discussion and evaluation of the results	2
Proj 10	Conducting an interview with the manager of a project carried out in a real IT company and preparing a report describing the project management method used in company – explanation of the task	2
Proj 11	Conducting an interview with the manager of a project carried out in a real IT company and preparing a report describing the project management method used in company– discussion and evaluation of the results	2
Proj 12	Discussion about the reports handed out to the teacher during P11	2
Proj 13	Discussion about advantages and disadvantages of various project management methods	2
Proj 14	Discussion about the possibility to introduce the methods in Poland	2
Proj 15	Making up the missing parts of the project, the final mark	2
	Total hours	30

Form of classes - seminar		Number of hours
Sem 1		
Sem 2		
Sem 3		

…		
	Total hours	

TEACHING TOOLS USED

N1. Traditional lecture
N2. Group work
N3. Discussion

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P1	PEK_W01; PEK_W02, PEK_U01. PEK_U02	Written exam
P2	PEK_W03, PEK_W04,	Written exam
P3	PEK_W05, PEK_W06, PEK_W07,	Written exam
F	PEK_W01; PEKW_02, PEK_W03, PEK_W04, PEK_U01. PEK_U02, PEK_K01; PEKK_02, PEK_K03, PEK_K04,	Evaluation of group work and discussion participation

lecture = (P1+P2+P3)/3
project = F

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[332] Frame J.D. , Zarządzanie projektami w organizacjach, WIG-PRESS, Warszawa, 2001
[333] Carr D.K. i inni, Zarządzanie procesem zmian. PWN, Warszawa, 1998
[334] Clarke L., Zarządzanie Zmianą. Gebethner i S-ka, Warszawa, 1997
[335] Cadle J, Yestes D., Zarządzanie procesem tworzenia systemów informacyjnych, WNT 2004
[336] Cockburn A., Agile Software Development. Gra zespołowa, Helion 2008
[337] Pressman R.S., Praktyczne podejście do inżynierii oprogramowania, WNT 2004
[338] Schwaber K., Sprawne zarządzanie projektami metodą Scrum, Microsoft Press 2005
[339] Skorupka D., Górski M., Kuchta D., Zarządzanie ryzykiem w projekcie, Wyższa Szkoła Oficerska Wojsk Lądowych we Wrocławiu, Wrocław 2012.

SECONDARY LITERATURE:

[1] Garmus D., Herron D., Function Point Analysis, Addison-Wesley 2001
[2] Darnall R.W. , Najwspanialszy projekt świata, DIFIN, Warszawa, 2002
[3] Betta J., Dobór członków zespołu projektowego w: Decyzyjne Systemy Zarządzania, Difin, Warszawa, 2012
[4] Chrościcki Z., Zarządzanie projektami – zespołami zadaniowymi. C.H. Beck, Warszawa, 2000
[5] Waszkiewicz J., Integracja w zespole. CL Consulting i Logistyka, Oficyna Wydawnicza „Nasz Dom i Ogród", Wrocław, 2005
[6] Kuchta D., Zagadnienie czasu i kosztu w projektach, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2011

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dorota Kuchta, dorota.kuchta@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Software Project Management
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……
AND SPECIALIZATION …….

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W03	C1	Lec1-Lec5, Proj1-Proj15	N1, N2,N3
PEK_W02	K2INF_W03	C1	Lec1-Lec5, Proj1-Proj15	N1, N2,N3
PEK_W03	K2INF_W03	C2	Lec6-Lec8, Lec10	N1
PEK_W04	K2INF_W03	C3	Lec9,Lec10	N1
PEK_W05	K2INF_W03	C4	Lec11-Lec15	N1,N2,N3
PEK_W06	K2INF_W03	C4	Lec11-Lec15	N1,N2,N3
PEK_W07	K2INF_W03	C4	Lec11-Lec15	N1,N2,N3
PEK_U01	K2INF_W03	C4	Lec1-Lec5, Proj1-Proj15	N1,N2,N3
PEK_U02	K2INF_W03	C4	Lec1-Lec5	N1,N2,N3
PEK_K01	K2INF_W03	C4	Lec1-Lec15	N1,N2,N3
PEK_K02	K2INF_W03	C4	Lec1-Lec15	N1,N2,N3
PEK_K03	K2INF_W03	C4	Proj1-Proj15	N1,N2,N3
PEK_K04	K2INF_W03	C4	Proj1-Proj15	N2,N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT……

SUBJECT CARD

Name in Polish Zintegrowane systemy zarządzania
Name in English Integrated Management Information Systems
Main field of study (if applicable): Computer Science
Specialization (if applicable):
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		15		
Number of hours of total student workload (CNPS)	120		60		
Form of crediting	crediting with grade		crediting with grade		
For group of courses mark (X) final course					
Number of ECTS points	4		2		
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	2,4		1,2		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Knowledge about:
1. theory of organisation and management
2. essentials of enterprise management
3. basics of computer science

\

SUBJECT OBJECTIVES

C1 Knowledge of integrated management information systems (IMIS)
C2 Ability to use ERP IMIS
C3 Knowledge of the implementation of IMIS

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 – knowledge of MIS classifications
PEK_W02 – knowledge of rules of MIS integration
PEK_W03 – knowledge of basic functions in business areas of MIS
PEK_W04 – knowledge of MIS history and new approaches
PEK_W05 – knowledge of the MIS implementation in the organization
PEK_W06 – knowledge of rules of selecting MIS
PEK_W07 – knowledge of human aspects of the MIS implementation
PEK_W08 – knowledge of gathering requirements before the MIS implementation (e.g. business process modeling)
PEK_W09 – knowledge of risk factors in the MIS implementation
relating to skills:

PEK_U01 – ability to classify a MIS
PEK_U02 – ability to find differences between MRP – MRPCL – MRPII – MRPIII – ERP – ERPII
PEK_U03 – ability to plan implementation of MIS
PEK_U04 – ability to find and minimalize risk factors during the MIS implementation
PEK_U05 – ability to set goals for the MIS implementation
PEK_U06 – ability to plan trainings for users of MIS
PEK_U07 – ability to analyze functionality of ERP system
PEK_U08 – ability to model business process
PEK_U09 – ability to prepare and present own approach to the MIS implementation

relating to social competences:
PEK_K01 – ability to searching for information and analyzing
PEK_K02 – developing ability to think independently and creatively
PEK_K03 – understand the importance of business requirements in the design and implementation of information systems
PEK_K04 – developing entrepreneurial thinking
PEK_K05 – developing the skills of group working

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction	2
Lec 2	Management Information Systems	2
Lec 3	Typology of informational systems at the angle of primary criterions. Types MPR II/ERP.	2
Lec 4	APICS standards (MRP, MRPII)	2
Lec 5	Classification of integrated systems according to APICS standards (MRP, MRP-CL, MRPII, MRPII+/MRPIII)	2
Lec 6	ERP systems	2
Lec 7	ERP II systems	2
Lec 8	CRM and PRM systems	2
Lec 9	Service Oriented Architecure (SOA) and mobile technologies in management	2
Lec 10	General characteristics of management information system sets	2
Lec 11	Informatics strategies of enterprise management	2
Lec 12	Choosing and implementation of system set	2
Lec 13	Training and coaching during IMIS implementation	2
Lec 14	Implementation risks	2
Lec 15	Conclusion	2
	Total hours	30

Form of classes - class	**Number of hours**

Form of classes - laboratory		**Number of hours**
Lab 1	Introduction to ERP system	2
Lab 2	General settings	2
Lab 3	Calculation of product’s costs	2
Lab 4	Purchasing orders (PO)	2

Lab 5	Work orders (WO)	2
Lab 6	MRP planning	2
Lab 7	Analysis of selected area of ERP system	2
Lab 8	Conclusion	1
	Total hours	15

TEACHING TOOLS USED
N1. Traditional lecture N2. Using MIS tool N3. Work with the teacher N4. Self-learning – for labs N5. Self-learning – for lectures

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 – PEK_W10 PEK_U01–PEK_U06 PEK_K01 PEK_K03	Exam (test)
F2	PEK_U07 –PEK_U10 PEK_K01 PEK_K02 PEK_K04 PEK_K05	Evaluation of the seminar and lab work
C = F1 + F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[340] Jerzy Kisielnicki: MIS Systemy informatyczne zarządzania, PLACET, 2009

[341] Zbigniew Klonowski: Systemy informatyczne zarządzania przedsiębiorstwem : modele rozwoju i właściwości funkcjonalne, Oficyna Wydawnicza Politechniki Wrocławskiej, 2004

[342] James O'Brien, George Marakas: Management Information Systems, McGraw-Hill/Irwin, 2010

[343] Ken Laudon, Jane Laudon: Management Information Systems, Prentice Hall; 11 edition, 2009

[344] R. Kelly Rainer, Hugh J. Watson: Management Information Systems, Moving Business Forward, Wiley, 2012

SECONDARY LITERATURE:

[1] Computerworld magazine

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Adam Wasilewski, adam.wasilewski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Zintegrowane systemy zarządzania

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatyka

AND SPECIALIZATION Teleinformatyka

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 **PEK_W02** **PEK_W03** **PEK_W04** **PEK_W05** **PEK_W06** **PEK_W07** **PEK_W08** **PEK_W09**	K2INF_W02	C1	Le1-Le14	N1, N5
PEK_U01 **PEK_U02** **PEK_U03** **PEK_U04** **PEK_U05** **PEK_U06** **PEK_U07** **PEK_U08**	K2INF_U05	C3	Lab2-Lab8	N2, N3, N4
PEK_K01 **PEK_K02** **PEK_K03** **PEK_K04** **PEK_K05**	K2INF_K01	C2, C4	Lab1-Lab8	

** - enter symbols for main-field-of-study/specialization educational effects

*** - from table above