FACULTY OF INFORMATICS AND MANAGEMENT / DEPARTMENT……

SUBJECT CARD

Name in Polish: Zaawansowana grafika komputerowa
Name in English: Advanced Computer Graphics
Main field of study (if applicable): Informatics
Specialization (if applicable): Computer Engineering
Level and form of studies: 2nd level, full-time
Kind of subject: optional
Subject code INZ0145WI
Group of courses YES

	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 /	Examination / crediting with grade*	Crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course	X				
Number of ECTS points	2.0		4.0		
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		2.4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

knowledge of methods and techniques of computer graphics in the scope corresponding to the contents of „Introduction to Computer Graphics" lecture
advanced skills in C++ or Java programming language
basic knowledge of linear algebra and 2D and 3D geometry

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SUBJECT OBJECTIVES

C1 Acquainting students with state-of-art methods of photorealistic 3D image synthesis, their properties and limitations with particular attention paid to lighting simulation

C2 Practical training in efficient programming of algorithms specific to lighting simulation, rendering and procedural texturing and modeling

C3 Developing skills related to design, implementation and optimization of specific methods aimed on various visual effects simulation and modeling and scene elements

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Knows properties, scope of application and limitations of basic lighting simulation and photorealistic rendering techniques

PEK_W02 Knows widely used techniques of ray tracing acceleration techniques

PEK_W03 Knows methods of space subdivision and SEADS structures traversal algorithms and is able to explain their role in efficient rendering

PEK_W04 Is able to describe typically used concepts of procedural creation of randomized patterns and related concepts of anti-aliasing

relating to skills:

PEK_U01 Is able to efficiently implement elements of ray tracing, radiosity, photon mapping techniques

PEK_U02 Can derive the formulas of ray object intersection for polygons, quadrics, metaballs

PEK_U03 Is able to design and implement the procedures of domain space traversal based on uniform and non uniform space subdivision and bounding volumes

PEK_U04 Is able to design a procedure for natural pattern rendering like wood, stone, Feather etc. and select appropriate anti-aliasing procedure

PEK_U05 Can modify and extend existing well-structuring code of 3D rendering systems so as to obtain New Visual effects or to improve its efficiency

PEK_U06 Can use the software and hardware available in the laboratory and knows principles of its safe use.

relating to social competences:

PEK_K01 Knows the areas of application of computer graphics and is able to identify new areas of CG usage in specific domains

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction to photorealistic rendering and lighting simulation. Basic optical phenomena reproducer in CG, basic photometry, lighting models, surface properties, basic geometry modeling method	
Lec 2	Basic photorealistic rendering paradigms: ray tracing, radiosity, photon mapping, properties, scope of aplication, limitations	2
Lec 3	Geometry for ray tracing, ray equation, intersections with geometry promitives, finding refleted and refracted rays	2
Lec 4	Implementation elements of ray tracer, overall architecture, advantages and disadvantages of structural and object oriented approaches in case of highly optimized implementation, usefull geometry classes and methods	2
Lec 5	Ray tracing optimization, classification, ray-object intersection tests elimination, space subdivision concepts, bounding volumes, interpolation in image and in object space, reduction of shadow tests	2
Lec 6	Uniform space subdivision and its application to reduce ray-object intersection tests, DDDA traversal, optimizing subdivision density	2
Lec 7	Non-uniform space subdivision, octrees, kd-trees, building SEADS data structures, finding triangles for a voxel, efficient nonuniformly subdivided	2

	domain traversal	
Lec 8	Interpolation in image space, adaptive sampling density selection, interpolation in object space, progressive ray tracing	2
Lec 9	Radiosity and diffused lighting simulation, principles, methods of illumination equation set solving, modified Gauss-Seidel method	2
Lec 10	Photon mapping, photon tracing, methods of photon maps organization, computing illumination from photon maps, optimization by selective tracing of photons	2
Lec 11	Simplified shadow analysis, shadow maps, shadow volumes, reducing shadow tests count with Ward method	2
Lec 12	Texturing in CG, classification of textures, examples of application, mapped textures, methods of 3D->2D mapping, mapped textures anti-aliasing, MIP-mapping, summed area tables	2
Lec 13	Procedural texturing, classification of patterns, examples of regular pattern procedures, randomized patterns, wood pattern textures	2
Lec 14	Cellular textures, application to stone and leather modeling, bump mapping and displacement mapping	2
Lec 15	Volumetric effects modeling, clouds modeling, light dispersion in foggy environment, smog and fire modeling	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**
Lab1	Presentation of lab scope, breief review of assignments, presentation of grading principles, presentation of suggested tools, preparation of IDE environment	2
Lab2	Ray tracing - implementation of data loading procedures, primary ray casting	2
Lab3	Implementation of ray triangle intersection tests	2
Lab4	Implementation of Phong lighting model, building ray tree, implementation of secondary rays tracing	2
Lab5	Building SEADS structure for uniform subdivision, implemantation of selected strategies of subdivision density level selection	2
Lab6	Implementation of ray-triangle intersection reduction by using uniform space subdivision, evaluation of gains	2
Lab7	Optimization of RT efficiency, evaluation of image quality, efficiency test using scenes of various complexity	2
Lab8	Implementation of other selected effect built into ray tracing renderer - part 1	2
Lab9	Implementation of other selected effect built into ray tracing renderer - part 1	2
Lab10	Optimization and tests of implemented RT extension, evaluation of efficiency and image quality, presentation of achieved effects	2
Lab11	Implementation of selected procedural texture, explanation of the proposed concept	2

Lab12	Extension of inpud data format for specification of the texturing procedure parameters, implementation of necessary extensions in data loading methods	2
Lab13	Implementation of procedural texturing methods for selected pattern	2
Lab14	Implementation of procedural texture antialiasing	2
Lab15	Preparation of final documentation of created software, documenting tests carried out, evaluation of the documentation quality, final evaluation of student's works, grading	2
	Total hours	30

Form of classes - project		**Number of hours**
Proj1		
Proj2		
Proj3		
Proj4		
...		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem1		
Sem2		
Sem3		
...		
	Total hours	

TEACHING TOOLS USED

N1. Lecture supported by multimedia presentations (slideshow) and on-line presentation of rendering and modeling software
N2. Compilers and IDEs for used programming languages (C++, Java) - MSVC, Netbeans, Eclipse
N3. Free software for 3D scene modeling and rendering
N4. e-learning system used for publishing of documents and data related to 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 - evaluation of basic ray tracer (Lab2 - Lab7)	PEK_W02 PEK_W03 PEK_U02 PEK_U03 PEK_U04 PEK_U05	Evaluation of visual effect, efficiency, flexibility (parameterization), code quality
F2 - evaluation of the extension related to selected additional visual effect (Lab8 - Lab10)	PEK_W01 PEK_U01 PEK_U05	Evaluation of visual effect, efficiency, flexibility (parameterization), relevance of used techniques and concepts
F2 - evaluation of the extension related to selected procedural texture pattern (Lab11-lab14)	PEK_W04 PEK_U04 PEK_U05 PEK_K01	Evaluation of visual effect, efficiency, flexibility (parameterization), relevance of used techniques and concepts
F4 - evaluation of the final	PEK_W01	Evaluation of relevance of used

documentation and presentation of achieved results (Lab15)	PEK_W04 PEK_K01	test data, completeness of the documentation, clarity of final presentation

C - the final grade given based on the written exam grade (GE) and the average of four forming grades (F1, F2, F3, F4) given based on the evaluation of three stages of renderer construction implemented in the lab:

$$C = 0.5*GE + 0.5*0.25*(F1+F2+F3+F4)$$

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Shirley P., Morley K.R., Realistic Ray Tracing, Second Edition, A.K.Peters, 2003
[2] Foley J.D. et al. Computer Graphics, Principles and Practice, Third Edition, Addition-Wesley, 2013
[3] Ebert D.s. et al., Texturing and Modeling. A Procedural Approach, Morgan-Kaufman, 2002

SECONDARY LITERATURE:

[1] Akenine-Moller T., Haines E., Hofman N., Real-Time Rendering, Third Edition, A.K.Peters 2008
[2] Shirley P., Fundamentals in Computer Graphics, A.K.Peters 2005

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

Jerzy Sas, jerzy.sas@pwr.wroc.pl, Inst. of Informatics

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Advanced Computer Graphics
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_W06_ S2CE_W03	C1	Lec1. Lec2, Lec9-Lec10 Lec15 Lab1	N1, N3, N4
PEK_W02	K2INF_W06_ S2CE_W03	C1, C3	Lec5-Lec8	N1, N3, N4
PEK_W03	K2INF_W06_ S2CE_W03	C1, C2	Lec6-Lec7	N1, N3, N4
PEK_W04	K2INF_W06_ S2CE_W03	C3, C2	Lec12-Lec14	N1, N3, N4
PEK_U01 (skills)	K2INF_U08_S2CE_U02	C2	Lec3, Lec4 Lab2-Lab6	N2, N3
PEK_U02	K2INF_U08_S2CE_U07	C2	Lec3, Lab3	N2, N3
PEK_U03	K2INF_U08_S2CE_U07	C1, C2	Lec5-Lec8 Lab5-Lab6	N2, N3
PEK_U04	K2INF_U08_S2CE_U07	C1, C2	Lec12-Lec13 Lab11-Lab14	N2, N3
PEK_U05	K2INF_U08_S2CE_U08	C2	Lab8-Lab10	N2, N3
PEK_U06	K2INF_U09	C2	Lab-1	N2,N4
PEK_K01 (competences)		C1, C3	Lab7. Lab10,Lab15	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 Zaawansowane sieci komputerowe
Name in English Advanced Computer Networks
Main field of study (if applicable): Computer Science
Specialization (if applicable): Computer Engineering
Level and form of studies: 2nd level, full-time
Kind of subject: optional
Subject code INZ0159Wl
Group of courses YES

	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		
For group of courses mark (X) final course	X				
Number of ECTS points	2		4		
including number of ECTS points for practical (P)			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. The student has a basic knowledge of computer networks and completed a course in this area.
2. The student has a basic knowledge of network operating systems and completed a course in this area.

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SUBJECT OBJECTIVES

C1. Acquire theoretical principles for planning and configuration of selected network technologies and services in enterprise environment.
C2. Acquire practical skills for planning and configuration of selected network technologies and services in enterprise environment.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 – student has knowledge on selected network technologies and services.

relating to skills:
PEK_U01 – student has basic skills in the planning and configuration of selected network technologies and services.
PEK_U02 – student has the preparation necessary to work in computer laboratories and knows the rules of safety associated with this work.

PROGRAMME CONTENT

Form of classes – lecture		**Number of hours**
Lec 1	Introduction to network operating systems.	2
Lec 2	Reference models: ISO/OSI and TCP/IP. Topologies.	2
Lec 3	Switching and switches.	2
Lec 4	Address spaces and addressing in IP v. 4 and IP v. 6.	2
Lec 5	Routing and routers.	2
Lec 6	Routing protocols.	2
Lec 7	Dynamic Host Configuration Protocol (DHCP)	2
Lec 8	Domain Name System (DNS).	2
Lec 9	Access to resources and data transmission in computer networks.	2
Lec 10	Network firewalls.	2
Lec 11	Security of network communication.	2
Lec 12	Computer networks in virtualization environments.	2
Lec 13	Monitoring and troubleshooting.	2
Lec 14	Quality of Services (QoS).	2
Lec 15	Wireless communication. Fiber-optic communication.	2
	Total hours	30
Form of classes - laboratory		**Number of hours**
Lab 1	Introduction to laboratory.	2
Lab 2	Introduction to the Windows Server environment.	2
Lab 3	Introduction to the Linux servers environment.	2
Lab 4	Cables and connectors.	2

Lab 5	Address space planning issues.	2
Lab 6	Test – Address space planning.	2
Lab 7	Software routing in MS Windows Environment.	2
Lab 8	Software routing in Linux Environment.	2
Lab 9	Test – Software routing	2
Lab 10	Dynamic Host Configuration Protocol (DHCP) in MS Windows environment	2
Lab 11	Dynamic Host Configuration Protocol (DHCP) in Linux environment	2
Lab 12	Test – DHCP service configuration.	2
Lab 13	Domain Name System (DNS) in MS Windows environment	2
Lab 14	Domain Name System (DNS) in Linux environment	2
Lab 15	Test – DNS service configuration	2
	Total hours	30

TEACHING TOOLS USED

N1. Lecture
N2. Laboratories with access to server operating systems with administrative privileges.
N3. Contact hours.
N4. Student work – Preparation to laboratories.
N5. Student work – Preparation to Exam.

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	Examination. To pass, a student must earn more than half of the points available during the exam. The lecturer can award additional points for the activity during lectures during the semester. The F1 grade is the partial grade.
F2	PEK_U01	Points for each of test during semester. To pass, a student must earn more than half of the points available during the semester. The lecturer can award additional points for the activity during laboaratories during the semester. The F2 grade is the partial grade.
F3	PEK_U02	Mandatory participation in the training conducted by the lecturer. Pass on the basis of participation.
P		The final grade for the group of courses is the arithmetic mean of F1 and F2. wherein the student must pass F1, F2, and F3, which means that both of the partial grades F1 and F2 must be positive and F3 passed..

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Tanenbaum A.S.: Computer Networks, Prentice Hall, 2002.
[2] Mir N. F.: Computer and Communication Networks, Prentice Hall, 2006.
[3] Comer D.E.: Computer Networks and Internets with Internet Application, Prentice Hall, 2004.

SECONDARY LITERATURE:

[1] RFC documents on http://www.rfc-editor.org
[2] Technical documentation on http://www.cisco.com
[3] Linux documentation project http://tldp.org
[4] Technical documentation on http://technet.microsoft.com

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Advanced Computer Networks
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
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_W06	C1	Lec 1-15	N1,3,5
PEK_U01 (skills)	K2INF_U08	C2	Lab 1-15	N2,3,4
PEK_U02	K2INF_U09		Lab 1	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 *Zawansowane bazy danych*
Name in English *Advanced databases*
Main field of study (if applicable): Computer Science
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 INZ0109Wps
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	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			3	2
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	1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Is able to develop database application with SQL language
2.

3.

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SUBJECT OBJECTIVES

C1 To enhance students' knowledge about advanced topics in databases
C2 To learn how to practically apply modern database models

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Has a basic knowledge about modern database models
PEK_W02 Has a basic knowledge about advanced topics in databases
…
relating to skills:
PEK_U01Is able to discus and evaluate modern database models
PEK_U02 Is able to build a dedicated database with usage of non-standard data models

…
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, advanced database models	2
Lec 2	Active databases	2
Lec 3	Temporal databases	2
Lec 4	Data stream management	2
Lec 5	Semistructural data storage	2
Lec 6	Semistructural data processing	2
Lec 7	NoSQL and Big 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		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		Number of hours
Proj 1	Introduction, Project teams building	2

Proj 2	Brainstorming	2
Proj 3	Presentation of self prepared or chosen idea of database application.	2
Proj 4	Building final, revised concept of projected solution.	2
Proj 5	Setup of project's infrastructure	2
Proj 6	Sprint 1 Iteration 1	2
Proj 7	Sprint 1 Iteration 2	2
Proj 8	Sprint 1 Iteration 3 and sprint demo	2
Proj 9	Sprint 2 Iteration 1	2
Proj 10	Sprint 2 Iteration 2	2
Proj 11	Sprint 2 Iteration 3 and sprint demo	2
Proj 12	Sprint 3 Iteration 1	2
Proj 13	Sprint 3 Iteration 2	2
Proj 14	Sprint 3 Iteration 3 and sprint demo	2
Proj 15	Final assessment	2
	Total hours	30

Form of classes - seminar		**Number of hours**
Sem 1	Introduction, Subject and term assignment	2
Sem 2-Sem8	Individual presentations prepared by students	13
	Total hours	15

TEACHING TOOLS USED

N1. Lecture
N2. The course web page with references to literature
N3. Software development 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 concept of solution [20 points] (Lab1-4)
F2	PEK_U01-02, PEK_K01	Evaluation of the sprint demo 1[20 points] (Lab5-8)
F3	PEK_U01-02, PEK_K01	Evaluation of the sprint demo 2[20 points] (Lab9-11)
F4	PEK_U01-02, PEK_K01	Evaluation of the sprint demo 3[40 points] (Lab12-14)
C1	PEK_U01-02, PEK_K01	C1 is based on the sum of the points from F1…F4. At least 50% of points is required.
C2	PEK_U01	C2 is based on quality of seminar presentation.
C3	PEK_W01-02	C3 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] Sam Lightstone,Toby Teorey,Tom Nadeau, Physical Database Design, Morgan Kaufmann, 2007
[3]

SECONDARY LITERATURE:

[1] Principles of Distributed Database Systems, Third Edition, M. Tamer Özsu, Patrick Valduriez, Springer, 2010
[2] C. S. Jensen - Temporal Database Management

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Advanced 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_S2CE_W05	C1	Lec1-Lec7	N1 – N2
PEK_W02	K2INF_W06_S2CE_W05	C1-C2	Lec1-Lec7	N1 – N2
PEK_U01 (skills)	K2INF_U08_S2CE_U10 K2INF_U08_S2CE_U09	C1-C2	Lec1-Lec7 Sem2-Sem8 Proj1-Proj15	N1 – N3
PEK_U02	K2INF_U08_S2CE_U10 K2INF_U08_S2CE_U09	C2	Proj1-Proj15	N3
PEK_K01 (competences)		C2	Proj1-Proj15	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 …Zaawansowane elementy sztucznej inteligencji….
Name in English … Advanced Topics in Artificial Intelligence ….
Main field of study (if applicable): ……..
Specialization (if applicable): … Computer Engineering (CE)
Level and form of studies: ~~1st/~~ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide~~*
Subject code INZ0110Wp
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			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			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. K2INF_W06_S2CE_W04
2. K2INF_U08_S2IT_U06
3.

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SUBJECT OBJECTIVES

C1 Extend and deepen the knowledge of intelligent methods, their uses and methods of validation
C2 The ability to select appropriate intelligent techniques and their validation to the task

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Awareness of the role of creative thinking and knowledge representation
PEK_W02 Issues connected with Machine Learning task
PEK_W03 Issues connected with imprecise knowledge
…
relating to skills:
PEK_U01 The ability to formulate problems in a way that facilitates its solution
PEK_U02 Skilful selection of intelligent techniques to the given problem
PEK_U03 The intelligent processing of imprecise knowledge
…
relating to social competences:
PEK_K01 Cooperation in group
PEK_K02

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to the course. What is Artificial Intelligence? A historical perspective and recent trends	2
Lec 2	Brain, Knowledge representation and processing, brain modeling. Memory as an association net. Gestalt principles of perception.	2
Lec 3	Problems: representation, re-representation and solving. Creative thinking	2
Lec 4	Supervised learning: inductive learning - learning version space. Induction of decision trees, ID3 and C4.5	2
Lec 5	Transformation and selection of attributes	2
Lec 6	Induction of rules covering sequential approach, the algorithm AQ, CN2, ILA	2
Lec 7, Lec8	Teams classifiers and clustering methods (Ensemble of Classifiers, clustering ensemble)	4
Lec 9, Lec 10	Statistical learning - selected methods	4
Lec 11	Reinforcement Learning - idea, methods	2
Lec 12	Learning from cases (Instance Based Learning)	2
Lec 13	Reasoning with uncertainty – rough sets theory	2
Lec 14	Evolutionary computation in data mining tasks	2
Lec 15	Summary of material, new directions.	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	Discussion about possible subjects of the project, teams, requirements	2
Proj 2	Decision and consultation about the project subject, its scope, etc.	2
Proj 3	Detailed plan of the project, consultation of used methods, approaches, etc.	6
Proj 4	Projects plan and progress presentation	4
Proj 5	Project realization and consultation	10
Proj 6	Student presentations of the project results	4
Proj 7	Summarization of the presented projects	2
	Total hours	30

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

TEACHING TOOLS USED
N1. Presentations with projectors N2. E-learning system used for the publication of teaching materials 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
F1 Project presentation in the middle of semester	PEK_U01 PEK_U02	Student can receive 10 point max. The presentation of the problem itself and the planned approach to solve the problem is evaluated.
F2 Presentation of the final results of the project	PEK_U02 PEK_U03 PEK_K01	Student can receive 20 point max. The presentation of the problem itself and the planned approach to solve the problem is evaluated.
P1 Final grade of the project	PEK_U02 PEK_U03 PEK_K01	Points for the presentations and additional 10 points for the student's activity during the semester is summed. The final evaluation will be issued in accordance with the following scale: % of points: grade [0%, 50%]: 2.0

		[50%+1 point, 60%): 3.0 [60%, 70%): 3.5 [70%, 80%): 4 [80%, 90%): 4.5 [90%, 100%]: 5.0
P2	PEK_W01 PEK_W02 PEK_W03	Exam. The exam is a written exam, checking knowledge of the lecture and the ability for practical use of this knowledge. It consists of open-ended questions, with known points for each. The student to pass the course should obtain more than 50% of all possible points (50%+1 point). % of points: grade [0%, 50%]: 2.0 [50%+1 point, 60%): 3.0 [60%, 70%): 3.5 [70%, 80%): 4 [80%, 90%): 4.5 [90%, 100%]: 5.0
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Mitchell Tom M., Machine Learning. McGraw-Hill companies, Inc., 1997.
[2] Jiawei Han: Data mining : concepts and techniques. Morgan Kaufmann Publishers, 2000.
[3] Russell S., Norvig P., Artificial Intelligence: A Modern Approach. 2nd Ed. Copyright © 2002. Prentice Hal
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SECONDARY LITERATURE:

[1] MAIMON O., ROKACH L.: Data Mining and Knowledge Discovery Handbook. Springer, 2006.
[2] Introduction to Machine Learning. Draft, Nils J. Nilsson http://ai.stanford.edu/~nilsson, 2010. Stanford University
[3] Arnold Lewis Glass, Keith James Holyoak, John Lester Santa: Cognition, Addison Wesly Pub. Comp., 1997

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

Halina Kwaśnicka, halina.kwasnicka@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
… Advanced Topics in Artificial Intelligence **…**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……..
AND SPECIALIZATION … Computer Engineering (CE) ..

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_S2CE_W02	C1	Lec 1- Lec 15;	N1-N2
PEK_W02	K2INF_W06_S2CE_W02	C1	Lec 1- Lec 15;	N1-N2
PEK_W03	K2INF_W06_S2CE_W02	C1	Lec 1- Lec 15;	N1-N2
…				
PEK_U01 (skills)	K2INF_U08_S2CE_U05	C2	Proj 1 – Proj 7	N1, N3
PEK_U02	K2INF_U08_S2CE_U07	C2	Proj 1 – Proj 7	N1, N3
PEK_U03	K2INF_U08_S2CE_U09	C2	Lec 1 – Lec 15; Proj 1 – Proj 7	N1, N2, N3
PEK_K01 (competences)	K2INF_U08_S2CE_U09	C2	Proj 1 – Proj 7	N1, N3
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 / DEPARTMENT…

SUBJECT CARD

Name in Polish Zastosowania i wyzwania informatyki

Name in English Applications and Challenges of Computer Science

Main field of study (if applicable): Computer Science

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 INZ0140Ws

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)	75				75
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	5				
including number of					

ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	3				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. None

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SUBJECT OBJECTIVES

C1 Educating the abilities of solving and understanding problems associated with the contemporary theories, solutions and technologies in computer engineering. Acquiring competence in the scope of the design of modern computers based on parallel, distributed, quantum and bio computations

C2 Acquiring competence in the scope of the assessment of the physical nature of information, quantum and bio computation. New kinds of computer architectures and software.

C3 Acquiring the knowledge of quantum computers and quantum computation. Acquiring the knowledge of bio computers and bio computation. Providing practical abilities in methods of the designing and implementation software with use quantum and bio solutions.

C4 Providing deepened knowledge of contemporary trends in the scope of new data security solutions, algebraic and quantum cryptography and security with use group, field and character theory.

C5 Providing the knowledge of trends essential to understand substantial problems of the safety and detection methods and to counteract problems of the safety in computer systems, web systems, mobile systems and built in systems.

C6 Acquiring the knowledge in processing and disclosing media data, of designing multimedia interfaces of computer applications and about developmental trends and the most significant new achievements in the area of contemporary multimedia technologies.

C7 Acquiring competence and shaping the attitude in the social scope including the ability of the harmonious group work and the reliable, honest and ethical practising a profession of the computer specialist and scientist with use contemporary theories and technologies.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student has a widened and deepened knowledge about of scope of the design of modern computers based on parallel, distributed, quantum and bio computations.

PEK_W02 Student has a knowledge about modern intelligent methods based on biocomputing and cortex models, their applications and methods of their validation. He has a detailed knowledge in processing and disclosing media data, of designing multimedia interfaces of computer applications and about developmental trends and the most significant new achievements in the area of contemporary multimedia technologies.

PEK_W03 Student knows contemporary trends in principles of essential methods, techniques, development tools applied at solving engineering complex tasks from the scope of designing and formulating mobile and hybrid systems.

PEK_W04 Student has a widened and deepened knowledge of contemporary trends in the scope of new data security solutions, algebraic and quantum cryptography and security with use group, field and character theory.

PEK_W05 Student has a knowledge trends essential to understand substantial problems of the safety and detection methods and to counteract problems of the safety in computer systems, web systems, mobile systems and built in systems.

relating to skills:

PEK_U01 Student has an ability to understand contemporary solutions in computer science based on last research results and last technologies applications.

PEK_U02 Student is able to understand and apply contemporary solutions and technologies in computer engineering. Especially he is able to understand technologies based on quantum and bio computing.

PEK_U03 Student is able to identify and to describe requirements of the user of the multimedia, distributed, web and other modern systems with applying contemporary solutions and tools.
PEK_U04 Student is able to understand human information processes, artificial intelligence and apply them in computer science profession.
PEK_U05 Student has an ability of the selection of the proper architecture of the system parallel/distributed/bio/quantum/optical to the solved problem.
PEK_U06 Student is able to select the appropriate method and the algorithm for solving a stated problem, as well as to effect the critical analysis and the evaluation of the suggested answer. He is using newest theoretical and technology solutions.
relating to social competences:
PEK_K01 Student has competence for solving ethical and society problems related to contemporary theories and technologies in software engineering.
PEK_K02 Student is able to cooperate in group, preparing presentation, discussion and argues ethical needs in modern computer science

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Physical nature of information and computation. Discrete and continuous information. Information density and entropy, the indeterminancy information rule. Old and new ideas of computers and computations. Macro, micro and nano scale of information flow. Basic description of mechanical-, electromagnetic-, optical-, bio- and quantum- information forms and transformations. Parallel and distributed computing. The future - galactic computer or one particle computer?	6
Lec 2	Quantum computers and quantum algorithms. Qubit as an quantum information unit. Quantum processes: teleportation, tunnelling and computation. Quantum gates. Toffoli gate and reverse computation. Quantum computers with use NMR, Mah-Zhender interferometer, quantum dot, heavy ion in semiconductor lattice. QC-algorithms and its complexity.	6
Lec 3	Human information processes. Artificial neural networks versus human brain. Limitations of artificial intelligence. What is a biocomputer? Biological cells, albumens as processor and memory. Modern computer vision and multimedia.	4
Lec 4	Computer crime. The nature of the new computer based crimes. Computer crime scene examination. Computer forensic.	6
Lec 5	New data security solutions. Algebraic and quantum cryptography. Security with use group, field and character theory. Continuous cryptography. Statistical databases. Zero knowledge proof in practice.	4
Lec 6	New types of algorithms. Object identification in Hilbert and Banach space. Prediction with use GRNN and wavelet.	2
Lec 7	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	Old and new ideas of hardware and software theories in computer science. Important role of physical nature of information.	4
Sem 2	Applications of quantum computers and quantum algorithms. Designing of quantum software.	4
Sem 3	Applications of artificial intelligence. New theories and new applications of cortex memory.	4
Sem 4	Applications of biocomputing. Challenges of computer science solutions based on biological cells and albumens as processor and memory.	4
Sem 5	Crimes and computer forensics. Applications and challenges of computer engineering in crime scene investigations, trace identification and free of law risk computing.	4
Sem 6	Applications of modern algebra, group theory, cohomology, spectral theory and other current achievements of mathematics in computer engineering.	4
Sem 7	Applications and challenges of object identification and object processing. Applications and challenges of mobile solutions. Theories and applications of designing and implementation mobile applications.	6
	Total hours	30

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_W01-PEK_W05 PEK_U01-PEK_U06	Short tests
F2	PEK_U01-PEK_K02	Evaluation of presentation, discussion and activity

F3	PEK_W01- PEK_K02	Final test
C=F1+F2+F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Stakhov A.: Mathematics of Harmony: From Euclid to Contemporary Mathematics and Computer Science. World Scientific Publishing 2009.

[2] Aaronson S.: Quantum computing since Democritus.Cambridge University Press 2013.

[3] Yanofsky N.S.: Quantum Computing for Computer Scientists. Cambridge University Press 2008.

[4] Pardalos P.M., Principe J.C.: Biocomputing. Springer 2002.

[5] Rohrkemper R.: Effective Topologies for Computation in Cortex-like Networks: Tools for evaluating computational richness and robustness/ LAP LAMBERT Academic Publishing 2012.

[6] Ali M., Bosse T., Hindriks K., Hoogendorn M., Jonker C., Treur J.: Contemporary Challenges and Solutions in Applied Artificial Intelligence. Springer 2013.

[7] Sein M.K., Munkvold BE., Orvik T., Wojtkowski W., Wojtkowski W.G., Zupannic Joze., Wrycza S.: Contemporary Trensd in Systems Sevelopment. Springer 2013.

SECONDARY LITERATURE:

[1] Carvalho V.H.: Image processing. Methods, Applications and Challenges. Gazelle 2012

[2] Selected science paper.

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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	C1-C7	Lec1-Lec6	N1, N2, N3
PEK_W02	K2INF_W06	C1-C7	Lec1-Lec6	N1, N2, N3
PEK_W03	K2INF_W06	C1-C7	Lec1-Lec6	N1, N2, N3
PEK_W04	K2INF_W06	C1-C7	Lec1-Lec6	N1, N2, N3
PEK_W05	K2INF_W06	C1-C7	Lec1-Lec6	N1, N2, N3
PEK_W06	K2INF_W06	C1-C7	Lec1-Lec6	N1, N2, N3
PEK_U01 - PEK_U06	K2INF_U08	C1-C7	Sem1-Sem6	N1, N2, N3
PEK_K01-PEK_K02	K2INF_W06, K2INF_U08	C1-C7	Lec1-Lec6 Sem1-Sem6	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 / DEPARTMENT…

SUBJECT CARD

Name in Polish Modelowanie i analiza biznesowa

Name in English Business Modeling and Analysis

Main field of study (if applicable): Computer Science

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 INZ0152Wc

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)	45	45			
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	3				
including number of ECTS points for practical (P) classes	1				
including number of ECTS points for direct	1,8				

teacher-student contact (BK) classes					

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. None

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SUBJECT OBJECTIVES

C1 Educating the abilities of using business processing modeling and analysis methods in computer engineering practice.

C2 Providing the knowledge of relationships between business processes, real objects, models and business process life cycle. Providing the knowledge of using deterministic and stochastic models in business modeling and analysis.

C3 Educating the abilities of using diagrams, charts and other formal and practical tools in analysing and modeling of business processes.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student has a knowledge about business process life cycle, relationships between business processes, real objects and models, business analysis tools and charts, business process cost metrics and practical applications of them.

PEK_W02 Student knows contemporary methods and tools for business modeling and analysis.

relating to skills:

PEK_U01 Student has an ability to understand and analyses business processes in computer engineering.

PEK_U02 Student is able to identify and to describe main parts of business processes and life-cycles. He has ability to practical use of business process analysis tools.

relating to social competences:

PEK_K01 Student is able to cooperate in modeling and analysis business processes.

PEK_K02 Student has competence for solving ethical and society problems related to contemporary business processes in computer engineering.

PROGRAMME CONTENT

	Form of classes - lecture	Number of hours
Lec 1	Introduction to business modeling and analysis.	2
Lec 2	Business process and information systems. Relationships between business processes, real objects and models. Business process life cycle. Analytical modeling versus simulation. Using IDEFF format for the business process mapping	2
Lec 3	Business process cost metrics. Analytical business process modeling. Steps of modeling. Classification of business process models Deterministic and stochastic models. Simulation and output analysis. case study of the business process modeling.	2
Lec 4	Business processes and software design. Formal description, analysis and tools. UML, Petri nets and other solutions.	2
Lec 5	Business analysis tools and charts. Part 1. Activity diagram, block diagram, business process diagram, business use-case diagram, cause and effect diagram, class diagram, communication diagram, data flow and context diagram, decision table. Examples in computer engineering.	2
Lec 6	Business analysis tools and charts. Part 2. Entity relationship diagram, flowchart, functional decomposition chart, FURPS+, object diagram, Pareto diagram, requirements attribute table, requirements traceability matrix, role map, root-cause analysis	2

	work plan, sequence diagram, state machine diagram . Examples in computer engineering.	
Lec 7	Petri nets and business modeling and analysis. Structure, behavior transition. Reachability graphs. Typical structures for business analysis. Extending Color and time Petri Nets in business modeling. Structural and simulation-based analysis.	2
Lec 8	Final test	1
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Business process life cycle. Theoretical solutions, exercises and examples.	2
Cl 2	Business process cost metrics . Theoretical solutions, exercises and examples.	2
Cl 3	Business processes and software design. Theoretical solutions, exercises and examples.	2
Cl 4	Business analysis tools. Theoretical solutions, exercises and examples.	2
Cl 5	Business analysis charts. Theoretical solutions, exercises and examples.	2
Cl 6	Petri nets and business modeling and analysis . Theoretical solutions, exercises and examples.	2
Cl 7	UML. Theoretical solutions, exercises and examples.	2
Cl 4	Final test.	1
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
…		
	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. 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		Short tests.
F2		Evaluation of exercises, activity, classes final test.
F3		Final test
C=F1+F2+F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Gooma H.: Software Modeling and Design: UML, Use cases, Patterns and Software Architectures. Cambridge University Press 2011.
[2] Aalst W.V.D., Stahl Ch.: Modeling Business Processes: A Petri Net-Oriented Approach. MIT Press 2011.
[3] Daoust N.: UML Requirements Modeling For Business Analysts. Technics Publications, LLC 2012.
[4] Podeswa H.: The Business Analyst's Handbook. Course Technology PTR 2008.

SECONDARY LITERATURE:

[1] Eriksson H.E., Penker M.: Business Modeling with UML: Business Patterns at work. Wiley & Sons, Fall 1999.
[2] Carkenord B.: seven Steps to Mastering Business Analysis. J. Ross Publishing 2008.

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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 _W03	C1-C3	Lec1-Lec7	N1, N2, N3
PEK_W02	K2INF _W03	C1-C3	Lec1-Lec7	N1, N2, N3
PEK_U01	K2INF _U06	C1-C3	Lec1-Lec7 Cl1- Cl7	N1, N2, N3
PEK_U02	K2INF _U06	C1-C3	Lec1-Lec7 Cl1- Cl7	N1, N2, N3
PEK_K01	K2INF _W03, K2INF _U06	C1-C3	Lec1-Lec7 Cl1- Cl7	N1, N2, N3
PEK_K02	K2INF _W03, K2INF _U06	C1-C3	Lec1-Lec7 Cl1- Cl7	N1, N2, N3

** - 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 **Hurtownie Danych**
Name in English **Data Warehouses**
Main field of study (if applicable): **Computer Science**
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 **INZ0164Wlp**
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)	**30**		**120**	**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**		**4**	**1**	
including number of ECTS points for practical (P) classes			**4**	**1**	

including number of ECTS points for direct teacher-student contact (BK) classes	**0,6**		**2,4**	**0,6**	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of database system, with a particular focus on the relational model.
2. At least basic knowledge of SQL query language

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SUBJECT OBJECTIVES

c1. Has basic knowledge on Business Intelligence systems.
c2. Has basic knowledge on transaction oriented processing (OLTP) and analytic oriented processing (OLAP).
c3. Has basic skills of determining type of processing (transaction vs analytic), including the ability to determine business needs and requirements.
c4. Has basic knowledge on multidimensional data model and basics of data warehousing
c5. Has basic skills of data warehouse usage, including design of data warehouses
c6. Has basic knowledge on data integration, reporting and visualisation
c7. Has basic skills of data integration process design
c8. Has basic skills of report generation and analysis
c9. Has basic knowledge on data analysis
c10. Has basic skills of data analysis tools usage

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 has basic knowledge on Business Intelligence
PEK_W02 has basic knowledge on data warehouses, including data warehouse design
PEK_W03 has basic knowledge on data integration process
PEK_W04 has basic knowledge on reporting and data analysis

relating to skills:
PEK_U01 can design and implement data integration process
PEK_U02 can design and implement basic data warehouse
PEK_U03 can conduct basic data analysis
PEK_U04 can design and implement simple reports, including different data visualisation methods
PEK_U05 observes occupational health and safety rules

relating to social competences:
PEK_K01 can acquire information from literature, and/or search for other sources
PEK_K02 understands the need for regular and constant work focused on course's material
PEK_K03 can identify basic usage of data warehouses, reporting and data visualization in different business processes

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Course details Business Intelligence Issues	2
Lec 2	Transaction vs analytic needs, processes and data sources	2
Lec 3	Multidimensional data model Basics of data warehousing	2
Lec 4	Data warehouse – design, including multidimensional modelling	2
Lec 5	ETL process	2
Lec 6	Data analysis, reporting and visualisation	2

Lec 7	Data analysis tools and techniques	2
Lec 8	Test	1
	Total hours	**15**
Form of classes - class		**Number of hours**
Cl 1		
..		
	Total hours	
Form of classes - laboratory		**Number of hours**
Lab 1	Course Details (Health and Safety Training, Course requirements)	1
Lab 2	SQL basics	1
Lab 3	Analysis of analytical needs Analysis of operational databases	2
Lab 4	ETL process – data extraction	2
Lab 5	ETL process – implementation, data transformation	2
Lab 6	Multidimensional data implementation – ROLAP ETL process – data loading	2
Lec 7	Analytical processing – SQL	2
Lec 8	Multidimensional data implementation – MOLAP ETL process –data loading	2
Lec 9	Using MOLAP	2
Lec 10	Analytical processing – MDX	2
Lec 11	Reporting	2
Lec 12	Data visualisation	2
Lec 13	Advanced reporting	2
Lec 14	Data analysis I	2
Lec 15	Data analysis II	2
	Total hours	**30**
Form of classes - project		**Number of hours**
Proj 1	Course details.	1
Proj 2	Operational data analysis – data sources for data warehouse	2
Proj 3	Analytical needs analysis Multidimensional data design	2
Proj 4	ETL process design and implementation	2
Proj 5	Data warehouse design	2
Proj 6	Data warehouse implementation	2
Proj 7	Reporting and data visualisation design and implementation	2
Proj 8	Data analysis design and implementation	2
	Total hours	**15**
Form of classes - seminar		**Number of hours**
Sem 1		
...		
	Total hours	

TEACHING TOOLS USED

N1. Lecture – traditional method with multimedia content
N2. Group work – discussion.

N3. Computer laboratory – traditional method with multimedia content
N4. Student's individual work – preparations to laboratories, literature studies

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_U06	Student assessment – individual discussion including laboratory result presentation, conclusions, etc.
F2	PEK_U01-PEK_U06	Student assessment – individual discussion including project result presentation, conclusions, etc.
P1	PEK_W01-PEK_W04	Test
P2	PEK_U01-PEK_U06	Student assesment – summary

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

1. Jensen C.S., Pedersen T.B., Thomsen C., Multidimensional Databases and DataWarehousing, Morgan & Claypool Publishers series SYNTHESIS LECTURES ON DATA MANAGEMENT, 2010
2. Rainardi V., Building a Data Warehouse With Examples in SQL Server, Apress, 2008
3. Harinath S., Pihlgren R., Lee D.G.-Y., Sirmon J., Bruckner R.M., PROFESSIONAL MICROSOFT® SQL SERVER® 2012 ANALYSIS SERVICES WITH MDX AND DAX, John Wiley & Sons, Inc., 2012
4. Microsoft SQL Server 2012 Integration Services, APN Promise, 2012
5. Inmon W., Building the Data Warehouse, John Wiley & Sons, New York 2002
6. Kimball R., Caserta J., The Data Warehouse ETL Toolkit, Wiley Publishing, Inc, 2004

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1. Aspin A., SQL Server 2012 Data Integration Recipes, Apress, 2012
2. Leonard A., Masson M., Mitchell T., Moss J.M., Ufford M., SQL Server 2012 Integration Services Design Patterns, Apress, 2012
3. Claudia Imhoff, Nicholas Galemmo, Jonathan G. Geiger, Mastering Data Warehouse Design, Wiley Publishing, Inc., 2003
4. MacLennan J., Tang ZH., Crivat B., Data Mining with SQL Server 2008, Wiley Publishing, Inc, 2009

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Data Warehouses
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
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_W06	C1-C3	Lec1-2, Proj2	N1
PEK_W02	K2INF_W06	C4-5	Lec3-4, Proj2-8	N1
PEK_W03	K2INF_W06	C6-7	Lec5, Proj4	N1
PEK_W04	K2INF_W06	C8-10	Lec6-7, Proj7-8	N1
PEK_U01 (skills)	K2INF_U08	C6	Lab4-6,Lab8, Proj4	N2,N3,N4
PEK_U02	K2INF_U08	C2-9	Lab3, Proj2-8	N2,N3,N4
PEK_U03	K2INF_U08	C9-10	Lab14-15, Proj8	N2,N3,N4
PEK_U04	K2INF_U08	C6, C8	Lab11-13, Proj7	N2,N3,N4
PEK_U05	K2INF_U08, K2INF_U09		Lab1, Lec1, Proj1	N2,N3,N4
PEK_K01 (competences)		C1-2,C4,C6,C9	Lec1-7, Lab2-15, Proj2-8	
PEK_K02			Lec1-7, Lab2-15, Proj2-8	
PEK_K03			Lec1-2, Proj2-3, Lab3	

** - 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): Computer Science
Specialization (if applicable): Computer Engineering
Level and form of studies: 2nd level, full-time
Kind of subject: optional
Subject code INZ0161WI
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		
For group of courses mark (X) final course					

Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes			3		
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. Computer graphics
2.

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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 Delivering the knowledge of techniques of non-linear digital video editing.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 The student has ordered, theoretically founded detailed knowledge of key problems of image and digital video processing.

PEK_W02 The student has ordered, theoretically founded detailed knowledge of non-linear digital video montage.

relating to skills:

PEK_U01 The student can perform advanced processing of digital images and video.

PEK_U02 The student is able to carry out non-linear digital video montage using special digital effects.

PEK_U03 The student is prepared to work in computer labs and knows the safety rules associated with this work.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Digital image classification. Raster of digital and printed images. Color depths. Color systems.	2
Lec 2	Image digitalization. Format conversion.	2
Lec 3	Scanners construction. Scanning techniques. 3D Scanners.	2
Lec 4	Image deformations during digitalization process. Image correction techniques. Mora effects.	2
Lec 5	Digital photo cameras. Digital movie cameras.	2
Lec 6	Software for digital image and video processing.	2
Lec 7	Digital image compression.	2
Lec 8	Special effects and filters.	2
Lec 9	MPEG and other video formats. Codecs.	2

Lec 10	DVD technology.	2
Lec 11	Principles of computer animations.	2
Lec 12	Digital video effects.	2
Lec 13	Rules of non-linear digital video editing.	2
Lec 14	Virtual reality.	2
Lec 15	Cyberspace.	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	Introduction	2
Lab 2-3	Digital image viewers and converters	4
Lab 4-6	Digital image corrections	6
Lab 7-9	Morphing	6
Lab 10-14	Digital video editing	10
Lab 15	Work discussions and evaluations	2
	Total hours	30

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

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
…		
	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 the e-learning system.
N5. Advanced software and specific equipments available in the Multimedia 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	PEK_W01 PEK_W02	Examination
F1	PEK_U01	Grading
F2	PEK_U02	Grading
F3	PEK_U03	Training

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Gonzalez R. C., Woods R. E.: Digital Image Processing, NJ : Pearson Prentice-Hall, 2008.
[2] Law M.S. (Ed.): Principles of Visual Information Retrieval. London: Springer-Verlag 2001.
[3] Long B., Schenk S.: The Digital Filmmaking Handbook, SE. Charles River Media 2002.
[4] Petru M., Petru C.: Image Processing. The Fundamentals. Chichester: John Wiley & Sons 2010.
[5] Richardson I.: H.264 and MPEG-4 Video Compression: Video Coding for Next-Generation Multimedia. Chichester: John Wiley & Sons, 2005

SECONDARY LITERATURE:

[1] Bimbo Del A.: Visual Information Retrieval. San Francisco: Morgan Kaufmann Publishers 1999.
[2] Bovik A. (Ed.): Handbook of Image and Video Processing. Amsterdam: Elsevier 2005.
[3] Chapman N., Chapman J.: Digital Multimedia. SE. Chichester: John Wiley & Sons 2006.
[4] Guan L., Kung S-Y., Larsen J.: Multimedia Image and Video Processing. Boca Raton: CRC Press 2001.
[5] Johnson N. F., Duric Z., Jajodia S.: Information Hiding: Steganography and Watermarking – Attacks and Countermeasures. Kluwer Academic Publishers 2000.
[6] Millerson G., Owens J.: Video Production Handbook. Burlington: Focal Press 2008.

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT: **Digital Image and Video Processing**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY:
Computer Science
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 (wiedza)	T2A_W04 – K2INF_W02	C1	Wy1 – Wy10	N1 – N4
PEK_W02	T2A_W04 – K2INF_W02	C2	Wy11 – Wy15	N1 – N4
PEK_U01 (umiejętności)	T2A_U19 – K2INF_U07	C1	La2 – La9	N1 – N5
PEK_U02	T2A_U19 – K2INF_U07	C2	La10 – La15	N1 – N5
PEK_U03	K2INF_U09	C1 – C2	La1	N4 – N5

** - 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): Computer Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university wide*~~
Subject code INZ0154S
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					3
including number of 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 Knowledge, skills and competences acquired at Informatics field at second level of study until 4th semester

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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.

C3 Preparing students to make a short presentation in a foreign for them language

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.

PEK_U03 He is able to present the results of his master thesis in foreign language (for polish students it is English, for international students it is Polish)

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 PEK_U03	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:

[1] Literature related to the scope of realized project selected by student and recommended by the teacher.
[2] 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 inż. Jan Kwiatkowski, jan.kwiatkowski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Diploma seminar
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
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_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
PEK_U03	K2INF_U08	C3	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 Systemyekspertowe
Name in English Expert Systems
Main field of study (if applicable): Informatyka
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 INZ0165WI
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	X				
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. Basic knowledge of logics and set theory.

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SUBJECT OBJECTIVES

C1 Acquiring knowledge on history, architecture and tasks of expert systems as well as on typical methods of knowledge representation and processing.

C2 Developing skills in implementing simple knowledge bases and reasoning algorithms in declarative programming languages (e.g. Prolog).

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student can present the idea and structure of an expert system, and the idea of a knowledge representation.

PEK_W02 Student can describe models and methods of expert systems based on two-value logics.

PEK_W03 Student can describe models and methods of expert systems based on multi-value logics and of expert systems automatically updating their knowledge base.

relating to skills:

PEK_U01 Student is capable of implementing and querying a knowledge base containing propositions, using a declarative programming language (e.g. Prolog) – in laboratory conditions.

PEK_U02 Student is capable of implementing and querying a knowledge base containing predicates, using a declarative programming language (e.g. Prolog) – in laboratory conditions.

PEK_U03 Student is capable of implementing fuzzy rules and the algorithm for processing them, using a chosen software package in laboratory conditions.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec1	History, application areas and perspectives of automated reasoning and expert systems.	2
Lec2	Basic components and structure of expert systems.	2
Lec3	Main tasks corresponding to the roles of: a user, a designer, an expert, a knowledge engineer, a programmer.	2
Lec4, Lec5	Expert systems based on relational knowledge representation.	4
Lec6 – Lec8	Expert systems based on logical knowledge representation (propositional logic).	6
Lec9 – Lec11	Expert systems based on predicate calculus.	6
Lec12 – Lec14	Application of other logics (fuzzy, modal) and hybrid approaches.	6
Lec15	Knowledge validation and updating. Learning in expert 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**
Lab1	Explaining safety rules (BHP training).	1
Lab1 – Lab5	Implementation and querying propositional knowledge base in Prolog	9

	programming language.	
Lab6 – Lab10	Implementation and querying predicative knowledge base in Prolog programming language.	10
Lab11 – Lab15	Implementing fuzzy rules and the algorithm for processing them, in a chosen software package.	10
	Total hours	30

Form of classes - project		**Number of hours**
Proj1		
Proj2		
Proj3		
Proj4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem1		
Sem2		
Sem3		
…		
	Total hours	

TEACHING TOOLS USED

N1. Traditional lecture.
N2. Group work – discussion, conversation with an individual student.
N3. Students' individual work – programming.
N4. Students' individual work – performing computer simulations.
N5. Students' individual work – studying literature.
N6. Students' individual work – analyzing, 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 (lecture)	PEK_W01 – PEK_W03	Examination
F2 (laboratory)	PEK_U01 – PEK_U03	Monitoring students' activity and observance of safety and laboratory rules. Conversations with individual students concerning current laboratory exercises (incl. presentation of computer programs, computed resultsand conclusions), a report.
P1 (lecture and laboratory as per GK)	PEK_W01 – PEK_W03, PEK_U01 – PEK_U03	(2*F1 + F2) / 3, F1, F2> 2

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1]
[2]
[3]
[4]

SECONDARY LITERATURE:

[1] Z. Bubnicki "Analysis and Decision Making in Uncertain Systems", Springer Verlag, 2004
[2] Z. Bubnicki "Modern Control Theory", Springer Verlag, 2005
[3] T. Mitchell "Machine Learning", McGraw-Hill, 1997
[4] Journal articles on expert systems available through WUT librarian system.

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

Donat Orski, donat.orski@pwr.edu.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Expert Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatyka
AND SPECIALIZATION ComputerEngineering

Subjecteducationaleffect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subjectobjectives***	Programmecontent***	Teachingtoolnumber***
PEK_W01 (knowledge)	K2INF_W06	C1	Lec1 – Lec3	N1, N5
PEK_W02	K2INF_W06	C1	Lec4 – Lec11	N1, N5
PEK_W03	K2INF_W06	C1	Lec12 – Lec15	N1, N5
PEK_U01 (skills)	K2INF_U08, K2INF_U09	C2	Lab1 – Lab5	N2 – N6
PEK_U02	K2INF_U08, K2INF_U09	C2	Lab6 – Lab10	N2 – N6
PEK_U03	K2INF_U08, K2INF_U09	C2	Lab11 – Lab15	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: Podstawy inżynierii wiedzy
Name in English: Foundations of Knowledge Engineering
Main field of study (if applicable): Computer Science
Specialization (if applicable): Computer Engineering (CE)
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ0139Wc
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	X				
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. Basic knowledge of logics, set theory, probability theory, graph theory.

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SUBJECT OBJECTIVES

C1 Acquiring understanding of issues related to using computers in solving engineering problems concerning knowledge.

C2 Developing skills in formulating mathematical models based on available knowledge or data, in designing solution algorithms to analysis and decision problems, and in application of existing software tools.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student can define a knowledge representation (KR) using relations or logical formulas, and formulate analysis problem (AP) and decision problem (DP) based on these KRs.

PEK_W02 Student can explain specific concepts of knowledge validation and updating devoted to a relational KR and to a logical KR.

PEK_W03 Student can characterize the process of knowledge discovery in databases and define several data mining problems and methods useful in knowledge acquisition.

relating to skills:

PEK_U01 Student is capable of applying knowledge processing algorithms for solving AP and DP.

PEK_U02 Student is capable of applying knowledge validation and updating algorithms to relational and logical KRs.

PEK_U03 Student knows how to process data so as to discover knowledge, and how to use existing software to carry out this task.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec1	Introduction. Main problems of knowledge engineering. Classical mathematical models vs. knowledge representations (KRs).	2
Lec2, Lec3	Relational KR.	4
Lec4 – Lec6	Logical KR. Issues on computational complexity.	6
Lec7, Lec8	Probabilistic uncertainty in logical KR – probabilistic reasoning and Bayesian networks.	4
Lec8, Lec10	Validation and updating of a relational knowledge KR.	3
Lec10, Lec11	Automated knowledge extraction from large data sets. Knowledge discovery in databases. Attributes' domains discretization and other data mining problems.	2
Lec11 – Lec13	Association rules.	4
Lec13, Lec14	Decision trees.	3
Lec15	Data clustering.	2
	Total hours	30

Form of classes - class		Number of hours
Cl1 – Cl6	Solving example problems of mathematical modeling with the use of knowledge representations, solving analysis and decision making problems based on knowledge representations.	12
Cl7 – Cl10	Numerical examples on knowledge validation and updating. Logical KR, Bayesian networks, relational KR. Using software tools.	7

Cl10 – C11	Mining data for association rules - numerical example, computer simulations.	3
Cl12, Cl13	Mining data for decision trees - numerical example, computer simulations.	4
Cl14	Mining data for clusters - numerical example, computer simulations.	2
Cl15	Test	2
	Total hours	30

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. Traditional lecture.
N2. Students' individual work – solving computational exercises.
N3. Students' individual work – programming.
N4. Students' individual work – performing computer simulations.
N5. Students' individual work – studying literature.

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_W03	Examination
F2 (classes)	PEK_U01 – PEK_U03	Observation of students' activity during classes, test
P1 (lecture and classes as per GK)	PEK_W01 – PEK_W03, PEK_U01 – PEK_U03	(2*F1 + F2) / 3, F1, F2> 2

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1]
[2]
[3]
[4]

SECONDARY LITERATURE:

[1] P. Adrians, D. Zantige "Data mining", Addison-Wesley, 1996
[2] T. Mitchell "Machine Learning", McGraw-Hill, 1997
[3] Z. Bubnicki "Modern Control Theory", Springer Verlag, 2005
[4] N. T. Nguyen "Advanced Methods for Inconsistent Knowledge Management", Springer Verlag, 2007

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Foundations of Knowledge Engineering
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatyka
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_W02	C1	Lec1 – Lec6	N1, N5
PEK_W02	K2INF_W02	C1	Lec7 – Lec10	N1, N5
PEK_W03	K2INF_W02	C1	Lec10 – Lec15	N1, N5
PEK_U01 (skills)	K2INF_U05	C2	Cl1 – Cl6	N2 – N5
PEK_U02	K2INF_U05	C2	Cl7 – Cl10	N2 – N5
PEK_U03	K2INF_U05	C2	Cl10 – Cl14	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 systemów informacyjnych
Name in English Information Systems Modeling and 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 INZ0113WC
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	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	X				
Number of ECTS points	3	4			
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	2,4			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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

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SUBJECT OBJECTIVES

C1. Basic knowledge in the area of object-oriented software modeling relating to the modeling and the object-orientation as modern paradigms in software development.

C2. Modern modeling languages: the Unified Modeling Language, Business Process Modeling Notation, and SysML as standards in modern approaches to information systems modeling.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:

PEK_W01: Students have basic knowledge on the role of modeling in information systems development process, especially, they know and understand the role of business modeling and specification of system requirements.

PEK_W02: Students have knowledge about modern modeling languages.

Relating to skills:

PEK_U01: Students 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 think creatively and act effectively.

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Software development cycle. Model-driven and quality-driven software development.	2
Lec 2	Survey of modeling languages: UML, BPMN and SysML.	2
Lec 3	Class diagrams – classes, associations, generalizations.	2
Lec 4	Object diagrams as instances of class diagrams.	2
Lec 5	Object Constraint Language.	2
Lec 6	System requirements; use case diagrams.	2
Lec 7	Sequence diagrams.	2
Lec 8	UML activity diagrams.	2
Lec 9	BPMN activity diagrams.	2
Lec 10	Statechart diagrams.	2
Lec 11	SysML requirements diagrams.	2
Lec 12	System analysis.	2
Lec 13	Architecture design.	2
Lec 14	UML implementation diagrams – component and deployment diagrams.	2
Lec 15	Metamodeling, UML metamodel.	2
	Total hours	30

	Form of classes - class	**Number of hours**
Cl 1	Textual description of exemplary application domains.	2
Cl 2	Construction and analysis of simple class diagrams.	2
Cl 3	Object diagrams as instances of class diagrams.	2
Cl 4	Analysis of advanced elements of class diagrams (association classes, n-ary associations).	2
Cl 5	Case study – an example of structural modeling.	2

Cl 6	Construction and analysis of OCL constraints imposed on class diagrams.	2
Cl 7	Intermediate test.	2
Cl 8	Construction and analysis of use case diagrams.	2
Cl 9	Interpretation of use cases using sequence diagrams.	2
Cl 10	Interpretation of use cases using activity diagrams.	2
Cl 11	Construction and analysis of simple BPMN diagrams.	2
Cl 12	Construction and analysis of advanced BPMN diagrams.	2
Cl 12	Construction and analysis of simple state diagrams.	2
Cl 13	Construction and analysis of advanced state diagrams.	2
Cl 14	SysML requirements diagrams.	2
Cl 15	Final 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_W02 PEK_U01	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_U02	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_K01	Each student gets up to 20 points for own solution of problems from the list of problems for the examination test.

C Final evaluation is based on the sum of points received within F1, F2 and F3 evaluations, according to the table:

Points	20	25	30	35	40
Mark	3.0	3.5	4.0	4.5	5.0

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:

[3] Graessle P., Baumann H., Baumann P., *UML 2.0 w akcji. Przewodnik oparty na projektach*, Helion, 2006.
[4] Object Management Group, Unified Modeling Language (available on the website: www.omg.com).
[5] Object Management Group, System Modeling Language SysML (available on the website: www.omg.com).
[6] 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)	S2CE_W02, S2CE_W03	C1, C2	Lec1-Lec15	N1, N2, N3, N4
PEK_W02	S2CE_W02, S2CE_W03	C1, C2	Lec1-Lec15	N1, N2, N3, N4
PEK_U01 (skills)	S2CE_U01, S2CE_U02, S2CE_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_U02	S2CE_U01, S2CE_U02, S2CE_U06	C1, C2	Cl1-Cl15	N1, N2, N3, N4
PEK_K01 (competences)	S2XXX_K01	C1, C2	Lec1-Lec15 Cl1-Cl15	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 **W8** / DEPARTMENT……

SUBJECT CARD

Name in Polish Systemy mobilne i multimedialne
Name in English Mobile and Multimedia Systems
Main field of study (if applicable): IT
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 INZ000137WI
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			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 object-oriented programming.
2. Basic knowledge of computer application interface design.
3. Elementary knowledge of graphics programs.

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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 applications using video files and audio files in an Android environment. Testing applications on a mobile device.	3
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.	
	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 (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
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	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.

	PEK_K01 PEK_K02	

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:

[7] Charlie Collins, Michael Galpin, Matthias Kaeppler, Android in Practice, Manning Publications Co, 2012.
[8] Ian F. Darwin, Android. Android Cookbook, O'Reilly, 2012.
[9] Frank Ableson, Robi Sen, Android in Action. Second edition, Manning Publications Co, 2011.
[10] Shane Condor, Lauren Darcey, Android Wireless Application Development(2nd Edition), Addison-Wesley, 2011.
[11] Jeff Friesen, Learn Java for Android Development, Appres, 2010.
[12] Derrick Ypenburg, ActionScript 3.0: Visual QuickStart Guide, Peachpit Press, 2009.
[13] Adobe Creative Team, Adobe Flash Professional CS6 Classroom in a Book, Adobe System Incorporeted, 2012.
[14] Stephen Chin, Dean Iverson, Oswald Campesato, Paul Trani, Pro Android Flash, Appres, 2011.

SECONDARY LITERATURE:

[1] Lyza Danger Gardner, Jason Grisby, Head First Mobile,O'Reilly, 2012.
[2] Jeremy Kerfs, Beginning Android Tablet Games Programming, Appres, 2011.
[3] Julian Dolce, Android Development with Flash, Wiley Publishing Inc, 2010.
[4] Juhani Lehtimaki, Smashing Android UI, John Wiley & Sons, 2013.
[5] 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 **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): Computer Engineering
Level and form of studies: 1st/ ~~2nd~~* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ0135
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			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 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

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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.
C5 Preparing to work in computer labs and learning the rules of safety associated with this work.

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
PEK_U03 Can use computer labs and knows the rules of safety in these labs.

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. Basics of Internet.	2
Lec 2	Internet infrastructure	2
Lec 3	TCP/IP protocol stack, IPv4, Distance metrics.	2
Lec 4	TCP transport.	2
Lec 5	DNS, King.	2

Lec 6	HTTP - current and future developments, Web traffic characteristics.	2
Lec 7	Web performance issues	2
Lec 8	Web performance prediction.	2
Lec 9	Spatial econometrics in theory	2
Lec 10	Spatial econometrics in practice	2
Lec 11	Parallel applications in Web environment	2
Lec 12	End-to-end performance of Web services	2
Lec 13	Method of performance measurement and profiling parallel applications in Web environment	2
Lec 14	Management of distributed 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	Organization classes. Health and Safety Training.	2
Lab 2	Reminder of C++ language and introduction to the CSIM package	2
Lab 3	Random numbers and streams	2
Lab 4	CSIM objects: processes, facility, event, tables	2
Lab 5	Queuing networks, M/M/1 and M/M/N queue	2
Lab 6	Queuing networks, M/M/1 and M/M/N queue Contd.	2
Lab 7	Simulation M/M/1 queue with using Markov Chain	2
Lab 8	Servers with JSQ Policy	2
Lab 9	Generating synthetic trace file	2
Lab 10	Fork-Join Queueing System	2
Lab 11	Fork-Join Queueing System Contd.	2
Lab 12	Social Network	2
Lab 13	Social Network Contd.	2
Lab 14	Social Network 2	2
Lab 15	Final grading	2

	Total hours	30
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. Multimedia presentations 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 PEK_U03	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,	Examination of the course or development problem made by the

	PEK_U01-2, PEK_K01-2	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, prof. PWr, 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 **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	K2INF_W06_S2ITM_W01	C1, C4	Lec1-15, Lab1-15	N1, N2, N3, N4, N5
PEK_U01	K2INF_U08_S2ITM_U02	C3, C4	Lec1-15, Lab1-15	N1, N2, N3, N4, N5
PEK_U02	K2INF_U08_S2ITM_U06	C3, C4	Lec1-15, Lab1-15	N1, N2, N3, N4, N5
PEK_U03	K2INF_U09	C5	Lab1	N2
PEK_K01	K2INF_U08_S2ITM_K01	C1, C2, C3,C4	Lec1-15, Lab1-15	N1, N2, N3, N4, N5
PEK_K02	K2INF_U08_S2ITM_K02	C1, C2, C3, C4	Lec1-15, Lab1-15	N1, N2, N3, N4, N5

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

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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): Computer Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: ~~obligatory~~ / optional ~~/ university-wide*~~
Subject code INZ0153WI
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)	45		45		
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	X				

mark (X) final course					
Number of ECTS points	3				
including number of ECTS points for practical (P) classes	1				
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. Knowledge, skills and competences acquired at Informatics field at second level of study until 4th semester

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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.

C2 Acquisition of the ability to apply the principles of health and safety work processing

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

PEK_U02 Is able to use the principles of safety and health at work

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 Computer Engineering 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.	1
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	14

	to computer engineering. Laboratories will be related to one (monographic approach) from the areas of research and development conducted by the teachers.	
	Total hours	15

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 homework's.
F2 – (laboratory)	PEK_U01 PEK_U02	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

In order to receive a positive grade from each activity is required to obtain at least 40% of the points.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[15] 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 inż. Jan Kwiatkowski, jan.kwiatkowski@pwr.edu.pl
Dr inż. Anna Kamińska-Chuchmała, anna.kaminska-chuchmala@pwr.edu.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Monographic Subject
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_W06	C1	Lec1 – Lec8	N1
PEK_U01 (skills)	K2INF_U08	C1	Lab1 – Lab8	N2
PEK_U02	K2INF_U09	C2	Lab1 – Lab8	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): Computer Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code INZ0142P
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				2	
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 3rd semester

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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.	30
	Total hours	30

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:

[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 inż. Jan Kwiatkowski, jan.kwiatkowski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis I
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_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): Computer Engineering
Level and form of studies: ~~1st~~/ 2nd* level, full-time ~~/ part-time*~~
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ0155P
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)				180	
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				10,8	

*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
C2 Developing the students' ability to independently identify gaps in his knowledge and self-complete them.

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
PEK_U01 He can during project realization determine own gaps in knowledge, and then top up them yourself.

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.	180
	Total hours	180

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	Educational effect	Way of evaluating educational effect achievement

(during semester), P – concluding (at semester end)	number	
P	PEK_U01 PEK_U02	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:

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

[19] 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 inż. Jan Kwiatkowski, jan.kwiatkowski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MSc Thesis II
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_U01 (skills)	K1INF_U03, K2INF_U08	C1	Proj1	N1, N2, N3, N4
PEK_U02	K1INF_U10	C2	Pr1	N1,N4

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

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FACULTY **W-8** / DEPARTMENT……

SUBJECT CARD

Name in Polish Systemy multimedialne
Name in English Multimedia Information Systems
Main field of study (if applicable): IT
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 INZ000147WI
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		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	X				
Number of ECTS points	3		4		
including number of ECTS points for practical (P) classes			3		
including number of ECTS points for direct teacher-student contact (BK) classes	1,8		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.

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SUBJECT OBJECTIVES

C1 Provide basic knowledge of the design of multimedia applications.
C2 Learning programming multimedia applications in Adobe Flash and HTML5.
C3 Presentation graphics software.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 He knows and understands multimedia applications specific.
PEK_Wo2 Has knowledge of the design and development of multimedia applications.
PEK_W03 Has knowledge of software tools for processing and multimedia creation.

relating to skills:
PEK_U01 Able to define a set of potential functional requirements of multimedia applications and, based on this set, can design a multimedia application.
PEK_U02 He can build a multimedia application.
PEK_U02 He can convert and generate media.

relating to social competences:
PEK_K01 Able to work with a potential user of multimedia application in order to define the set of possible functional requirements.
PEK_K02 It can take into account in the design process of mobile application interface specific requirements of a potential user.

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	The presentation of the lecture plan. A review of selected multimedia applications implemented in different runtime environments. Presentation of Adobe Flash Environment. Demonstration of constructing multimedia applications in Adobe Flash.	2
Lec 2	Presentation of the basic elements of the Adobe Flash. Presentation of the principles of design and multimedia applications run in Adobe Flash. Programming mechanisms of interaction.	2
Lec 3 Lec 4	Grammar describes the basics of ActionScript 3.0. Presentation and discussion of selected examples of programs in ActionScript 3.0.	4
Lec 5	Analysis of complex mechanisms of interaction and navigation multimedia application. Presentation of the AS 3.0 code fragments implementing mechanisms of navigation.	2
Lec 6 Lec 7	A review of selected media data compression formats. Presentation methods of media management in Adobe Flash CS6 from the timeline and ActionScript 3.0. Discussion of mechanisms for streaming media data, and methods for working with audio and video. Presentation and analysis of the source code for multimedia applications using audio and video. Overview of multimedia application design principles of the peculiarities of the target group, the platform runtime and lifetime of the application.	4
Lec 8	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.	2
Lec 9	Overview and characteristics of programming environments used for multimedia processing components of multimedia applications. Describes the basics of using Photoshop. Presentation 3ds Max Design. Discussion of the principles of cooperation Photoshop and 3ds Max Design with the Adobe Flash environment.	2
Lec 10	Discussion of the principles of design and construction of multimedia mobile	2

	applications in Adobe Flash. Presentation and discussion of program code in AS 3.0, dedicated mobile platforms.	
Lec 11 Lec 12	Presentation environments alternatives to Adobe Flash for example, Adobe Director, Microsoft Silverlight and HTML5. Describes the basics of grammar HTML5. Overview of HTML5 canvas elements. Presentation of the principles API canvas elements. Discussion of the principles of working with images and video clips. Discussion of the principles of animation and interaction with the elements of the canvas. Presentation and discussion of the code sample programs implemented in HTML5.	4
Lec 13 Lec 14	Discussion of the principles of the use of 3D graphics for multimedia applications. Presentation and discussion of the example design and animation of 3D objects in the environment 3ds Max Design. Creating and managing objects in a 3D environment in Adobe Flash. Discussion environments support the creation of 3D graphics in AS 3.0. The presentation the possibility Papervision and Away3D environments. Presentation and discussion of the principles of combining components Papervision and Away3D with native code multimedia applications in AS 3.0.	4
Lec 15	Summary of the lecture. Discuss the importance of mobile multimedia applications. Discussion of factors affecting the commercial success of a multimedia application.	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	Presentation of the principles of operation of the laboratory and the principles of assessment. Basic use of the Adobe Flash environment. How to use the GUI tools. Animations in the timeline.	2
Lab 2	Defining symbols: buttons, movie clip and graphic. The implementation of the mechanisms of interaction. Importing multimedia components to the working environment.	2
Lab 3	An interactive gallery of photos from the alpha channel animation in the timeline (in the form of movie clips). Construction applications on multiple layers. Interaction and animation in AS 3.0.	2
Lab 4	Design interactive photo gallery with exciting animation and sound. Coding in AS 3.0. Downloading multimedia components from the application library.	2
Lab 5	Construction of the complex mechanisms, interactive animation in AS 3.0.	2
Lab 6	Constructing an application that retrieves multimedia components from external sources (from the indicated storage location) in AS 3.0.	2
Lab 7	Constructing sound management of multimedia applications and video in AS 3.0. Implementation of the built-in mechanisms audio and video.	2
Lab 8	Using the motion editor panel (Motion Editor). Preparing an animated banner using motion editor.	2
Lab 9	Designing a 3D object model and implementation of animation in 3ds Max Design environment.	2
Lab 10 Lab 11	Designing complex 3D object in the 3ds Max Design. The implementation of a set of animation movements between selected points 3d object. Export animation to Adobe Flash. Programming navigation mechanism in AS 3.0.	4

Lab 12	Implementation interactive animation in HTML5.	2
Lab 13 Lab 14	Designing a multimedia e-learning applications (with elements of interactive tests), implementation in AS 3.0, running and testing of the tablet with Android.	4
Lab 15	Summary laboratory. Credit lab.	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. 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 (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 PEK_W02 PEK_W03 PEK_U01 PEK_U02 PEK_U03	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_W03	The summary of the laboratory is design multimedia e-learning applications (with elements of interactive tests) according to the specifications of 10 laboratory task in AS 3.0 and run on an Android tablet. The task 10 may be obtained 0, 1, 2, 3 or 4 points.

	PEK_U01 PEK_U02 PEK_U03 PEK_K01 PEK_K02	

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:

[20] Derrick Ypenburg, ActionScript 3.0: Visual QuickStart Guide, Peachpit Press, 2009.
[21] Adobe Creative Team, Adobe Flash Professional CS6 Classroom in a Book, Adobe System Incorporeted, 2012.
[22] Keith Peters, ActionScript 3.0 Animation. Making Things Move !, Friendsof, 2007.
[23] Stephen Chin, Dean Iverson, Oswald Campesato, Paul Trani, Pro Android Flash, Appres, 2011.
[24] Eric T Freeman, Elizabeth Robson, Head First HTML5 Programming: Building Web Apps with JavaScript, O'Reilly, 2011.
[25] Eric Rowell, HTML5 Canvas Canvas Cookbook, Packt Publishing, 2011.

SECONDARY LITERATURE:

[6] Matthew MacDonald, HTML5: The Missing Manual, O'Reilly, 2011.
[7] Chuck Hudson, Tom Leadbetter, HTML5 Developer's Cookbook, Addison-Wesley, 2012.
[8] Shelley Powers, Painting the Web, Shelley Powers, 2008.
[9] Jim Ver Hague, Chris Jackson, Flash 3D: animation, interactivity and games, Elsevier/ Focal Press, 2006.
[10] Adobe Creative Team, Adobe Photoshop Professional CS6 Calssroom in a Book, Adobe System Incorporated, 2012.
[11] Sham Tickoo, Autodesk 3ds Max Design2013: A Tutorial Approach, Autodesk, 2012.
[12] Cameron Chapman, The Smashing Idea Book: From Inspiration to Application (Smashing Magazine Book Series), Wiley and Sons, 2011.
[13] Pete Brown, Silverlight 5 in Action, Manning Publications Co, 2012.
[14] Mike Snell, Lars Powers, Microsoft Visual Studio 2010 Unleashed, Pearson Education Inc, 2011.

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
Multimedia Information Systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
IT
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-Lec15	N1, N2, N3, N4
PEK_W02	K2INF_W06_S2ITM_W03 K2INF_W06_S2ITM_W04	C1,C2,C3	Lec1-Lec15	N1, N2, N3, N4
PEK_W03	K2INF_W06_S2ITM_W03 K2INF_W06_S2ITM_W04	C1,C2,C3	Lec1-Lec15	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_U03	K2INF_U08_S2ITM_U09 K2INF_U08_S2ITM_U10	C1,C2,C3	Lab1-Lab15	N1, N2, N3, N4
PEK_K01 (competences)		C1,C2,C3	Lec1-Lec15 Lab1-Lab15	N1, N2, N3, N4
PEK_K02		C1,C2,C3	Lec1-Lec15 Lab1-Lab15	N1, N2, N3, N4

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

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

SUBJECT CARD

Name in Polish: Przetwarzanie równoległe i rozproszone
Name in English: Parallel and Distributed Computing
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 INZ000136Wcl
Group of courses YES ~~/ NO*~~

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

mark (X) final course					
Number of ECTS points	2	2	2		
including number of ECTS points for practical (P) classes	0	0	2		
including number of ECTS points for direct teacher-student contact (BK) classes	1.2	1.2	1.2		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of computer architecture and organization
2. Programming skills at an intermediate level

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SUBJECT OBJECTIVES

C1 Acquainting students with different environments that allow parallel processing

C2 Acquainting students with the most popular parallel algorithms

C3 Acquainting students with different techniques used during program parallelization

C4 Acquainting students with different parallel computers architecture

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

C7 Acquisition of the ability to solve different problems related to parallel and distributed computing

C8 Acquisition of the ability to apply the principles of health and safety work processing

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 He knows different environments that allow parallel processing.

PEK_W02 He knows most popular parallel algorithms

PEK_W03 He knows different approaches to program parallelization

PEK_W04 He knows different parallel computers architectures

relating to skills:

PEK_U01 He is able to choose parallel environment to the selected problem

PEK_U02 He is able to write programs under different parallel distributed environment

PEK_U03 He is able to solve different problems related to parallel and distributed computing

PEK_U04 Is able to use the principles of safety and health at work

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Parallel and distributed computing - basic definitions. Taxonomy of parallel computers. Static and dynamic interconnection networks, typical	2

	topologies	
Lec 2	MPI standard. Message passing communication. Collective communication.	2
Lec 3	Evaluations of parallel systems: performance metrics, scalability of parallel systems, Amdhal, Gustafson and other laws. Using granularity for parallel program evaluation.	2
Lec 4	Parallelization and vectorization techniques. Dependencies in sequential programs and the ways of its elimination.	2
Lec 5	Parallel matrix multiplication and parallel sorting algorithms	2
Lec 6	Parallel graph algorithms	2
Lec 7	Automatic program parallelization, dependence tests.	2
Lec 8	Loop transformation techniques	2
Lec 9	Architecture of GPU. Programming in CUDA environment	2
Lec 10	Load balancing, task mapping and task scheduling in parallel distributed environments	2
Lecc11	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	Presentation of classes scope and grading principles. Solving simple problems related with parallel execution I.	1
Cl 2	Solving simple problems related with parallel execution II.	2
Cl 3	Scalability analysis. Using Amdhal law for performance prediction.	2
Cl 4	Determining dependences in sequential programs and its elimination.	2
Cl 5	Evaluation of different parallel algorithms.	2
Cl 6	Evaluation of different transformation techniques.	2
Cl 7	Evaluation of different loop transformation techniques	2
Cl 8	Evaluation of different task mapping and task scheduling algorithms.	2
	Total hours	15

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 laboratory tool.	1
Lab2	Implementation of simple algorithm that uses point to point communication using MPI	2
Lab3	Implementation of simple algorithm that uses collective communication using MPI	2
Lab4	Implementation of selected parallel algorithm using MPI	2
Lab5	Performance analysis of implemented parallel algorithm using the traditional method and by analyzing of its granularity	2
Lab6	Implementation of selected loop transformation technique using MPI. Performance evaluation of implemented algorithm.	2
Lab7	Implementation selected for laboratory 3 parallel algorithm using GPU	2
Lab8	Performance analysis of implemented parallel algorithm using the traditional method	2

	Total hours	15
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
N4. Classes supported by blackboard

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	Quizzes during the lecture, student activity during the lecture, students answering on questions during lecture
F2 – (laboratory)	PEK_U01 PEK_U02 PEK_U04	Checking of student preparation for exercise realization, assessment (points allocated) the reports of the exercises. Evaluation of the quality of submitted by students programs.
F3 – (class)	PEK_U01 PEK_U03	Quizzes during the classes, student activity during the classes, assessment of students solutions presented during classes (points allocated).

P - the final assessment will be issued on the basis of partial grades (points) received from the final exam (E) and the evaluation of F1, F2, F3 as follows:

Grade = 40% * E + 10% * F1 + 25% * F2 + 25% * F3 In order to receive a positive grade from each activity is required to obtain at least 40% of the points.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[26] V. Kumar i inni, "Introduction to Parallel Computing", The Benjamin/Cummings Pub., New York 2003.

[27] J.M. Crichlow, „An introduction to distributed and parallel computing”, Prentice Hall, London 1997

[28] Foster I., “Designing and Building Parallel Programs”, http://www.mcs.aul.gov/dbpp/text/book.html

[29] B. Wilkinson, M. Allen, “Parallel Programming, Prentice Hall, 2005

[30] Writing Message-Passing Parallel Programs with MPI, Course Notes, http://www.zib.de/zibdoc/mpikurs/mpi-course.pdf

[31] Peter Pacheco, Parallel Programming with MPI, Morgan Kaufmann Pub. http://www.cs.usfca.edu/~peter/ppmpi/

[32] CUDA documentation

[33] Different microprocessors documentation

SECONDARY LITERATURE:

[1] D. Patterson, J. Hennessy, “Computer Architecture – a Quantitave Approach”, Elsevier

[2] A.Y.H. Zomaya, „Parallel and distributed computing handbook”, McGraw-Hill, New York 1996

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 Computing

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_W06	C1	Lec1, Lec2, Lec9, Lec10, Lec11, Lec12, Lec13,Lec15	N1
PEK_W02	K2INF_W06	C2	Lec3, Lec5, Lec6	N1
PEK_W03	K2INF_W06	C3	Lec4, Lec7, Lec8, Lec10	N1
PEK_W04	K2INF_W06	C4	Lec1, Lec9, Lec11, Lec13, Lec14, Lec15	N1
PEK_U01 (skills)	K2INF_U08	C5	Lab5, Lab6, Lab8	N2, N3
PEK_U02	K2INF_U08	C6	Lab2, Lab3, Lab4, Lab7	N2, N3
PEK_U03	K2INF_U08	C7	Cl1 – Cl8	N4
PEK_U04	K2INF_U09	C8	Lab1 – Lab8	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**/ DEPARTMENT……

SUBJECT CARD

Name in Polish: Architektury Komputerów Równoległych

Name in English: Parallel Computer Architecture

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 INZ0143Wcs

Group of courses YES ~~/ NO*~~

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	15			15
Number of hours of total student workload (CNPS)	90	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	3	2			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			1,2

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

3. Basic knowledge of computer architecture and organization
4. Basic skills in programming

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SUBJECT OBJECTIVES

C1 Acquainting students with extend knowledge related to parallel computer architectures

C2 Acquainting students with different ways of parallel program execution

C3 Acquainting students with architecture of currently produced microprocessors and parallel computers

C4 Acquisition of the ability to choose the most suitable parallel architecture to the solved problem

C5 Acquisition of the ability of evaluation of used processor architecture

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 He has extended knowledge related to parallel computers architectures

PEK_W02 He knows different ways in which parallel program execution can be performed

PEK_W03 He knows different architecture of currently produced microprocessors and computers

relating to skills:

PEK_U01 He is able to choose parallel environment to the selected problem

PEK_U02 He is able to evaluate the processor architecture

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Fundamentals of Computer Design. Technology Trends. Taxonomy of parallel computers. Harvard, Princeton and Harvard-Princeton architectures	2
Lec 2	Instruction level parallelism. Data dependences and hazards. Dynamics Scheduling – the idea. Dynamic Scheduling using Tomasulo's Approach	2
Lec 3	Delay branch. Basic branch predictions schema. Branch target buffers.	2
Lec 4	Multiple issue processors. Hardware based speculation. Limitation of Instruction Level parallelism.	2
Lec 5	Basic compilers techniques for exploiting Instruction Level Parallelism	2

Lec 6	Multiprocessor and thread level parallelism. Symmetric shared-memory and distributed shared-memory	2
Lec 7	Evaluations of parallel systems: performance metrics, scalability of parallel systems, Amdhal and other laws. Granularity concept.	2
Lec 8	Models of memory consistency	2
Lec 9	Pipeline processors, identification of conflicts and it's avoiding	2
Lec 10	Vector processors and vectorization process	2
Lec 11	Clusters as a parallel computers	2
Lec 12	Architecture of GPU. CUDA and OpenCL.	2
Lec 13	Hybrid Message Passing/Shared Memory Computers.	2
Lec14	Non-conventional way of processing - dataflow computers	2
Lec15	New trends in computer architecture	
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1	Presentation of classes scope and grading principles. Solving simple problems related with parallel execution .	1
Cl 2	Data dependences and hazards analysis	2
Cl 3	Dynamic Scheduling using Tomasulo's Approach	2
Cl 4	Evaluation of branch prediction algorithms	2
Cl 5	Automatic reordering of program execution. Program execution with speculation	2
Cl 6	Exploiting of Instruction Level Parallelism	2
Cl 7	Evaluations of parallel systems	2
Cl 8	Models of memory consistency	2
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab1		
Lab2		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj1		
Proj2		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem1	Presentation of the classes scope and grading principles . Rules related to student presentations. Determining the schedule of student presentations.	1
Sem2 – Sem8	During seminar will be presented architecture of currently produced microprocessors and parallel computers. The specific architectures that will be presented will be selected for each edition of the course on the basis of current knowledge of microprocessors and parallel computers producers.	14
	Total hours	15

TEACHING TOOLS USED
N1. Lecture supported by multimedia presentations (slideshow) N2. Seminars supported by multimedia presentations (slideshow)

N3. Classes supported by blackboard

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	Quizzes during the lecture, student activity during the lecture, students answering on questions during lecture
F2 – (class)	PEK_U01 PEK_U02	Quizzes during the classes, student activity during the classes, assessment of students solutions presented during classes (points allocated).
F3 – (seminar)	PEK_W03	Evaluation of the presentation 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. Participation in the discussions after presentation is also evaluated.
P - the final assessment will be issued on the basis of partial grades (points) received from the final exam (E) and the evaluation of F1, F2, F3 as follows: Grade = 40% * E + 10% * F1 + 25% * F2 + 25% * F3 In order to receive a positive grade from each activity is required to obtain at least 40% of the points.		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[34] V. Kumar i inni, "Introduction to Parallel Computing", The Benjamin/Cummings Pub., New York 2003.

[2] J D. Patterson, J. Hennessy, “Computer Architecture – a Quantitave Approach”, Elsevier

[3] D. Patterson, J. Hennessy, Computer Organization and design, Elsevier

[4] A.Y.H. Zomaya, „Parallel and distributed computing handbook”, McGraw-Hill, New York 1996 B. Wilkinson, M. Allen, “Parallel Programming, Prentice Hall, 2005

SECONDARY LITERATURE:

[1] Technical documentation available on the Web related to MIPS, Intel and AMD processors

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 Computer Architecture
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_W06	C1	Lec1, Lec7, Lec8, Lec9, Lec10, Lec11, Lec12, Lec13, Lec14, Lec15	N1
PEK_W02	K2INF_W06	C2	Lec2, Lec3, Lec4, Lec5, Lec6, Lec7, Lec12	N1
PEK_W03	K2INF_W06	C3	Sem1 – Sem8	N2
PEK_U01 (skills)	K2INF_U08	C4	Cl1 – Cl8	N3
PEK_U02	K2INF_U08	C5	Cl1 – Cl8	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 / DEPARTMENT…

SUBJECT CARD

Name in Polish Fizyczne podstawy współczesnej informatyki

Name in English Introduction to Physics of Computer Science

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 INZ0156WsW EN

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	X				
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. None

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SUBJECT OBJECTIVES

C1 Educating the abilities of understanding the principles of physics of Computer Science.
C2 Educating the competences in the scope of understanding physical nature of information and thermodynamics of information media.
C3 Acquiring the knowledge of physics of the telecommunication media, principles of physics of storages, and physical nature of computing machines.
C4 Providing knowledge of contemporary trends in the scope of new data security solutions, algebraic and quantum cryptography and security with use group, field and character theory.
C5 Providing the knowledge of the nature of quantum information.
C6 Acquiring the knowledge of physical nature of bioinformatics.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Student has a knowledge about of physical principles of contemporary computer science.
PEK_W02 Student has a knowledge about the physical nature of information and thermodynamics of informational media.
PEK_W03 Student knows physical phenomena used for creating storage devices.
PEK_W04 Student has knowledge of quantum information and quantum information processing.
PEK_W05 Student has a knowledge of classical and quantum gates, quantum computers, and physical principles of bioinformatics.
relating to skills:
PEK_U01 Student has an ability to understand contemporary solutions in computer science based on physics of computer science.
relating to social competences:
PEK_K01 Student has competence for solving ethical and society problems related to physical nature of computer science.

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Introduction. Great discoveries in physics and mathematics leading to originate of computer science.	2
Lec 2	Physical nature of information. Thermodynamics of informational media. Physics and computer software.	2
Lec 3	Physics of telecommunication media.	2
Lec 4	Physical nature of data storages. Materials for creating data storages. Ferromagnetics, ferroelectrics and ferroelstics. Physics of computing machines, bases.	2
Lec 5	Quantum physics and quantum information.	2
Lec 6	Classical and quantum gates. Quantum computers.	2
Lec 7	Final test.	1
Lec 8	Biophysics and bioinformatics.	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
S1-S6	Presentation of additional and extended subject matter of lectures content	12
S7	Final test	1
S8	Presentation of the foreseeable future of the cyber physics	2

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 F2	PEK_W01-PEK_W05	Short tests, final test Oral presentations, reports prepared by student, personal and science activity
C=(F1+F2)/2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Aaronson S.: Quantum computing since Democritus.Cambridge University Press 2013.

[2]. Feynmann R.: The Feynman Lectures on Physics. Basic Books; Slp edition. 2011.

[3] Pardalos P.M., Principe J.C.: Biocomputing. Springer 2002.

SECONDARY LITERATURE:

[1] Rohrkemper R.: Effective Topologies for Computation in Cortex-like Networks: Tools for evaluating computational richness and robustness/ LAP LAMBERT Academic Publishing 2012.

[2] Yanofsky N.S.: Quantum Computing for Computer Scientists. Cambridge University Press 2008.

[3] Stakhov A.: Mathematics of Harmony: From Euclid to Contemporary Mathematics and Computer Science. World Scientific Publishing 2009.

[4] Selected science papers.

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

Arkadiusz Liber, PhD

Arkadiusz . Liber / at / 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_W01	C1-C6,	Lec1-Lec8,S1-S8	N1, N2, N3
PEK_W02	K2INF_W01	C1-C6	Lec1-Lec8,S1-S8	N1, N2, N3
PEK_W03	K2INF_W01	C1-C6	Lec1-Lec8,S1-S8	N1, N2, N3
PEK_W04	K2INF_W01	C1-C6	Lec1-Lec8,S1-S8	N1, N2, N3
PEK_W05	K2INF_W01	C1-C6	Lec1-Lec8,S1-S8	N1, N2, N3
PEK_W06	K2INF_W01	C1-C6	Lec1-Lec8,S1-S8	N1, N2, N3
PEK_U01	K2INF_U10	C1-C6	Lec1-Lec8,S1-S8	N1, N2, N3
PEK_K01	K2INF_W01, K2INF_U10	C1-C6	Lec1-Lec8,S1-S8	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 przygotowawcze
Name in English Preparatory Seminar
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 INZ0141S
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 Knowledge, skills and competences acquired at Informatics field at second level of study until 3rd semester

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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, for the purpose of preparation a presentation on a selected topic, is able to integrate the information obtained, interpret them and also draw conclusions and formulate and justify opinions.

PEK_U02 He can work and communicate using a various information and communication techniques in order to present the results of work and during the seminar presentations.

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 discipline related to his Master thesis topic and the primary aim of thesis. The purpose of the second presentation is presentation the first results of prepared 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:

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

[36] 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 inż. Jan Kwiatkowski, jan.kwiatkowski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Preparatory Seminar
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
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_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 / DEPARTMENT…

SUBJECT CARD

Name in Polish Metodologia badań

Name in English Research Methodology

Main field of study (if applicable): Computer Science

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 INZ0151W

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	3				
including number of 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. None

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SUBJECT OBJECTIVES

C1 Providing the knowledge of definitions, characteristics and theories of research. Main components in research processes. Types of research. Research in computer science. Criteria for selecting problems for research. Analyzing and formulating the research problem . Literature collecting and review. Definition of the science objectives. Types of research methods. Phases in research process. Methods of measurement.

C2 Educating the abilities of organization of research, research report. Creation of science papers and science presentations.

C3 Acquiring competence in the applying new research methods to contemporary computer engineering.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student has a widened and deepened knowledge about definitions, characteristics and theories of research. He has a knowledge about analyzing and formulating the research problem, fundamental methods of research, phases in research process, data collection and measurements, writing research proposal, report, paper and preparation of science presentation.

PEK_W02 Student has a knowledge about methodology of contemporary research in computer science and software engineering.

PEK_W03 Student knows contemporary trends in applying new research methods to contemporary computer engineering

relating to skills:

PEK_U01 Student has an ability to understand research process and contemporary research methods. He is able to apply knowledge related to providing science research, collecting and analysis of data, preparing science report, science paper and science presentation.

PEK_U02 Student is able to identify and to describe science problems and select appropriate method to conduct correct research process.

PEK_U03 Student is able to select the appropriate method and the algorithm for solving a stated problem with use new research methods to contemporary computer engineering

relating to social competences:

PEK_K01 Student has competence for solving ethical and society problems related to contemporary research in computer science.

PEK_K02 Student is able to cooperate and research in group.

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Introduction to philosophy of science and research methodology. Short history notes. Cybersemiotics and the question of knowledge. Information dynamics in categorical setting. Quantitative and qualitative methods.	2
Lec 2	Introduction to research. Definitions, characteristics and theories of research. Main components in research processes. Types of research. Research in computer science.	2
Lec 3	Problem identification and topic selection. Criteria for selecting problems for research.	2
Lec 4	Analyzing and formulating the research problem statement.	2
Lec 5	Literature collecting and review. Source of information. Selecting, indexing and verification. Classical and digital libraries. Abstracts and full texts.	2
Lec 6	Definition of the science objectives. Formulation of the research objectives.	2
Lec 7	Fundamental methods of research. Types of research methods. Plan and documentation. Formulate research questions. Data collection. Data processing and analysis. Draw appropriate conclusions. Law and ethical problems.	2

Lec 8	Phases in research process. Components and outline. Types and sources of data for scientific research.	2
Lec 9	Writing a research proposal. Statement of problem. Study objectives, research questions and hypothesis, proposed methods, scope and limitations of study. Literature review. Significance.	2
Lec 10	Special role of measurement in research. Strategies. Accuracy and precision of measurements. Nominal, ordinal, internal and ratio levels of measurement.	2
Lec 11	Methods of measurement. Single and multi item measures. Indexing and scaling.	2
Lec 12	Organization of research report. Introduction. Literature part. Theoretical part. Methods chapter. Data analysis part. Discussion part. Conclusions part.	2
Lec 13	Science papers and science presentations. Types of science papers. Scientific writing. Paper preparation, review and publication. Types of presentations. Presentation preparation and presentation. Science and media.	2
Lec 14	Applying new research methods to contemporary computer engineering. New mathematical approach.	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		
Sem 2		
Sem 3		

…		
	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_W01-PEK_W03 PEK_U01-PEK_U03	Final test
C=F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Creswell J.W.: Resarch Design: Qualitative, Quantitative, and Mixed Approaches. Sage Publications 2008.
[2] Packer M.: The Science of Qualitative Research. Cambridge University Press 2010.
[3] Kuipers T.A.F.: General Philosophy of Science: Focal Issues. Elseviere 2007.
[4] Dodig-Crnkovic G. Burgin M.:

SECONDARY LITERATURE:

[1] Collins H., Pinch T.: The Golem. What You Should Know about Science. Cambridge University Press 2003.
[2] Chalmers A.F.: What is this thing called Science?, Latest ed., Open University Press, (Previous edition can be used if the course leader is informed before the examination.).
[3] Denning P.J., et al.: Computing as a Discipline, Communications of the ACM, vol 12, no 1, Jan 1989.
[4] Hägglund S. (ed.): Selected term papers on Methodology of Research in Computer Science, Vol II, Lecture Notes, IDA, LiTH, 1997
[5] ACM Self Assessment Procedure XXII: Ethics, CACM, vol 33, no 11, November 1990.
[6] Kock K.: A Case of Academic Plagiarism. Comm of the ACM, vol 42, no 7, July 1999.
[7] Simon H.: Understanding the natural and the artificial worlds, The Sciences of the Artificial, pp 3-29, 3rd printing, 1984.
[8] Smith A.J.: The task of the Referee, IEEE Computer, vol 23, no 4, April 1990
More reading material will be added during the course.
[9] Sandewall E.: *The Methodology of Design Iteration for Systems-oriented Research in Computer Science. http://www.ida.liu.se/ext/caisor/pm-archive/morador/001/index.html*
[10] Selected science papers

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

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 _W05	C1-C3	Lec1-Lec14	
PEK_W02	K2INF _W05	C1-C3	Lec1-Lec14	
PEK_W03	K2INF _W05	C1-C3	Lec1-Lec14	
PEK_U01	K2INF _U06	C1-C3	Lec1-Lec14	
PEK_U02	K2INF _U06	C1-C3	Lec1-Lec14	
PEK_U03	K2INF _U06	C1-C3	Lec1-Lec14	
PEK_K01	K2INF_W06, K2INF_U08	C1-C3	Lec1-Lec14	
PEK_K02	K2INF_W06, K2INF_U08	C1-C3	Lec1-Lec14	

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Informatics and Management / DEPARTMENT of Informatics

SUBJECT CARD

Name in Polish Projektowanie Systemów Informatycznych
Name in English Software System Development
Main field of study (if applicable): Informatics
Specialization (if applicable): Computer Engieering
Level and form of studies: ~~1st/~~ 2nd* level, full-time ~~/ part-time~~*
Kind of subject: obligatory ~~/ optional / university wide~~*
Subject code INZ0138Wp
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	X				
Number of ECTS points	2			4	
including number of ECTS points for practical (P) classes	0			3	
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. A student has fundamental knowledge from software engineering: basic processes, life-cycle models, modelling and specification languages
2. A student knows any object-oriented language
3. A student knows how to design, create, and use at least relational data-base

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SUBJECT OBJECTIVES

C1. To familiarize students with modern software development processes
C2. To allow students to gain practical experience from application of a selected process (resulting with at least a minimal set of documents) to the development of a software system
C3. To develop students' skills that will enable them to assess the quality of a software product at early stages of development

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 A student knows different models used during software system development and understands the role of modeling
PEK_W02 A student knows typical processes (phases) of software development, their work products, and relationships among them
PEK_W03 A student knows methods used for quality assessment of software projects (and particular work products)

relating to skills:

PEK_U01 A student designs an architecture of distributed software system using appropriate languages and tools according to the selected development process
PEK_U02 A student implements a software system in accordance to the project
PEK_U03 A student defines tasks aiming at realization of specific engineering problems, and estimates their duration

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction. Basic terms. Overview of managerial activities.	2
Lec 2	The Unified Process – overview	2
Lec 3	Requirements management – repetition	2
Lec 4	Business modelling	2
Lec 5	Requirements discipline	2
Lec 6	User interface design	2
Lec 7	Analysis discipline	2
Lec 8	Design discipline – software system architecture	2
Lec 9	Design discipline – design patterns	2
Lec 10	Design discipline – architectural mechanisms, and tactics; use-case realizations	2
Lec 11	Design discipline – database concerns: integrity, transactions	2
Lec 12	Implementation discipline	2
Lec 13	Testing discipline	2
Lec 14	Architecture assessment	2
Lec 15	Modern trends in Software Engineering	2
	Total hours	30

Form of classes - project	**Number of**

		hours
Proj 1	Inception phase	12
Proj 2	Elaboration phase – Requirements and analysis	4
Proj 3	Elaboration phase – Design	6
Proj 4	Elaboration phase – Implementation and tests	8
	Total hours	30

TEACHING TOOLS USED

N1. Informative lecture supported by multimedia presentations
N2. Examples of documents or templates
N3. Case tool, IDE used for programming and testing
N4. E-learning system used for materials publication

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	Multiple choice test. The grade calculated on the base of sum of points: <50%, 60%) → 3.0 <60%, 70%) → 3.5 <70%, 80%) → 4.0 <80%, 90%) → 4.5 >90% → 5.0
F2 – project	PEK_U01, PEK_U02, PEK_U03	A grade proposed to a student taking into account the quality of the software product and all intermediate documents; the engagement of the person in software development (the number of tasks, their accuracy, etc.)
P – final grade	All	0.4 * F1 + 0.6 * F2

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] L. Maciaszek, B.L. Liong, Practical software engineering: a case study approach, Pearson Addison Wesley, 2005
[2] P. Kroll, P. Kruchten, The Rational Unified Process Made Easy: A Practitioner's Guide to the RUP, Addison-Wesley Object Technology Series, 2003

SECONDARY LITERATURE:

[1] Per Kroll, Agility and Discipline Made Easy: Practices from Open UP and RUP, Addison-Wesley Professional, 2006
[2] OpenUP description (Eclipse project)

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

Bogumila 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 Informatics
AND SPECIALIZATION Computer Engineeering

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_S2CE_W05	C1	Lec1..Lec13, Lec15	N1, N4
PEK_W02	K2INF_W06_S2CE_W05	C1	Lec2, Lec5, Lec7-Lec13	N1, N4
PEK_W03	K2INF_W06_S2CE_W05	C3	Lec14	N1, N4
PEK_U01	K2INF_U08_S2CE_U10	C2	Proj1, Proj2, Proj3	N2, N3
PEK_U02	K2INF_U08_S2CE_U10	C2	Proj4	N3
PEK_U03	K2INF_U08_S2CE_U10	C2	Proj2 .. Proj4	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 Modelowanie i analiza systemów
Name in English System Modeling and Analysis
Main field of study (if applicable): Computer Science
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 INZ0108Wcs
Group of courses YES / ~~NO*~~

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	15			15
Number of hours of total student workload (CNPS)	90	45			45
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	3	2			1
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			0,6

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge about mathematical analysis and linear algebra.
2. Knows basics of probability theory and statistics.

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SUBJECT OBJECTIVES

C1 Acquisition of knowledge about dynamical systems modelling.
C2 Ability to analyse properties of dynamic processes.

SUBJECT EDUCATIONAL EFFECTS

related to knowledge:
PEK_W01 Knowledge of the basic concepts related to modeling of dynamic systems.
PEK_W02 Knowledge of basic ideas, problems and methods of system identification.

related to skills:
PEK_U01 Knows how to analyze dynamic systems.
PEK_U02 Knows how to estimate parameters of dynamic systems.

related to social competences:
PEK_K01 Knows how to readily communicate knowledge to other people.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Model in systems research. Introduction – basic concepts.	2
Lec 2	Physical signal characteristics.	2
Lec 3	Continuous signal, the Laplace transform.	2
Lec 4	Discrete signal, the Z transform.	2
Lec 5	Typical plant models – relations between descriptions.	1
Lec 6	Model building task based on experiment – identification problem.	2
Lec 7	Identification of static plant. Deterministic problem – determination of the plant parameters.	1
Lec 8	Identification of static plant. Deterministic problem – choice of the best model.	2
Lec 9	Noised measurements of the physical values.	1
Lec 10	Estimation of plant parameters with noisy measurements.	2
Lec 11	Choice of the best model – probabilistic case. Regression functions.	2
Lec 12	Determination of the regression functions based on the experimental data.	1
Lec 13	Identification of dynamic systems.	2
Lec 14	Recursive identification algorithms.	2
Lec 15	Selected problems of complex systems modeling.	2
Lec 16	Modeling of complexes of operation systems.	2
Lec 17	Model based decision making (optimal decision, satisfactory decision, acceptable decision).	2
	Total number of hours	30

Form of classes - class		**Number of hours**
Cl 1	Examples of continuous dynamic processes and ordinary differential equations (ODEs) as their models.	1
Cl 2	The Laplace transform and analytical solutions of linear ODEs.	2
Cl 3	ODEs, state vector description and the transfer function. Relations between descriptions of dynamic processes.	2

Cl 4	Numerical methods of solving ODEs; the Euler scheme. Relations between continuous and discrete models.	2
Cl 5	Least square approximation – choice of the best model.	2
Cl 6	The maximum likelihood method - estimation of plant parameters with noisy measurements.	2
Cl 7	Test I	2
Cl 8	Test II	2
	Total number of 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		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1	Introduction. How to design proper scientific presentation.	2
Sem 2	Students' presentations.	13
	Total number of hours	15

TEACHING TOOLS USED

N1. Traditional lecture. Multimedia presentations.
N2. Student's own works – solving exercises.
N3. Student's own works – literature studies.
N4. Student's own works – oral presentations.

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 achievements
F1	PEK_W01 PEK_W02 PEK_U01 PEK_U02	Observation of student's activity. Solving exercises.
F2	PEK_W01 PEK_K01	Multimedia presentation.
P1 (Lec)	PEK_W01 PEK_W02 PEK_U01	Examination

	PEK_U02	
P2 (Cl)	PEK_W01 PEK_W02 PEK_U01 PEK_U02	On the basis of F1.
P3 (Sem)	PEK_W01 PEK_K01	On the basis of F2.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[37] Brzostowski K., Drapała J. – *Systems modelling and identification*, skrypt PWr.

[38] Bubnicki Z., *Identification of control plants*, PWN, Warszawa, 1980.

[3] Ikonen E., Najim K*., Advanced identification and control*, CRC Press LLC, 2002

[4] Ljung L., Glad T., *Modelling of dynamic systems*, 1994.

[5] Larkowski T., Burnham K. – *System identification, parameter estimation and filtering*, skrypt PWr.

SECONDARY LITERATURE:

[1] Ogata K., *Modern Control Engineering*, Prentice Hall, 2009.

[2] Logan J.D., *A First Course in Differential Equations*, Springer, 2006.

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)	K2_INF_W01	C1	Lec1 – Lec6	N1, N3
PEK_W02	K2_INF_W05	C2	Lec7 – Lec17	N1, N3
PEK_U01 (skills)	K2_INF_U05	C1	Cl1 – Cl4, Cl7 – Cl8	N2, N3
PEK_U02	K2_INF_U05	C2	Cl5 – Cl8	N2, N3
PEK_K01 (competences)	K2_INF_U05	C1, C2	Sem1 – Sem2	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 …*Wytwarzanie interfejsu użytkownika*
Name in English *User Interface Development*
Main field of study (if applicable): Computer Science
Specialization (if applicable): Computer Engineering
Level and form of studies: 2nd level, full-time
Kind of subject: optional
Subject code INZ0148Wl
Group of courses YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	80		130		
Form of crediting	Examination / ~~crediting with grade~~	Examination / crediting with grade*	crediting with grade	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course	X				
Number of ECTS points	3		4		
including number of ECTS points for practical (P) classes			3		
including number of ECTS points for direct teacher-student contact (BK) classes	1,8		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge in designing of software systems
2. Ability to read with under standing scientific and technical Texas in English.

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SUBJECT OBJECTIVES

C1 To familiarise students with the basis of Cognitive Psychology that are necessary for good understanding of Human Computer Interaction.
C2 To make students aware of the importance of the notion of the software system usability and importance of usability for the overall quality of the software system.
C3 To familiarise students with the overall process of software systems development in way focused on achieving high quality in the domain of usability.
C4. To present methods and techniques for complex usability evaluation.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Students know basic notions and techniques from the domain of applications of Cognitive Psychology in Human Computer Interaction.
PEK_W02 Students know basic set of good practices in the area of user interface designing.
PEK_W03 Students know basic models of the processes of interactive system design and interactive system usability assessment.
…
relating to skills:
PEK_U01 Students are able to perform context of use analysis for an interactive system.
PEK_U02 Students have ability to plan and monitor a process of user interface development.
PEK_U03 Students are equipped to design user interface.
PEK_U04 Students know how to plan a process of usability assessment, to perform it and to draw conclusions related to the necessary changes in the system which has been evaluated.
…
relating to social competences:
PEK_K01 Students are able to cooperate in a team which is developing a software system, in situation in which the team members responsible for the system usability are appointed.
PEK_K02 Students are aware of the influence made by the software system on the work and life environment of the users and understand the importance of the software system usability situated in this context.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Basic notions and techniques of Cognitive Psychology in the area of Human Computer Interaction.	4
Lec 2	Usability and the process for achieving the high quality of the usability.	2
Lec 3	Context of Use description and analysis.	4
Lec 4	System design process focus on users and their tasks	2
Lec 5	Standards from the area of Human Computer Interaction and their applications in user interface development.	2
Lec 6	Usability evaluation of the user interface.	4
Lec 7	Designing of the structure and the content of web sites, web services and portals.	2
Lec 8	Survey of the most important rules of graphical screen design and applications of the user interaction tools in GUI.	4
Lec 9	Selected case studies in the area of GUI design.	4
Lec 10	Usability specification and usability issues in the project management.	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	Task-experiment (*performed during laboratory meeting*): an intuitive analysis of a selected application on the basis of exploratory learning (learning by using).	2
Lab 2	Task-experiment (*performed mainly as the own work of students, the results are presented during laboratory meeting*): teaching a person, who has no previous experience in using computers, using some application selected together with the person being taught.	2
Lab 3	Preparation of the general specification of the project (mission, initial, general description of users and their tasks), which will be a main line of the next tasks.	2
Lab 4	Preparation of the description of the context of use (on the basis of the previously collected data).	4
Lab 5	Carrying out the task analysis (on the basis of the description of the context of use).	4
Lab 6	Construction of the conceptual design of the user interface.	2
Lab 7	Initial specification of the user interface technical design and construction of the initial paper prototype.	4
Lab 8	Construction of the initial electronic prototype (*performed mainly as the own work of students, the results are presented during laboratory meeting*).	4
Lab 9	Preparation of the analytical usability evaluation by Cognitive Walkthrough and GOMS.	2
Lab 10	.Task-experiment: empirical usability evaluation performed for selected tasks during a laboratory meeting on the basis of the constructed electronic prototype.	2
Lab 11	Construction of an improved prototype and completion of the usability evaluation for the most important user tasks.	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		
…		
	Total hours	

TEACHING TOOLS USED

N1. Textbooks
N2. Electronic materials on the selected Web pages and Web sites.
N3.Teaching materials published 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 the phases: context of use analysis and task analysis	PEK_W03, PEK_U01, PEK_U02, PEK_K01, PEK_K02	Students present reports that are evaluated.
F2 Evaluation of the user interface design	PEK_W02, PEK_U02, PEK_U03, PEK_K01	Students present user interface design which is evaluated
F3 Evaluation of the prototype and usability evaluation.	PEK_W01, PEK_U02, PEK_U04, PEK_K01, PEK_K02	Students present user interface prototypes, reports including results of the usability evaluation and improved prototypes that are evaluated.
C test for grading – the effects: PEK_W01- PEK_W03		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[39] Barfield L. The User Interface Concepts & Design. Addison-Wesley 1993.
[40] Hackos J., Redish J. User and Task Analysis for Interface Design, Wiley Comp. Pub. 1998.
[41] Newman W., Lamming M. Interactive System Design. Addison-Wesley 1995.
[42] International Standard ISO 9241 (1,2,10-17) Ergonomic requirements for office work with visual display terminals (VDTs), szczególnie: Part 11 Guidance on Usability.
[43] Galitz W.O. Essential Guide to User Interface Design. Wiley Comp. Pub. 2007.
[44] Nielsen J. Projektowanie funkcjonalnych serwisów internetowych. Helion, 2003.
[45] Human-Computer Interaction: Design Issues, Solutions, and Applications. Ed. Andrew Sears i Julie A. Jacko. CRC Press/Taylor & Francis Group, 2009

SECONDARY LITERATURE:

[15] Spool J. M., Scanlon T., Schroeder W., Snyder C., DeAngelon T. Web Site Usability. Morgan Kaufman, 1999.
[16] Marti A. Hearst. Search User Interfaces.

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

Maciej Piasecki, maciej.piasecki@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

User Interface Development…

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ……Computer Science (1st level)

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_S2CE_W03, K2INF_W06_S2CE_W04	C1	Lec1, Lec3	N1-N3
PEK_W02	K2INF_W06_S2CE_W03, K2INF_W06_S2CE_W04	C2, C3	Lec3, Lec7, Lec8, Lec9	N1-N3
PEK_W03	K2INF_W06_S2CE_W03, K2INF_W06_S2CE_W04, K2INF_W06_S2CE_W05	C3, C4	Lec2, Lec4, Lec5, Lec6, Lec10	N1-N3
PEK_U01 (skills)	K2INF_U08_S2CE_U02	C1, C2, C3	Lab1, Lab2	N1-N3
PEK_U02	K2INF_U08_S2CE_U02, K2INF_U08_S2CE_U03, K2INF_U08_S2CE_U10	C3	Lab3-Lab5	N1-N3
PEK_U03	K2INF_U08_S2CE_U10	C3	Lab6-Lab8	N1-N3
PEK_U04	K2INF_U08_S2CE_U09	C2, C4	Lab9, Lab10, Lab11	N1-N3
PEK_K01 (competences)	K2INF_U08_S2CE_U02, K2INF_U08_S2CE_U10	C3	Lab3-Lab11	N1-N3
PEK_K02	K2INF_U08_S2CE_U09	C2	Lab1, Lab2, Lab4, Lab10, Lab 11	N1-N3

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

*** - from table above