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): Information Technology
Level and form of studies: 2nd level, full-time
Kind of subject: optional
Subject code INZ000033Wl
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	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	3.0		3.0		
including number of ECTS points for practical (P) classes	0.0		3.0		
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 methods and techniques of computer graphics in the scope corresponding to the contents of „Introduction to Computer Graphics" lecture
2. advanced skills in C++ or Java programming language
3. 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

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,	2

	interpolation in image and in object space, reduction of shadow tests	
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 domain traversal	2
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, volumetric effects modeling	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**
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	Educational effect number	Way of evaluating educational effect achievement

semester end)		
F1 - evaluation of basic ray tracer (Lab2 - Lab7)	PEK_W02 PEK_W03 PEK_U02 PEK_U03 PEK_U04	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 documentation and presentation of achieved results (Lab15)	PEK_W01 PEK_W04 PEK_K01	Evaluation of relevance of used test data, completeness of the documentation, clarity of final presentation
C - the final grade given based on the written test grade (FT) 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: $C = 0.5*FT + 0.5*0.25*(F1+F2+F3+F4)$		

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 **Information technology**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	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_K01 (competences)		C1, C3	Lab7. Lab10,Lab15	N3

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

*** - from table above

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

SUBJECT CARD

Name in Polish: Teoria informacji i sygnałów

Name in English: Theory of information and signals

Main field of study (if applicable): Information technology

Specialization (if applicable): ……..

Level and form of studies: 1st level, full-time

Kind of subject: obligatory

Subject code INZ000031

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)	100	80			
Form of crediting	Examination	Crediting with grade			
For group of courses mark (X) final course	x				
Number of ECTS points	4	2			
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	2,4	1,2			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Have a basic knowledge from linear algebra, analytic geometry and mathematical analysis necessary to solve simple engineering oriented calculation tasks in technical and nontechnical applications (K1INF_W01)
2. Have a basic knowledge from discrete mathematics, mathematical logic and mathematical statistics necessary to formulate and solve simple engineering problems (K1INF_W02)
3. Have a basic knowledge in area of mechanics and waves theory (K1INF_W03)
4. Can use indicated an analytical method and plan and carry out a simple experiment and computer simulation engineering, conduct a survey and analyze the results, particularly for the selected system components (K1INF_U09)
5. Understands and knows the need continuous training opportunities and improving their

social skills (K1INF_K01)

SUBJECT OBJECTIVES

C1. Ordered, underpinned by theoretical knowledge of information systems and processes, the use of statistical information theory, optimal coding of continuous and discrete channels and information without interference, methods and techniques to transmit signals using different modulation techniques supporting continuous and discrete signals, continuous and discrete signals and information prevention of errors arising in the results of interference in the transmission channels.

C2. Skills for determining the characteristics of analog and discrete signals (frequency spectrum, frequency, power distribution), the advantages and disadvantages of various methods of modulation signals, continuous and discrete signals and adjust transmission channels, modulation methods for comparing continuous and discrete signals, the range of applications of particular methods of modulation, basis of the hierarchy of analog and digital signals and selection methods to prevent errors in transmission systems.

C3. Skills for the selection of appropriate modulation methods of communication tasks in analog and digital systems.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
K1INF_W11: Has a basic knowledge of IT systems and computer networks
K1INF_W16: Knows the basic methods and tools for collecting, processing and retrieval of information and knowledge extraction

Relating to skills:
K1INF_U05: Has the ability to self-education, including in order to improve the professional competence
K1INF_U15: Can using the right tools to build a simple model of the process (the object), to formulate a specific task analysis and decision making
K1INF_U16: Able to effectively use the methods and tools for the collection, processing and retrieval of information and knowledge extraction

Relating to social competences:
K1INF_K01: He understands and knows the need continuous training opportunities and improving their social skills and
K1INF_K03: Able to interact and work in a group, taking in the different roles

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Information systems - basic concepts	2
Lec 2	Theories of information. Statistical information theory. Entropy as a measure of the amount of information in the statistical theory of	2

	information.	
Lec 3	Information processes and transmission of information. Transmission channel model.	2
Lec 4	Optimal encoding in discrete channel without interferences	2
Lec 5	Optimal encoding in discrete channel with interferences	2
Lec 6	Optimal encoding in continuous transmission channel without and with interferences	2
Lec 7	Representation of signals and systems - Fourier transform	2
Lec 8	Fourier transform - properties	2
Lec 9	Continuous amplitude modulation	2
Lec 10	Continuous angle modulation	2
Lec 11	Keying of amplitude, frequency and phase	2
Lec 12	Pulse code modulation	2
Lec 13	Transmission encoding	2
Lec 14	Preventing errors - correction codes	2
Lec 15	Preventing errors – automatic retransmission request	2
	Total hours	**30**

PROGRAMME CONTENT		
Form of classes - class		**Number of hours**
Cl 1	Fourier transform and Fourier series expansion	2
Cl 2	Orthogonality - collections of orthogonal signals. Even and odd functions.	2
Cl 3	The Fourier transform of periodic and aperiodic signals. Even and odd harmonics. Convergence of Fourier series.	2
Cl 4	Fourier series - amplitude, trigonometric and exponential forms	2
Cl 5	Calculation of Fourier series coefficients in amplitude, trigonometric and exponential forms.	2
Cl 6	Fourier series - linear, timeline stretching and shift of signals in the time domain	2
Cl 7	Fourier series - a shift of signals in the frequency domain.	2
Cl 8	Fourier series - differentiation and integration of signals in the time domain.	2
Cl 9	Fourier series - coupled functions, multiplication in the time domain and time-domain convolution. Discrete frequency spectra.	2
Cl 10	Rayleigh energy theorem. The multiplication and Parseval’s theorems. Power spectrum.	2
Cl 11	The inverse proportionality of the time and frequency - the interchangeability of the products of bandwidth and time	2
Cl 12	The Dirac delta function, step function and sampling function	2

Cl 13	Applications of Dirac delta and step functions	2
Cl 14	Transmission of signals through linear systems	2
Cl 15	Fast Fourier Transform algorithms	2
	Total hours	**30**

TEACHING TOOLS USED
N1. Traditional lecture. Multimedia presentations.
N2. Student's own works – solving calculation tasks.
N3. N4. Student's own works – literature studies.
N5. Collective works during classes.
N5. 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	Way of evaluating educational effect achievement
F1 (lecture)	K1INF_W11 K1INF_W16 K1INF_U05 K1INF_U15 K1INF_U16 K1INF_K01 K1INF_K03	Observation of student's activity. Solving exercises. Preparation and presentation delivery.
F1 – F15 (class)	K1INF_W11 K1INF_W16 K1INF_U05 K1INF_U15 K1INF_U16 K1INF_K03	Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and evaluation of student independence. Analysis of reports of exercise.
P (lecture and class)	K1INF_W11 K1INF_W16 K1INF_U05 K1INF_U15 K1INF_U16 K1INF_K01 K1INF_K03	Examination taking into account results of forming evaluation F1 (lecture) and forming evaluations F1 – F15 (classes).

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] G. Pujolle, D. Seret, D. Dromard, E. Horlait, „Integrated Digital Communication Networks", J. Wiley & Sons
[2] S. Haykin, „Communication systems", J. Wiley & Sons
[3] M. Roden, „Analog and digital communication systems", Prentice Hall

SECONDARY LITERATURE:

[1] MIT open cources:http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/
[2] http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
Adam Grzech, adam.grzech@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Information and signals theory

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***	Program content***	Teaching tool number***
PEK_W01 (knowledge)	K1INF_W11	C1, C2, C3	Lec 1 – Lec 15	N1, N2, N3
PEK_W02	K1INF_W16	C1, C2, C3	Lec 1 – Lec 15	N1, N2, N3
PEK_U01 (skills)	K1INF_U05	C2, C3	Lec 1 – Lec 15 Cl 1 – Cl 15	N1, N2, N4
PEK_U02	K1INF_U15	C2, C3	Lec 1 – Lec Cl 1 – Cl 15	N1, N2, N4, N5
PEK_U03	K1INF_U16	C2, C3	Lec 1 – Lec Cl 1 – Cl 15	N1, N2, N3, N4
PEK_K01 (competences)	K1INF_K01	C1, C2, C3	Cl 1 – Cl 15	N4, N5
PEK_K02	K1INF_K03	C1, C2, C3	Lec 1 – Lec Cl 1 – Cl 15	N1, N2, N3, N4

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

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Modelowanie i analiza systemów
Name in English System Modeling and Analysis
Main field of study (if applicable): Computer Science
Specialization (if applicable): Information Technology
Level and form of studies: ~~1st/~~ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ 000108Wcs
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					
Number of ECTS points	3	2			1
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			0,6

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge about description of dynamic processes with use of differential equations and transfer function (*K2INF _W01* Student has extended and deepened his/her knowledge in the fields of mathematics, physics or chemistry useful to formulate and to solve complex problems in computer science)
2. Knowledge about methods of data analysis and data mining (K2INF _W05 Student has organized and theoretically-based knowledge in the field of the advanced methods of data analysis)
3. Ability to apply data analysis and data mining methods to solve technical and non-technical problems for dynamic processes (K2INF _U05 Students are capable to integrate knowledge in branches of science proper for degree course to formulate and to solve engineering problems. Student knows how to apply system analysis approach in practice.

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SUBJECT OBJECTIVES

C1 Acquisition of skills to create mathematical models of technical and non-technical processes.
C2 Learn how to formulate typical decision making problems and how to solve them .

SUBJECT EDUCATIONAL EFFECTS

related to knowledge:
PEK_W01Knowledge of modern techniques of modelling and analysis of dynamical processes.
PEK_W02 Knowledge of generic decision making problems in computer science.

related to skills:
PEK_U01 Knows how to apply system analysis in scientific and engineering problems.
PEK_U02 Knows how to solve scientific and engineering problems analytically.

related to social competences:
PEK_K01Manage to present modern problems in the field of system modelling analysis.
PEK_K02 Knows modern methods of dynamical processes analysis, comprehends the need for new solutions and his/her knowledge improvement

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Model in systems research. Introduction – basic concept	2
Lec 2	Physical signal characteristics	2
Lec 3	Continuous signal, the Laplace transforms	2
Lec 4	Discrete signal, Z transforms	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 dynamical processes and their models	1
Cl 2	Differential equations, Laplace’s transform and transfer function	1
Cl 3	Solving differential equations with use of the Laplace transform	1
Cl 4	Discrete processes examples and their models. The Z Transform	1

Cl 5	Solving difference equations	1
Cl 6	Numerical methods of solving differential equations. Euler's scheme, mid-point method and Runge-Kutta methods.	1
Cl 7	Optimization problems formulations. Decision variables, performance index, constraints.	2
Cl 8	Foundations of optimization. Convex sets and functions, quadratic form, gradient, the Hessian matrix	1
Cl 9	Analytical methods for unconstrained and constrained optimization. Equality constraints and the Lagrange function.	1
Cl 10	Analytical methods for unconstrained and constrained optimization. Inequality constraints and Kuhn-Tucker conditions.	1
Cl 11	Linear programming	1
Cl 12	Integer programming	1
Cl 13	Dynamical programming	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 calculation tasks.
N3. Collective works.
N4. Student's own works – literature studies.
N5. 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 – F13	PEK_U01, PEK_U02, PEK_K01, PEK_K02	Observation of student's activity. Solving exercises. Preparation and presentation delivery.
P1 (Lec)	PEK_W01, PEK_W02, PEK_U01, PEK_U02, PEK_K02	Examination
P2 (Cl)	PEK_U01, PEK_U02, PEK_W01	F1 – F13
P3 (Sem)	PEK_K01, PEK_K02, PEK_W02	F1 – F13

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Bubnicki Z., *Identification of control plants*, PWN, Warszawa, 1980.
[2] Bubnicki Z. *Modern Control Theory*, Springer, Berlin-Heidelberg-New York, 2005
[3] Ikonen E., Najim K*., Advanced identification and control*, CRC Press LLC, 2002

SECONDARY LITERATURE:

[1] Bazaraa M. S., Sherali H.D., Shett C. M., *Nonlinear Programming Theory and Algorithms*, John Wiley and Sons, Inc., 2006
[2] Chong E.K.P., Żak S.H., *An Introduction to Optimization*, Wiley-Interscience, 2008.
[3] Ogata K., *Modern Control Engineering*, Prentice Hall, 2009.

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

prof. Jerzy Świątek, jerzy.swiatek@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

……

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

……..

AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF _W01	C1, C2	Lec1 – Lec17	N1
PEK_W02	K2INF _W05	C1	Lec15 – Lec17	N1
PEK_U01 (skills)	K2INF _U05	C2	Cl1 – Cl13	N2, N4
PEK_U02	K2INF _U05	C1, C2	Cl – Cl13	N2, N3
PEK_K01 (competences)	K2INF _U05	C1	Sem1 – Sem2	N3, N5
PEK_K02	K2INF _U05	C1	Lec1 – Lec17, Cl1 – Cl13	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 Systemy multimedialne
Name in English Multimedia Information Systems
Main field of study (if applicable): IT
Specialization (if applicable): Information Technology (IT)
Level and form of studies: ~~1st~~/ 2nd* level, full-time / part-time*
Kind of subject: ~~obligatory~~ / optional / ~~university-wide~~*
Subject code INZ000034Wl
Group of courses YES / ~~NO~~*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes					
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 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 applications in Adobe Flash. Presentation and discussion of program code in AS	2

	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	Designing complex 3D object in the 3ds Max Design. The implementation of a set	4

Lab 11	of animation movements between selected points 3d object. Export animation to Adobe Flash. Programming navigation mechanism in AS 3.0.	
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	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.

	PEK_U02 PEK_U03	
F2	PEK_W01 PEK_W02 PEK_W03 PEK_U01 PEK_U02 PEK_U03 PEK_K01 PEK_K02	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.

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 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

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

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

SECONDARY LITERATURE:

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

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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

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish Systemy ekspertowe
Name in English Expert Systems
Main field of study (if applicable): Informatyka
Specialization (if applicable): Information Technology
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: ~~obligatory~~ / optional / ~~university-wide~~*
Subject code INZ0036
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 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.

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.

PEK_U02 Student is capable of implementing and querying a knowledge base containing predicates, using a declarative programming language, e.g. Prolog.

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

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	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**
Lab1 – Lab5	Implementation and querying propositional knowledge base in Prolog programming language.	10

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**
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. 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	Test
F2 (laboratory)	PEK_U01 – PEK_U03	Observation of students' activity. Conversations with individual students concerning current laboratory exercises (incl. presentation of computer programs, computed results and conclusions), a report.
P1 (lecture and laboratory as per GK)	PEK_W01 – PEK_W03, PEK_U01 – PEK_U03	(F1 + 2*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

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

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF_W02	C1	Lec1 – Lec3	N1, N5
PEK_W02	K2INF_W02	C1	Lec4 – Lec11	N1, N5
PEK_W03	K2INF_W02	C1	Lec12 – Lec14	N1, N5
PEK_U01 (skills)	K2INF_U05	C2	Lab1 – Lab5	N2 – N6
PEK_U02	K2INF_U05	C2	Lab6 – Lab10	N2 – N6
PEK_U03	K2INF_U05	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: Algorytmy i struktury danych – wybrane zagadnienia.
Name in English: Algorithms and Data Structures – Selected Topics.
Main field of study (if applicable): Computer Science
Specialization (if applicable): Information Technology
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code …….
Group of courses YES / ~~NO~~*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	15	15		
Number of hours of total student workload (CNPS)	60	30	90		
Form of crediting	Examination / ~~crediting with grade~~*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course	X				
Number of ECTS points	2	1	3		
including number of ECTS points for practical (P) classes	0	0	3		
including number of ECTS points for direct teacher-student contact (BK) classes	1,2	0,6	1,8		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Programming skill in C/C++ language.
2. Ability to prepare the development environment for building applications in C/C++.

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SUBJECT OBJECTIVES

C1 Providing knowledge on data structures, including dynamic structures and classic algorithms and algorithmic problem-solving techniques.
C2 Ability to implement data structures, implementation of selected algorithms and the ability to use algorithmic problem-solving techniques.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Knowledge about structures and operation complexity of linear structures, trees, heaps and graphs.

PEK_W02 Knowledge about chosen algorithms and its complexity.

Relating to skills:

PEK_U01 Ability to implement selected data structures

PEK_U02 Ability to implement selected algorithms.

PROGRAMME CONTENT

Form of classes – lecture		**Number of hours**
Lec 1	Fundamental principles algorithms analysis.	2
Lec 2	Basic structures: stack, queue, list.	2
Lec 3	Computation complexity of algorithm (worse-case, expected, amortized)	1
Lec 4	Fundamental techniques: divide and conquer, dynamic programming, greedy algorithms, backtracking.	1
Lec 5	Sorting and order statistic algorithms.	2
Lec 6	Searching and simple dictionary (linear and binary searching, binary search tree, hashing)	2
Lec 7	Effective implementation of dictionary (AVL tree, red-black tree, B-tree).	4
Lec 8	Advanced data structures: binomial heaps, Fibonacci heap.	2
Lec 9	Representations of graphs, graph algorithms: minimum spanning tree, shortest paths, matching in graph, network flow.	4
Lec 10	Huffman codes, knapsack problem	2
Lec 11	Algorithms for number theory	2
Lec 12	String matching	2
Lec 13	Chosen computational geometry algorithms	2
Lec 14	Backtracking algorithms.	2
	Total hours	30

Form of classes – class		**Number of hours**
Cl 1	Solving simple problems dividing it into smaller subproblems	2
Cl 2	Implementation of selected operations on choosen type of linked list	2
Cl 3	Solving selected problems with use of divide-and-conquer, dynamic programming, greedy algorithms.	2
Cl 4	Analyze of selected sorting algorithms.	2
Cl 5	Analyze of unbalanced and balanced binary search trees	3
Cl 6	Analyze of operation of disjoin set forest.	1
Cl 7	Analyze of algorithms from graph theory	3
	Total hours	15

Form of classes – laboratory		Number of hours
Lab 1	Instruction about a laboratory, introduction to programming environments, Solving simple problems dividing it into smaller subproblems.	2
Lab 2	Implementation of stack and queue and one-way linked list.	2
Lab 3	Implementation of two-way linked list	2
Lab 4	Implementation algorithm with use of fundamental techniques.	1
Lab 5	Implementation and comparison of sorting algorithms	2
Lab 6	Implementation and research of binary search tree.	2
Lab 7	Implementation and use of disjoin-set forest	1
Lab 8	Implementation of graphs representation in memory	1
Lab 9	Implementation selected algorithms from graph theory.	2
	Total hours	15

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

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

TEACHING TOOLS USED
N1. Lecture N2. The course web page with references to literature and course related stuff. N3. Exercises. N4. Software infrastructure for programmers.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), E – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	K2INF_U07	Solving and presenting solutions to programming tasks using a variety of data structures (Lab1-Lab9). Implementation of a list of 7 tasks, each list is worth 70 points. A total of 70 points can be obtained.

E1	K2INF_U07	Points gained in the laboratory represent 30% of the final mark, but the condition of taking a part in the exam is to obtain a minimum of 28 points from the lab.
E2	K1INF_W05 K2INF_U07	Points gained during the exercise represent 30% of the final, but only count as an additional component of the assessment E3.
E3	K1INF_W05	The exam consists of about 20 different types of tasks and the degree of difficulty, which is 70% of the final assessment.
E		E=E1+MIN(70, E2+E3) Final evaluation: • 5.5 – <95%; 100%> • 5.0 – <90%; 95%) • 4.5 – <80%; 90%) • 4.0 – <70%; 80%) • 3.5 – <60%; 70%) • 3.0 – <50%; 60%) • 2.0 – <0%; 50%)

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, "Introduction in algorithms". The MIT Press; 2 edition (September 1, 2001), 1184 pages,
[2] Kenneth A. Berman, Jerome L. Paul, "Algorithms: Sequential, Parallel, and Distributed", Course Technology; 1 edition (October 11, 2004), 992 pages.

SECONDARY LITERATURE:

[1] Harel D., Algorithmics. The Spirit of Computing, Addison Wesley, 2004.
[2] Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, Data Structures and Algorithms, Addison-Wesley, 1983.

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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 _W05**	C1	Lec2, 6-8 Cl2,5,6	N1-3
PEK_W02	**K2INF _W05**	C1	Lec1,3-5,9-14 Cl1,3,4,7	N1-3
PEK_U01	**K2INF _U07**	C2	Lab2,3,6,7 Cl2,5,6	N2-4
PEK_U02	**K2INF _U07**	C2	Lab1,4,5,8,9 Cl1,3,4,7	N2-4

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish *Zawansowane bazy danych*
Name in English *Advanced databases*
Main field of study (if applicable): Computer Science
Specialization (if applicable): Information Technology
Level and form of studies: 1st/ ~~2nd~~* level, full-time / ~~part-time~~*
Kind of subject: obligatory / optional / university-wide*
Subject code …….
Group of courses YES / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	15
Number of hours of total student workload (CNPS)	60			90	30
Form of crediting	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2			3	1
including number of ECTS points for practical (P) classes	0			3	0
including number of ECTS points for direct teacher-student contact (BK) classes	1,2			1,8	0,6

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Is able to develop database application with SQL language
2.
3.

\

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	Data stream management	2
Lec 4	Stream query languages	2
Lec 5	Temporal databases	2
Lec 6	Semistructural data storage	2
Lec 7	Semistructural data processing	2
Lec 8	Query languages for semistructural data	2
Lec 9	Spatial data storage and processing	2
Lec 10	Multidimensional data	2
Lec 11	Physical storage of multidimensional data	2
Lec 12	Distributed database systems	2
Lec 13	Distributed transactional processing	2
Lec 14	Cloud databases	2
Lec 15	Test	2
	Total hours	30

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

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

	Total hours	

Form of classes - project		Number of hours
Proj 1	Introduction, 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_S2IT_W02	C1	Lec1-Lec14	N1 – N2
PEK_W02	K2INF_W06_S2IT_W02	C1-C2	Lec1-Lec14	N1 – N2
PEK_U01 (skills)	K2INF_U08_S2IT_U10 K2INF_U08_S2IT_U09	C1-C2	Lec1-Lec14 Sem2-Sem8 Proj1-Proj15	N1 – N3
PEK_U02	K2INF_U08_S2IT_U10 K2INF_U08_S2IT_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 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): Information Technology
Level and form of studies: ~~1st/~~ 2nd* level, full-time ~~/ part-time~~*
Kind of subject: ~~obligatory~~ / optional /~~ university-wide~~*
Subject code INZ000042
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			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. 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	2
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 – exam	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.)
P1 – final grade	PEK_W01, PEK_W02, PEK_W03, PEK_U01, PEK_U02, PEK_U03	A grade is calculated as: 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)

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Software System Development

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Informatics

AND SPECIALIZATION Information Technology

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2INF_W06_S2IT_W01	C1	Lec1..Lec13, Lec15	N1, N4
PEK_W02	K2INF_W06_S2IT_W01	C1	Lec2, Lec5, Lec7-Lec13	N1, N4
PEK_W03	K2INF_W06_S2IT_W01	C3	Lec14	N1, N4
PEK_U01	K2INF_U08_S2IT_U02 K2INF_U08_S2IT_U10	C2	Proj1, Proj2, Proj3	N2, N3
PEK_U02	K2INF_U08_S2IT_U02 K2INF_U08_S2IT_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

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT/ DEPARTMENT ……

SUBJECT CARD

Name in Polish: Badania operacyjne w informatyce
Name in English: Operational Research in Computer Science
Main field of study (if applicable): Computer Science
Specialization (if applicable): Information Technology
Level and form of studies: 2nd level, full-time
Kind of subject: elective
Subject code: INZ0046
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)	90	90			
Form of crediting	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	0	0			
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

None

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SUBJECT OBJECTIVES

General objective deals with the acquisition of skills and indispensable knowledge concerning analysis and decision making for complex operation systems (complexes of operations), i.e. systems composed of operations connected via time relationships, with applications to computer systems.

Particular objectives are as follows:

C1 Getting to know and acquisition of skills to determine mathematical models for complexes of operations.

C2 Getting acquainted with application areas of complexes of operations.

C3 Acquisition of skills to formulate decision making problems for complexes of operations.

C4 Getting acquainted with methods and algorithms for solution selected decision making problems in complexes of operations, e.g.: allocation, task scheduling, optimization in networks, transportation, routing, and packing.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student knows foundations of decision making for complexes of operations as well as their areas of application.

PEK_W02 Student is familiar with different ways for modeling and analysis of complexes od operations.

PEK_W03 Student knows solution algorithm to selected decision making problems for complexes of operations.

relating to skills:

PEK_U01 Student is able to elaborate a mathematical model for the complex of operations, to analyze it, and to formulate the corresponding decision making problem.

PEK_U02 Student can apply a known algorithm to solve formulated case-study decision making problem.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction. Decision making system. Aims and scope of operational research.	2
Lec 2	Optimization problems in networks.	2
Lec 3	Maximum flow problem.	2
Lec 4	Linear programming.	2
Lec 5	Resource allocation I.	2
Lec 6	Resource allocation II.	2
Lec 7	Task scheduling I.	2
Lec 8	Computational complexity.	2
Lec 9	Task scheduling II.	2
Lec 10	Traveling salesman problem.	2
Lec 11	Packing problems.	2
Lec 12	Queuing systems.	2
Lec 13	Uncetain problems I.	2
Lec 14	Uncetain problems II.	2
Lec 15	Summary. Selected case study.	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1	Foundations of graphs.	4
Cl 2	Algorithms for shortest path and minimum spanning tree problems.	2
Cl 3	Algorithm for maximum flow problem.	2
Cl 4	Simplex method.	4
Cl 5	Application of a solver for selected optimization problems.	4
Cl 6	Algorithms for resource and task allocation.	4
Cl 7	Selected algorithms for task scheduling.	4
Cl 8	Selected algorithms for traveling salesman problem.	3
Cl 9	Algorithm for 0-1 knapsack problem.	1
Cl 10	Final test.	2
	Total hours	30

Form of classes - laboratory		Number of hours
Lab 1		
…		
	Total hours	

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.
N2. Solving numerical examples.
N3. Consultation.
N4. Self-contained work.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), C – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 (classes)	PEK_U01–PEK_U02	Short tests (5 mins.)
C (classes)	PEK_U01–PEK_U02	F1 + Final test
C (lecture)	PEK_W01–PEK_W03	Examination

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Taha H.A., Operations Research, An Introduction, 5th Edition, Prentice Hall Inc., 1995.
[2] Pinedo M., L., Scheduling. Theory, Algorithms, and Systems. Springer 2008.

SECONDARY LITERATURE:

[1] Bubnicki Z., Modern Control Theory, Springer Verlag, 2005.
[2] Krajewski L.J., Ritzman L.P., Operations Management, processes and value chains. 7th edition, Prentice Hall Inc, 2005.

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

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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_W02	C2	Lec1, Lec15	N1, N2, N3
PEK_W02	K2INF_W02	C1	Lec 2–Lec14	N1, N2, N3
PEK_W03	K2INF_W02	C4	Lec 2–Lec14	N1, N2, N3
PEK_U01	K2INF_U05	C1, C3	Cl1–Cl9	N2, N3, N4
PEK_U02	K2INF_U05	C4	Cl2–Cl9	N2, N3, N4

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: Informatics and Management

SUBJECT CARD

Name in Polish: Modelowanie i analiza systemów informacyjnych
Name in English Information Systems Modeling and Analysis
Main field of study (if applicable): Informatics
Specialization (if applicable): Information Technology
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ000041
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	0	3			
including number of ECTS points for direct teacher-student contact (BK) classes	1,8	1,8			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. 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 software development.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

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

PEK_W02: Students have knowledge about modern modeling languages.

relating to skills:

PEK_U01: With the participation of domain experts the student can construct and analyze the business model.

PEK_U02: Students can build models system requirements.

relating to social competences:

PEK_K01: Students can cooperate with experts representing application domain.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
Lec 3		
Lec 4		
Lec 5		
….		
	Total hours	

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

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

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

Proj 3		
Proj 4		
…		
	Total hours	

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

TEACHING TOOLS USED
N1. N2. N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1		
F2		
F3		
C		

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [1] [2] [3] [4] **SECONDARY LITERATURE:** [1] [2] [3]
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 (knowledge)				
PEK_W02				
…				
…				
PEK_U01 (skills)				
PEK_U02				
…				
PEK_K01 (competences)				
PEK_K02				
…				

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY of Computer Science and Management / Institute of Informatics

SUBJECT CARD

Name in Polish: Przetwarzanie Obrazów i Cyfrowego Wideo
Name in English: Digital Image and Video Processing
Main field of study (if applicable): Computer Science
Specialization (if applicable): Information Technology
Level and form of studies: 2nd level, full-time
Kind of subject: optional
Subject code INZ000043
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		
For group of courses mark (X) final course					
Number of ECTS points	3		3		
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,8		1,8		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Computer graphics
2.
3.

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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 as well as of techniques of non-linear digital video editing.
C2

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01
PEK_W02
…
relating to skills:
PEK_U01
PEK_U02
…
relating to social competences:
PEK_K01
PEK_K02

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		
Cl 3		
Cl 4		
..		
	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		
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. N2. N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1		
F2		
F3		
C		

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.

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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 (knowledge)				
PEK_W02				
…				
…				
PEK_U01 (skills)				
PEK_U02				
…				
PEK_K01 (competences)				
PEK_K02				
…				

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

*** - from table above

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): Information Technology

Level and form of studies~~: 1st~~/ 2nd~~* level, full-time / part-time*~~

Kind of subject: obligatory ~~/ optional / university-wide*~~

Subject code INZ0152

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 teacher-student contact (BK) classes	1,8				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. None

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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 information technologies 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 information technologies.

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 information technologies.

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 information technologies.	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 work plan, sequence diagram, state machine diagram . Examples in information technologies.	2
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**
Cw 1	Business process life cycle. Exercises.	2

Cw 2	Business process cost metrics . Exercises.	2
Cw 3	Business processes and software design. Exercises.	2
Cw 4	Business analysis tools. Exercises.	2
Cw 5	Business analysis charts. Exercises.	2
Cw 6	Petri nets and business modeling and analysis. Exercises.	2
Cw 7	UML. Exercises	2
Cw 8	Short test and discussion.	1
	Total hours	15

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

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

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

TEACHING TOOLS USED
N1. Multimedia presentations N2. The course Web page N3. Electronics and paper books and library references

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1		Short tests
F2		Evaluation of presentation, discussion and activity
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.

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 _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 Cw1- Cw7	N1, N2, N3
PEK_U02	K2INF _U06	C1-C3	Lec1-Lec7 Cw1- Cw7	N1, N2, N3
PEK_K01	K2INF _W03, K2INF _U06	C1-C3	Lec1-Lec7 Cw1- Cw7	N1, N2, N3
PEK_K02	K2INF _W03, K2INF _U06	C1-C3	Lec1-Lec7 Cw1- Cw7	N1, N2, N3

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

*** - from table above

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT / DEPARTMENT…

SUBJECT CARD

Name in Polish Metodologia badań

Name in English Research Methodology

Main field of study (if applicable): Computer Science

Specialization (if applicable): Information Technology

Level and form of studies~~: 1st~~/ 2nd~~* level, full-time / part-time*~~

Kind of subject: obligatory ~~/ optional / university-wide*~~

Subject code INZ0151

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	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. 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 information technology.

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 information technology.

PEK_W03 Student knows contemporary trends in applying new research methods to contemporary information technology

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 information technology

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	Writing a research proposal. Statement of problem. Study objectives, research	2

9	questions and hypothesis, proposed methods, scope and limitations of study. Literature review. Significance.	
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 information technology. 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 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):
Level and form of studies: 1st/ ~~2nd~~* level, full-time / ~~part-time~~*
Kind of subject: obligatory / optional / university-wide*
Subject code …….
Group of courses YES / NO*

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

*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	Data stream management	2
Lec 4	Stream query languages	2
Lec 5	Temporal databases	2
Lec 6	Semistructural data storage	2
Lec 7	Semistructural data processing	2
Lec 8	Query languages for semistructural data	2
Lec 9	Spatial data storage and processing	2
Lec 10	Multidimensional data	2
Lec 11	Physical storage of multidimensional data	2
Lec 12	Distributed database systems	2
Lec 13	Distributed transactional processing	2
Lec 14	Cloud databases	2
Lec 15	Test	2
	Total hours	30

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

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

	Total hours	

Form of classes - project		**Number of hours**
Proj 1	Introduction, 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)

Artur Wilczek,
Artur.wilczek@pwr.wroc.pl

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-Lec14	N1 – N2
PEK_W02	K2INF_W06_S2CE_W05	C1-C2	Lec1-Lec14	N1 – N2
PEK_U01 (skills)	K2INF_U08_S2CE_U10 K2INF_U08_S2CE_U09	C1-C2	Lec1-Lec14 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 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 INZ 000108Wcs
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					
Number of ECTS points	3	2			1
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	2,6	1			1

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge about description of dynamic processes with use of differential equations and transfer function (*K2INF _W01* Student has extended and deepened his/her knowledge in the fields of mathematics, physics or chemistry useful to formulate and to solve complex problems in computer science)
2. Knowledge about methods of data analysis and data mining (K2INF _W05 Student has organized and theoretically-based knowledge in the field of the advanced methods of data analysis)
3. Ability to apply data analysis and data mining methods to solve technical and non-technical problems for dynamic processes (K2INF _U05 Students are capable to integrate knowledge in branches of science proper for degree course to formulate and to solve engineering problems. Student knows how to apply system analysis approach in practice.

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SUBJECT OBJECTIVES

C1 Acquisition of skills to create mathematical models of technical and non-technical processes.
C2 Learn how to formulate typical decision making problems and how to solve them .

SUBJECT EDUCATIONAL EFFECTS

related to knowledge:
PEK_W01Knowledge of modern techniques of modelling and analysis of dynamical processes.
PEK_W02 Knowledge of generic decision making problems in computer science.

related to skills:
PEK_U01 Knows how to apply system analysis in scientific and engineering problems.
PEK_U02 Knows how to solve scientific and engineering problems analytically.

related to social competences:
PEK_K01Manage to present modern problems in the field of system modelling analysis.
PEK_K02 Knows modern methods of dynamical processes analysis, comprehends the need for new solutions and his/her knowledge improvement

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Model in systems research. Introduction – basic concept	2
Lec 2	Physical signal characteristics	2
Lec 3	Continuous signal, the Laplace transforms	2
Lec 4	Discrete signal, Z transforms	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 dynamical processes and their models	1
Cl 2	Differential equations, Laplace’s transform and transfer function	1
Cl 3	Solving differential equations with use of the Laplace transform	1
Cl 4	Discrete processes examples and their models. The Z Transform	1

Cl 5	Solving difference equations	1
Cl 6	Numerical methods of solving differential equations. Euler's scheme, mid-point method and Runge-Kutta methods.	1
Cl 7	Optimization problems formulations. Decision variables, performance index, constraints.	2
Cl 8	Foundations of optimization. Convex sets and functions, quadratic form, gradient, the Hessian matrix	1
Cl 9	Analytical methods for unconstrained and constrained optimization. Equality constraints and the Lagrange function.	1
Cl 10	Analytical methods for unconstrained and constrained optimization. Inequality constraints and Kuhn-Tucker conditions.	1
Cl 11	Linear programming	1
Cl 12	Integer programming	1
Cl 13	Dynamical programming	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 calculation tasks.
N3. Collective works.
N4. Student's own works – literature studies.
N5. 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 – F13	PEK_U01, PEK_U02, PEK_K01, PEK_K02	Observation of student's activity. Solving exercises. Preparation and presentation delivery.
P1 (Lec)	PEK_W01, PEK_W02, PEK_U01, PEK_U02, PEK_K02	Examination
P2 (Cl)	PEK_U01, PEK_U02, PEK_W01	F1 – F13
P3 (Sem)	PEK_K01, PEK_K02, PEK_W02	F1 – F13

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Bubnicki Z., *Identification of control plants*, PWN, Warszawa, 1980.
[2] Bubnicki Z. *Modern Control Theory*, Springer, Berlin-Heidelberg-New York, 2005
[3] Ikonen E., Najim K*., Advanced identification and control*, CRC Press LLC, 2002

SECONDARY LITERATURE:

[1] Bazaraa M. S., Sherali H.D., Shett C. M., *Nonlinear Programming Theory and Algorithms*, John Wiley and Sons, Inc., 2006
[2] Chong E.K.P., Żak S.H., *An Introduction to Optimization*, Wiley-Interscience, 2008.
[3] Ogata K., *Modern Control Engineering*, Prentice Hall, 2009.

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

prof. Jerzy Świątek, jerzy.swiatek@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

……

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

……..

AND SPECIALIZATION ……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K2INF _W01	C1, C2	Lec1 – Lec17	N1
PEK_W02	K2INF _W05	C1	Lec15 – Lec17	N1
PEK_U01 (skills)	K2INF _U05	C2	Cl1 – Cl13	N2, N4
PEK_U02	K2INF _U05	C1, C2	Cl – Cl13	N2, N3
PEK_K01 (competences)	K2INF _U05	C1	Sem1 – Sem2	N3, N5
PEK_K02	K2INF _U05	C1	Lec1 – Lec17, Cl1 – Cl13	N2. N3

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: Informatics and Management

SUBJECT CARD

Name in Polish: Modelowanie i analiza 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 …….
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	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	0	3			
including number of ECTS points for direct teacher-student contact (BK) classes	1	1			

*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 software development.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

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

PEK_W02: Students have knowledge about modern modeling languages.

relating to skills:

PEK_U01: With the participation of domain experts the student can construct and analyze the business model.

PEK_U02: Students can build models system requirements.

relating to social competences:

PEK_K01: Students can cooperate with experts representing application domain.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1		
Lec 2		
Lec 3		
Lec 4		
Lec 5		
….		
	Total hours	

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

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

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

Proj 3		
Proj 4		
…		
	Total hours	

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

TEACHING TOOLS USED
N1. N2. N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1		
F2		
F3		
C		

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [1] [2] [3] [4] **SECONDARY LITERATURE:** [1] [2] [3]
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 (knowledge)				
PEK_W02				
…				
…				
PEK_U01 (skills)				
PEK_U02				
…				
PEK_K01 (competences)				
PEK_K02				
…				

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

*** - from table above

FACULTY …… / DEPARTMENT……

SUBJECT CARD

Name in Polish: Podstawy inżynierii wiedzy
Name in English: Foundations of Knowledge Engineering
Main field of study (if applicable): Informatyka
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 INZ0139
Group of courses YES / ~~NO~~*

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

end)		
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)

Donat Orski, donat.orski@wp.pl

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 / 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 …….
Group of courses YES ~~/ NO~~*

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

*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	2
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)

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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

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 INZ000137Wl
Group of courses YES / ~~NO~~*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		45		
Number of hours of total student workload (CNPS)	45		135		
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	2		4		
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,2		2,4		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of object-oriented programming.
2. Basic knowledge of computer application interface design.
3. Elementary knowledge of graphics programs.

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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	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_U02 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 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

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Charlie Collins, Michael Galpin, Matthias Kaeppler, Android in Practice, Manning Publications Co, 2012.
[2] Ian F. Darwin, Android. Android Cookbook, O'Reilly, 2012.
[3] Frank Ableson, Robi Sen, Android in Action. Second edition, Manning Publications Co, 2011.
[4] Shane Condor, Lauren Darcey, Android Wireless Application Development(2nd Edition), Addison-Wesley, 2011.
[5] Jeff Friesen, Learn Java for Android Development, Appres, 2010.
[6] Derrick Ypenburg, ActionScript 3.0: Visual QuickStart Guide, Peachpit Press, 2009.
[7] Adobe Creative Team, Adobe Flash Professional CS6 Classroom in a Book, Adobe System Incorporeted, 2012.
[8] 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

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 INZ000145Wl
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 /	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	3.0		4.0		
including number of ECTS points for practical (P) classes	0.0		4.0		
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 methods and techniques of computer graphics in the scope corresponding to the contents of „Introduction to Computer Graphics" lecture
2. advanced skills in C++ or Java programming language
3. 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

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,	2

	interpolation in image and in object space, reduction of shadow tests	
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 domain traversal	2
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	2

	uniform space subdivision, evaluation of gains	
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	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 documentation and presentation of achieved results (Lab15)	PEK_W01 PEK_W04 PEK_K01	Evaluation of relevance of used 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)

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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_K01 (competences)		C1, C3	Lab7. Lab10,Lab15	N3

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

*** - from table above

FACULTY …… / DEPARTMENT……

SUBJECT CARD

Name in Polish Systemy ekspertowe
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 INZ0150
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	4		3		
including number of ECTS points for practical (P) classes			3		
including number of ECTS points for direct teacher-student contact (BK) classes	2,4		1,8		

*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.

PEK_U02 Student is capable of implementing and querying a knowledge base containing predicates, using a declarative programming language, e.g. Prolog.

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

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 – Lab5	Implementation and querying propositional knowledge base in Prolog programming language.	10

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**
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. 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	Observation of students' activity. Conversations with individual students concerning current laboratory exercises (incl. presentation of computer programs, computed results and 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)

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Expert Systems
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_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	C2	Lab1 – Lab5	N2 – N6
PEK_U02	K2INF_U08	C2	Lab6 – Lab10	N2 – N6
PEK_U03	K2INF_U08	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 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 …….
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		
For group of courses mark (X) final course					
Number of ECTS points	3		3		
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes					

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Computer graphics
2.
3.

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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 as well as of techniques of non-linear digital video editing.
C2

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01
PEK_W02
…
relating to skills:
PEK_U01
PEK_U02
…
relating to social competences:
PEK_K01
PEK_K02

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		
Cl 3		
Cl 4		
..		
	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		
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. N2. N3.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1		
F2		
F3		
C		

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.

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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 (knowledge)				
PEK_W02				
…				
…				
PEK_U01 (skills)				
PEK_U02				
…				
PEK_K01 (competences)				
PEK_K02				
…				

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

*** - from table above

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 INZ0140

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

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

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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

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 …….
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)	110		100		
Form of crediting	Examination		Crediting with grade		
For group of courses mark (X) final course	X				
Number of ECTS points	4		3		
including number of ECTS points for practical (P) classes			3		
including number of ECTS points for direct teacher-student contact (BK) classes	2,4		1,8		

*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, deploying and maintaining selected technologies and network services in enterprise environment.
C2. Acquire practical skills for planning, deploying and maintaining selected technologies and network services in enterprise environment.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 – student has knowledge on selected network technologies.
PEK_W02 – student has knowledge on selected network services.
relating to skills:
PEK_U01 – student has basic skills in the planning and configuration of address space in networks.
PEK_U02 – student has basic skills in the configuration on selected network services.

PROGRAMME CONTENT		
Form of classes – lecture		**Number of hours**
Lec 1	Reference models: ISO/OSI and TCP/IP. Topologies.	2
Lec 2	Address spaces and addressing in IP v. 4 and IP v. 6.	2
Lec 3	Switching and switches.	2
Lec 4	Routing and routers.	2
Lec 5	Routing protocols.	2
Lec 6	Dynamic Host Configuration Protocol (DHCP)	2
Lec 7	Domain Name System (DNS).	2
Lec 8	Firewalls.	2
Lec 9	Quality of Services (QoS).	2
Lec 10	Virtual Private Networks (VPN) and remote access.	2
Lec 11	Access to resources.	2
Lec 12	Multimedia transmission issues.	2
Lec 13	Wireless communication.	2
Lec 14	Fiber-optic communication.	2
Lec 15	Monitoring and troubleshooting	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_U01	Test – Address space planning.
F2	PEK_U02	Test – Software routing.
F3	PEK_U02	Test – DHCP service configuration.
F4	PEK_U02	Test – DNS service configuration.
P	PEK_W01, PEK_W02	Examination.

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

……..

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	C1	Lec 1-5,9,11-14	N1,3,5
PEK_W02	K2INF_W06	C1	Lec 6-8,10,15	N1,3,5
PEK_U01 (skills)	K2INF_U08	C2	Lab 1-6	N2,3,4
PEK_U02	K2INF_U08	C2	Lab 7-15	N2,3,4

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish …*Wytwarzanie interfejsu użytkownika*
Name in English *User Interface Development*
Main field of study (if applicable): Computer Science
Specialization (if applicable): ……..
Level and form of studies: 2nd level, full-time
Kind of subject: optional
Subject code …….
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	2.8		4.2		
including number of ECTS points for practical (P) classes			4.2		
including number of ECTS points for direct teacher-student contact (BK) classes			4.2		

*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:

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

SECONDARY LITERATURE:

[1] Spool J. M., Scanlon T., Schroeder W., Snyder C., DeAngelon T. Web Site Usability. Morgan Kaufman, 1999.
[2] 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

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 INZ000147Wl
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	3		4		
including number of ECTS points for practical (P) classes					
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 applications in Adobe Flash. Presentation and discussion of program code in AS	2

	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	Designing complex 3D object in the 3ds Max Design. The implementation of a set	4

Lab 11	of animation movements between selected points 3d object. Export animation to Adobe Flash. Programming navigation mechanism in AS 3.0.	
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	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.

	PEK_U02 PEK_U03	
F2	PEK_W01 PEK_W02 PEK_W03 PEK_U01 PEK_U02 PEK_U03 PEK_K01 PEK_K02	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.

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 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

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

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

SECONDARY LITERATURE:

[1] Matthew MacDonald, HTML5: The Missing Manual, O'Reilly, 2011.
[2] Chuck Hudson, Tom Leadbetter, HTML5 Developer's Cookbook, Addison-Wesley, 2012.
[3] Shelley Powers, Painting the Web, Shelley Powers, 2008.
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[5] Adobe Creative Team, Adobe Photoshop Professional CS6 Calssroom in a Book, Adobe System Incorporated, 2012.
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[8] Pete Brown, Silverlight 5 in Action, Manning Publications Co, 2012.
[9] Mike Snell, Lars Powers, Microsoft Visual Studio 2010 Unleashed, Pearson Education Inc, 2011.

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

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 INZ0152

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 teacher-student contact (BK) classes	1,8				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. None

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 work plan, sequence diagram, state machine diagram . Examples in computer engineering.	2
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		

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	Business process life cycle. Presentations theoretical solutions and examples supplements lectures.	2
Sem 2	Business process cost metrics . Presentations theoretical solutions and examples supplements lectures.	2
Sem 3	Business processes and software design. Presentations theoretical solutions and examples supplements lectures.	2
Sem 4	Business analysis tools. Presentations theoretical solutions and examples supplements lectures.	2
Sem 5	Business analysis charts. Presentations theoretical solutions and examples supplements lectures.	2
Sem 6	Petri nets and business modeling and analysis . Presentations theoretical solutions and examples supplements lectures.	2
Sem 7	UML. Presentations theoretical solutions and examples supplements lectures.	2
Sem 8	Short test and discussion.	1
	Total hours	15

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 presentation, discussion and activity
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.

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 _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 Sem1- Sem7	N1, N2, N3
PEK_U02	K2INF _U06	C1-C3	Lec1-Lec7 Sem1- Sem7	N1, N2, N3
PEK_K01	K2INF _W03, K2INF _U06	C1-C3	Lec1-Lec7 Sem1- Sem7	N1, N2, N3
PEK_K02	K2INF _W03, K2INF _U06	C1-C3	Lec1-Lec7 Sem1- Sem7	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 INZ0151

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	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. None

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	Writing a research proposal. Statement of problem. Study objectives, research	2

9	questions and hypothesis, proposed methods, scope and limitations of study. Literature review. Significance.	
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