SUBJECT CARDS

FACULTY:	ELECTRONICS
MAIN FIELD OF STUDY:	**COMPUTER SCIENCE**
EDUCATION LEVEL:	1st level, Engineer
FORM OF STUDIES:	full-time
PROFILE:	general academic
LANGUAGE OF STUDY:	polish
SPECJALIZATION:	**IMT –** Applied Computer Engineering in Medicine
	INT – Internet Engineering
	INS – Data Processing System Engineering
	ISK – Computer Systems and Networks

Zał. nr 4 do ZW 64/2012

FACULTY ELECTRONICS

SUBJECT CARD

Name in Polish **Podstawy automatyki i robotyki**
Name in English **Introduction to automation and control**
Main field of study: **Computer Science**
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code **AREW001**
Group of courses **YES**

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

not

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SUBJECT OBJECTIVES

C1 Acquisition of knowledge of the basic concepts of control theory and systems theory.
C2 Knowledge how to perform a simple simulation in MATLAB / Simulink.
C3 The acquisition of knowledge of the principles of operation and tuning controllers, sensors, actuators, and industrial controllers, computer networks and automatic signal standards.
C4 The acquisition of knowledge in the identification, mathematical model, computer simulation, dynamics design of closed-loop system.
C5 Acquisition of basic knowledge on construction of industrial robots and manipulators, stationary and mobile, and robotic manufacturing processes.
C6 The acquisition of basic skills in the operation and programming of industrial robots, stationary and mobile.
C7 Acquisition of basic knowledge of the prospects and directions of development of technologies for systems and automation equipment and robotics.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 knows the definitions and basic properties of static and dynamic systems, linear and non-linear.
PEK_W02 knows the basic structure of control systems and linear regulators.
PEK_W03 knows the basic applications of mobile robots, understands the concept of self-localization and robot autonomy.
PEK_W04 have a general knowledge about the design of mobile robots, their transportation systems, control and power.

PEK_W05 knows the basic configurations of industrial robots, their design, capacity, handling and use, has an elementary knowledge of control and robot programming languages, and on the effectors and sensory systems used in robotics.
PEK_W06 has a basic knowledge of the mathematical models of control engineering objects, methods for identifying and computer simulation
PEK_W07 has a basic knowledge of the selection of controls and settings regulators, sensors, industrial controllers, and actuators.

relating to skills:
PEK_U01 he's able to plan and conduct an experiment to determine the dynamics of the controlled object.
PEK_U02 can develop a simple control algorithm for the intelligent building code algorithm and test in the laboratory.
PEK_U03 can use the technical documentation robots and use it to operate, and simple manual programming of a typical industrial robot.
PEK_U04 can run a simple simulation of linear dynamic systems in MATLAB / Simulink.
PEK_U05 can run a simple test for automatic control systems in MATLAB / Simulink.
PEK_U06 can run a mobile robot and test the efficiency of its components, chassis system and sensory systems.

relating to social competences:
PEK_K01 understands and can apply the principles of health and safety at work with devices of automation and robotics in the laboratory and beyond.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Automation and robotics - the basic concepts. The basic structure of control systems and linear regulators, industrial controllers, sensors, actuators.	2,5
Lec 2	Static and dynamic, linear and nonlinear, stationary and non-stationary systems. Selected properties, stability and instability of systems.	2,5
Lec 3	Automatic regulation. Regulation systems in open and closed-loop. Some elementary properties of linear regulators.	2,5
Lec 4	Identification, development of a mathematical model, computer simulation, design of closed-system dynamics.	2,5
Lec 5	Industrial robots, stationary and mobile, structures and configurations of manipulators, tasks, control systems, programming methods, typical technical parameters.	2,5
Lec 6	Service robots, medical, social, intelligent robots, robotics and flexible manufacturing systems, robotics trends and prospects.	2,5
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab 1	Mobile robots, the principles of design, sensor technology, autonomy and auto-localisation	2,5
Lab 2	Industrial robots, structure, control system, control panel and programming, effectors, service, and basic programming.	2,5
Lab 3	Standard signals and fieldbus automation in intelligent buildings.	2,5

Lab 4	Measurements of digital and analog signals. Research of analog measurement and executive channel. The experiment determining the parameters of the dynamic characteristics of the object.	2,5
Lab 5	Simulation of simple linear dynamic systems in MATLAB / Simulink	2,5
Lab 6	Simulation and properties study of simple automatic control systems in MATLAB / Simulink	2,5
	Total hours	15

TEACHING TOOLS USED

N1. Traditional lecture using multimedia
N2. Presentations using laboratory equipments
N3. Practical exercises in the laboratory
N4. Discussions
N5. Consultations
N6. Own work - preparation of reports
N7. Own work - literature studies and source materials

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK1_U01, PEK1_U02 PEK1_U03, PEK1_U04 PEK1_U05, PEK1_U06 PEK1_K01	assessment of laboratory exercises, assessment of reports and selected papers
F2	PEK1_W01, PEK1_W02 PEK1_W03, PEK1_W04 PEK1_W05, PEK1_W06 PEK1_W07	written test
C=0.5F1+0.5F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

1. Greblicki W., Teoretyczne podstawy automatyki, Oficyna Wydawnicza PWr., Wrocław 2001.
2. Halawa J. Symulacja i komputerowe sterowanie dynamiki układów sterowania, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2007.
3. Klimesz J., Solnik W., Urządzenia automatyki, Wyd. Politechniki Wrocławskiej, Wrocław, 1991.
4. Łysakowska B., Mzyk G., Komputerowa symulacja układów automatycznej regulacji w środowisku MATLAB/Simulink, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2005.
5. Siemens, *SIMATIC S7-1200 w przykładach*. Siemens, Warszawa 2011.
6. J.-C. Latombe, Robot motion planning, Kluwer Academic Publishers 1993.
7. Zdanowicz R., Podstawy robotyki, Wydawnictwo Politechniki Ślaskiej, Gliwice, 2011
8. pod red. Morecki A, Knapczyk J., Podstawy robotyki: teoria i elementy manipulatorów i robotów, Warszawa, WNT, 1993

SECONDARY LITERATURE:

1. Brzózka J. Regulatory cyfrowe w automatyce, Wyd. MIKOM, Warszawa, 2002.
2. Lesiak P., Świtalski D., Komputerowa technika pomiarowa, Agenda Wydawnicza PAK, Warszawa, 2002.
3. Solnik W., Zajda Z., Komputerowe sieci przemysłowe Profibus DP i MPI w automatyce, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2010.
4. Kwaśniewski J., Programowalny sterownik SIMATIC S7-300 w praktyce inżynierskiej, Wydawnictwo BTC,

Legionowo 2009.
5. Solnik W., Zajda Z., *Komputerowe sieci przemysłowe Uni-Telway i magistrala rozszerzenia TSX*. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2010.
6. Z. Korzeń, A. Wołczowski, Tendencje rozwojowe robotów mobilnych w logistycznie zintegrowanych systemach transportowo-magazynowych i produkcyjnych - Cz. 1 i Cz. 2, Logistyka nr 2 i nr 3, 1995.

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

Wojciech Muszyński wojciech.muszynski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Foundations of automation and robotics

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

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	K1AIR_W11, K1EKA_W10, K1INF_W11, K1TIN_W10, K1TEL_W10	C1,C2	Lec1, Lec 2,Lab5,Lab6	N1,N2,N3,N4,N7
PEK_W02	K1AIR_W11, K1EKA_W10, K1INF_W11, K1TIN_W10, K1TEL_W10	C1	Lec 3,Lab6	N1,N2,N3,N4,N7
PEK_W03	K1AIR_W11, K1EKA_W10, K1INF_W11, K1TIN_W10, K1TEL_W10,	C5,C6	Lec 6,Lab1	N1,N2,N3,N6,N7
PEK_W04	K1AIR_W11, K1EKA_W10, K1INF_W11, K1TIN_W10, K1TEL_W10,	C5,C6,C7	Lec 6,Lab1	N1,N2,N3,N6,N7
PEK_W05	K1AIR_W11, K1EKA_W10, K1INF_W11, K1TIN_W10, K1TEL_W10	C5,C6,C7	Lec 5, Lec 6,Lab2	N1,N2,N3,N6,N7
PEK_W06	K1AIR_W11, K1EKA_W10, K1INF_W11, K1TIN_W10, K1TEL_W10,K1AIR_W12,	C3,C4	Lec 3, Lec 4,Lab5,Lab6	N1,N3,N4,N6
PEK_W07	K1AIR_W11, K1EKA_W10, K1INF_W11, K1TIN_W10, K1TEL_W10, K1AIR_W25	C3,C4	Lec 3, Lec 4,Lab3,Lab4	N1,N3,N4,N6
PEK_U01	K1AIR_U22, K1EKA_U09, K1INF_U10, K1TIN_U10, K1TEL_U09	C3,C4	Lec 4,Lab6	N1,N3,N4,N6
PEK_U02	K1AIR_U30, K1EKA_U09, K1INF_U10, K1TIN_U10, K1TEL_U09	C3	Lab3	N3,N4
PEK_U03	K1AIR_U11, K1EKA_U09, K1INF_U10, K1TIN_U10, K1TEL_U09	C5	Lab2	N3,N4,N6,N7
PEK_U04	K1AIR_U11, K1EKA_U09, K1INF_U10, K1TIN_U10, K1TEL_U09	C2	Lab6	N3,N4
PEK_U05	K1AIR_U11, K1EKA_U09, K1INF_U10, K1TIN_U10, K1TEL_U09	C4	Lab5	N3,N4
PEK_U06	K1AIR_U30, K1EKA_U09, K1INF_U10, K1TIN_U10, K1TEL_U09	C6	Lab1	N3,N4,N7

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

*** - from table above

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FACULTY OF **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Miernictwo 1**
Name in English	**Measurement technique 1**
Main field of study (if applicable):	**Computer Science**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**ETEW001**
Group of courses	**NO**

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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SUBJECT OBJECTIVES

C1. Acquiring basic knowledge in the field of metrology
C2. Acquiring knowledge in the field of measurement theory
C3. Acquiring knowledge in the field of technique electrical and nonelectrical quantities measurement

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 – explains the basic concepts in the field of metrology
PEK_W02 – explains the theoretical fundamentals of measurement technique
PEK_W03 – describes construction and operation of measuring devices and systems
PEK_W04 – explains principles of measurement of nonelectrical quantities
PEK_W05 – characterises measurements of constant and time-variable electrical quantities
PEK_W06 – describes measurement methods of power and passive elements properties

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec1	Introduction to metrology	4
Lec2	Measurement units and systems, standards of electrical quantities and	2

	time	
Lec3	Direct and indirect measurement methods	2
Lec4	Measurement accuracy and approaches to its assessment	4
Lec5	General characteristics of measurement devices	2
Lec6	Construction and operation of measuring devices and systems	6
Lec7	Principles of nonelectrical quantities measurement	1
Lec8	Measurement of constant electrical quantities	1
Lec9	Measurement of time-variable quantities	4
Lec10	Measurement of power and passive elements properties	2
Lec11	Summing-up knowledge in the field of measurement techniques	2
	Total hours	**30**

TEACHING TOOLS USED

N1. Traditional lectures with the use of multimedia presentations
N2. Conspectus available in the PDF format
N3. Individual consultations
N4. Own work – repetition of delivered material

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
C	PEK_W01 - PEK_W06	Final test

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Chwaleba A., Poniński M., Siedlecki A.: Metrologia elektryczna. WNT, Warszawa 2003.
[2] Tumański S.: Technika pomiarowa. WNT, Warszawa 2013.
[3] Sydenham P.H. (ed.): Podręcznik metrologii (T1-T2). WKiŁ, Warszawa 1988, 1990.
[4] Dusza J. Gortat G., Leśniewski A.: Podstawy miernictwa. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1998.

SECONDARY LITERATURE:

[1] Barzykowski J. (red.): Współczesna metrologia - zagadnienia wybrane. WNT, Warszawa 2004.
[2] Mroczka J. (red.): Problemy metrologii elektronicznej i fotonicznej (T1-T4). Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2008-2011.
[3] Piotrowski J.: Podstawy miernictwa. Wydawnictwo Politechniki Śląskiej, Gliwice 1997.
[4] Jaworski J., Morawski R., Olędzki J.: Wstęp do metrologii i techniki eksperymentu. WNT, Warszawa 1992.
[5] Taylor J.: Wstęp do analizy błędu pomiarowego. PWN, Warszawa 1995.
[6] Winiecki W.: Organizacja komputerowych systemów pomiarowych. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2006.
[7] Wyrażanie niepewności pomiaru. Przewodnik. Główny Urząd Miar, Warszawa 1999.

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Measurement technique 1

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

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	K1INF_W08	C1	Lec1	N1, N2
PEK_W02	K1INF_W08	C2	Lec2-Lec4	N1, N2
PEK_W03	K1INF_W08	C3	Lec5, Lec6	N1, N2
PEK_W04	K1INF_W08	C3	Lec7	N1, N2
PEK_W05	K1INF_W08	C3	Lec8, Lec9	N1, N2
PEK_W06	K1INF_W08	C3	Lec10	N1, N2
PEK_W01-PEK_W06	K1INF_W08	C1-C3	Lec11	N3, N4

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

*** - from table above

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FACULTY OF **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Miernictwo 2**
Name in English	**Measurement technique 2**
Main field of study (if applicable):	**Computer Science**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**ETEW002**
Group of courses	**NO**

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

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

K1INF_W08

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SUBJECT OBJECTIVES

C1. Exploitation of analog and digital measurement devices according to rules.
C2. Acquisition of skills of plan and perform of measurement
C3. Acquisition of skills of simply measurements results analyze
C4. Learning using of oscilloscope
C5. Acquisition of skills of DC voltage measurements
C6. Acquisition of skills of DC current measurements
C7. Acquisition of skills of statistical analyze of measurement results
C8. Meeting of electrical periodic signals and measurement of their frequency

SUBJECT EDUCATIONAL EFFECTS

relating to skills:

PEK_U01 –can describe structure, use basic analog and digital measurement devices
PEK_U02 – can connect measurement circuit and write measurement results
PEK_U03 – can describe structure, basic functions and applications and use oscilloscope.
PEK_U04 – can perform and analyze of DC voltage measurements
PEK_U05 – can perform and analyze of DC current measurements
PEK_U06 – can assess final measurement result base many statistical independent measurements and analyze such an experiment
PEK_U07 – can perform and analyze of measurement of frequency and phase of periodic signals

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
	Total hours	

Form of classes – laboratory		**Number of hours**
Lab 1	Organizational matters, health and safety regulations and laboratory rules	1
Lab 2	Measurement devices	2
Lab 3	Oscilloscope - principle of operation, maintenance and using	2
Lab 4	DC voltage measurement with analog and digital instruments	2
Lab 5	DC current measurement with analog and digital instruments	2
Lab 6	Statistical methods of measurement results evaluation	2
Lab 7	Measurements of the frequency and the phase of periodic signals	2
Lab 8	Repetytorium	2
	Total hours	15

TEACHING TOOLS USED

N1. Own work - preparation for laboratory
N2. Laboratory classes – short 10 min. tests of theoretical preparation
N3. Laboratory classes – combining measurement circuits and using instruments
N4. Laboratory classes – protocols of the experiments
N5. 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_U01÷PEK_U07	Written quizzes, discussions and efficiency of services and connect devices, protocols
C=F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Chwaleba A., Poniński M., Siedlecki A.: „Metrologia elektryczna", ,WNT, Warszawa 1996r
[2] Dusza J.: „Podstawy miernictwa", Oficyna Politechniki Warszawskiej, Warszawa 1998r.
[3] Marcyniuk A.: „Podstawy metrologii elektrycznej", WNT, Warszawa 1984r.
[4] Taylor J.: „Wstęp do analizy błędu pomiarowego", PWN, Warszawa 1995r.

SECONDARY LITERATURE:

[1] Bolkowski S.: „Elektrotechnika", Wydawnictwa Szkolne i Pedagogiczne, Warszawa 1993r.
[2] Marve C.: „Zarys cyfrowego przetwarzania sygnałów", Warszawa 1999r.
[3] Winiecki W.: „Organizacja komputerowych systemów pomiarowych", Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1997r.

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

Zbigniew Świerczyński, Ph.D., Zbigniew.Swierczynski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Measurement technique 2
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	K1INF_U06	C1, C2, C3	Lab1, Lab2	N1÷N5
PEK_U02	K1INF_U06	C1, C2, C3	Lab2-Lab8	N1÷N5
PEK_U03	K1INF_U06	C1, C2, C3, C4	Lab3	N1÷N5
PEK_U04	K1INF_U06	C1, C2, C3, C5	Lab4	N1÷N5
PEK_U05	K1INF_U06	C1, C2, C3, C6	Lab5	N1÷N5
PEK_U06	K1INF_U06	C1, C2, C3, C7	Lab6	N1÷N5
PEK_U07	K1INF_U06	C1, C2, C3, C8	Lab7	N1÷N5

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FACULTY OF **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Grafika inżynierska**
Name in English	**Technical drawing**
Main field of study (if applicable):	**Computer Science**
Level and form of studies:	**1st, full-time**
Kind of subject:	**obligatory**
Subject code	**ETEW003**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	15			
Number of hours of total student workload (CNPS)	90	30			
Form of crediting	crediting with grade	crediting with grade			
For group of courses mark (X) final course	X				
Number of ECTS points	4				
including number of ECTS points for practical (P) classes	-	1			
including number of ECTS points for direct teacher-student contact (BK) classes	0.5	0.5			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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SUBJECT OBJECTIVES

C1. The acquisition of knowledge in the field of design and construction technological documentation of electronic devices:
- C1.1. projection methods.
- C1.2. draw line and other elements of the technical drawing,
- C1.3. by technical letter,
- C1.4. drawing in the view bar and cross sections,
- C1.5. dimensioning,
- C1.6. drawing and dimensioning tools,
- C1.7. drawing penetrate solids.

C2. To acquire skills in the use of basic forms of writing, casting techniques and describe models of objects using different types of sections.

C3. Acquisition and persisting social competence in terms of the importance of technical documentation engineer work and is aware of the responsibility associated with the creation of technical documentation.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

knows the rules and read the documentation of the construction technology of electronic devices.

PEK_W01 – knows projection methods
PEK_W02 - knows the rules draw lines and other elements of the technical drawing,
PEK_W03 - knows technical writing,
PEK_W04 – knowledge of drawing in the view bar and cross sections,
PEK_W05 – knowledge of dimensioning,
PEK_W06 - has a basic knowledge of drawing and dimensioning tools,
PEK_W07 - has a basic knowledge of drawing the penetration of solids.
…

relating to skills:

know how to use basic forms, write cast techniques and describe the object model using various cross sections

PEK_U01 - is able to correctly cast the item onto a plane,
PEK_U02 - can perform technical drawing in accordance with the principles,
PEK_U03 - can actually describe the figure by letter,
PEK_U04 - can properly to draw views and cross sections,
PEK_U05 - can properly dimension the drawing items
PEK_U06 - is able to correctly draw and size the threaded connection
PEK_U07 - is able to correctly draw the intertwining of solids.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Organisational matters. The importance of documentation in engineering activities. The basic method of casting block plane,	2
Lec 2	The principle of creating a technical drawing,	2
Lec 3	Basic ways of describing the technical drawing,	2
Lec 4	The principle of drawing views and cross sections,	2
Lec 5	Principles of dimensioning objects	2
Lec 6	The basic principles of drawing and dimensioning of threaded connections	2
Lec 7	The basic principles of drawing up penetrate solids.	2
Lec 8	Colloquium	1
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Organisational matters. Perspective drawing.	2
Cl 2	Throw the solid plane.	2
Cl 3	Throw the solid plane with respect to the sections.	2
Cl 4	Throw the solid plane with descriptions and dimensioning.	2
Cl 5	Thread connections with dimensioning	2
Cl 6	Other projections on a plane than rectangular	2

Cl 7	Drawing Test	2
Cl 8	Summary activities.	1
	Total hours	15

TEACHING TOOLS USED

N1. Traditional Lecture with slides
N2. Consultation
N3. Own Work – drawings
N4.oown Work-independent studies and preparation for the seminar on

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_W1 – PEK_W7	crediting with grade
F2	PEK_U01 - PEK_U07	exercise
P = (F1*3 + F2)/4		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] T. Dobrzański. Rysunek techniczny maszynowy. WNT
[2] J. Houszka. Podstawy konstrukcji mechanicznych w elektronice.

SECONDARY LITERATURE:

[1] Poradnik inżyniera mechanika. Praca zbiorowa
[2] Zbiory Polskich Norm

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Technical drawing

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 **PEK_W02** **PEK_W03** **PEK_W04** **PEK_W05** **PEK_W06** **PEK_W07**	K1INF_W10	C1.1 – C1.7	Lec.1 – Lec.8	1, 2, 4
PEK_U01 **PEK_U02** **PEK_U03** **PEK_U04** **PEK_U05** **PEK_U06** **PEK_U07**	K1INF_U09	C2	Cl. 1 – Cl. 8	2, 3

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

*** - from table above

Zał. nr 3 do ZW

FACULTY OF ELECTRONICS

SUBJECT CARD

Name in Polish: **Podstawy telekomunikacji**
Name in English: **Introduction to Telecommunications**
Main field of study (if applicable): **Computer Science**
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code **ETEW004**
Group of courses **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	**30**				
Number of hours of total student workload (CNPS)	**60**				
Form of crediting	crediting with grade				
Number of ECTS points	**2**				
including number of ECTS points for practical (P) classes	**0**				
including number of ECTS points for direct teacher-student contact (BK) classes	**1**				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Knowledge concerning mathematical analysis 1.2A (K1INF_W02) and linear algebra with analytical geometry A (K1INF_W01), proved by positive examination results..

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SUBJECT OBJECTIVES

C1. Getting the knowledge concerning basics of telecommunications

SUBJECT EDUCATIONAL EFFECTS

I**. Relating to knowledge: has basic knowledge of telecommunications**

PEK_W01 – knows basics of signal representation in time and frequency domain.
PEK_W02 – knows basis notions used in the description of telecommunication systems.
PEK_W03 – knows basics of analog and digital modulations..
PEK_W04 – has the knowledge concerning pulse modulations, knows sampling theorem.
PEK_W05 – has the knowledge concerning Pulse Code Modulation and basics of coding in telecommunications.
PEK_W06 – has the knowledge concerning noise and interference in telecommunications systems.
PEK_W07 – knows the theorem about bandwidth of telecommunication channel and principles of wideband systems.
PEK_W08 – knows basis notion of multiplexing.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1,2	Organizational matters. Signals in time and frequency domain.	4
Lec 3	Telecommunication system – basic concepts.	2
Lec 4,5	Analog and digital modulations.	4
Lec 6	Pulse modulations. Sampling theorem.	2
Lec 7,8	Pulse Code Modulation.	4
Lec 9	Coding in telecommunications.	2
Lec 10-12	Noise and interference in telecommunication systems.	6
Lec 13	Bandwidth of telecommunication channel. Wideband systems.	2
Lec 14	Multiple systems	2
Lec 15	Final test.	2
	Total hours	**30**

TEACHING TOOLS USED
N1. Traditional lectures N2. Consultations. N3. Student's own work – self-studies and preparations for final test.

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_W08	Written or electronic test
P = F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Simon Haykin, *Systemy telekomunikacyjne*. Cz. 1. Wydawnictwa Komunikacji i Łączności, Warszawa 2004.
[2] Simon Haykin, *Systemy telekomunikacyjne*. Cz. 2. Wydawnictwa Komunikacji i Łączności, Warszawa 2004.
[3] Daniel Józef Bem, *Systemy telekomunikacyjne*. Cz. 1, Modulacja, systemy wielokrotne, szumy. Politechnika Wrocławska, Wrocław 1978.

SECONDARY LITERATURE IN POLISH:

[1] W. David Gregg, *Podstawy telekomunikacji analogowej i cyfrowej*, Wydawnictwa Naukowo-Techniczne, Warszawa 1983.

SECONDARY LITERATURE IN ENGLISH:

[1] Tommy Öberg, *Modulation, detection and coding*, John Wiley & Sons, Chichester 2001.
[2] Jerry D. Gibson, *Principles of digital and analog communications*, MacMillan Publ., New York, 1993.

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT **Introduction to telecommunications** AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Computer Science**

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	K1INF_W14	C1	Lec1, Lec2	1,2,3
PEK_W02	K1INF_W14	C1	Lec3	1,2,3
PEK_W03	K1INF_W14	C1	Lec4, Lec5	1,2,3
PEK_W04	K1INF_W14	C1	Lec6	1,2,3
PEK_W05	K1INF_W14	C1	Lec7÷Lec9	1,2,3
PEK_W06	K1INF_W14	C1	Lec10÷Lec12	1,2,3
PEK_W07	K1INF_W14	C1	Lec13	1,2,3
PEK_W08	K1INF_W14	C1	Lec14	1,2,3

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Podstawy przetwarzania sygnałów**
Name in English	**Fundamentals of signal processing**
Main field of study (if applicable):	**Computer Science**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**ETEW005**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		15		
Number of hours of total student workload (CNPS)	90		60		
Form of crediting	crediting with grade		crediting with grade		
For group of courses mark (X) final course	X				
Number of ECTS points					
including number of ECTS points for practical (P) classes			2		
including number of ECTS points for direct teacher-student contact (BK) classes	1		1.5		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1AIR_W01, K1EKA_W01, K1INF_W01, K1TEL_W01, K1TIN_W01
2. K1AIR_U01, K1EKA_U01, K1INF_U01, K1TEL_U01, K1TIN_U01
3. K1AIR_W02, K1EKA_W02, K1INF_W02, K1TEL_W02, K1TIN_W02
4. K1AIR_U02, K1EKA_U02, K1INF_U02, K1TEL_U02, K1TIN_U02
5. K1AIR_W03, K1EKA_W03, K1INF_W03, K1TEL_W03, K1TIN_W03
6. K1AIR_W04, K1EKA_W04, K1INF_W04, K1TEL_W04, K1TIN_W04
7. K1AIR_W12, K1EKA_W11, K1INF_W12, K1TEL_W11, K1TIN_W11
8. K1AIR_U12, K1EKA_U10, K1INF_U11, K1TEL_U10, K1TIN_U11

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SUBJECT OBJECTIVES

C1. He knows the basic concepts of the theory of digital signal processing for deterministic and random signals, in particular the task of: sampling, quantization, transformations, filtering, estimation and detection.

C2. He can analyze the properties of the signals in the time and frequency domain, also synthesize digital filters using dedicated software.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01: Knowledge of the nature, characteristics and statistics of analog and digital signals, deterministic and random

PEK_W02: Knowledge about the essence of the transformation of signals

PEK_W03: Knowledge of digital signal filtering and fundamental methods of digital filter design

PEK_W04: Knowledge of the nature and methods of estimation and detection

relating to skills:

PEK_U01: Ability to realize basic digital signal processing algorithms

PEK_U02: Ability to analyze results of the signal processing and presentation of the results of the analysis

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction: classification of signals, signal processing purposes, the basic parameters of deterministic signals	2
Lec 2	Spaces signals and transforms: Hilbert space, approximation, time domain and frequency domain, Fourier transform, other transformations	4
Lec 3	Analysis of the similarity of signals, time-frequency transforms, wavelet transform	2
Lec 4	The digitization of signals: sampling theorem, sampling errors, aliasing, quantization, interpolation, decimation	2
Lec 5	Discrete and fast Fourier transform	3
Lec 6	Systems in signal processing: classification, description, systems with discrete time, the Z transformation	2
Lec 7	Digital filtering: difference equation, the location of zeros and poles of the filter transfer function, filter types, the basic structure of the filter, the inverse filter	3
Lec 8	Designing digital filters	2
Lec 9	Random signals: the definition of a stochastic process, process statistics	3
Lec 10	Stationary random processes: definitions of stationarity, examples of processes, classes of equivalence classes, signal passage through a linear system, the system identification elements	2
Lec 11	Introduction to estimation theory: the essence of estimation, estimation errors, the classes of estimators, estimation methods of the basic statistics, examples	3
Lec 12	Introduction to the theory of detection: the essence of detection, detection alphabet, the criterion of detection, error detection, Bayesian criterion, examples	2
	Total hours	30

Form of classes - laboratory		**Number of hours**
Lab 1	Getting to know the software used for digital signal processing	3
Lab 2	The implementation of the calculation of the spectrum for model signals and	

	real-world signals, results analysis	3
Lab 3	Implementation of digital filter design and filtering the model signals and real-world signals, results analysis	3
Lab 4	Implementation of histogram calculation and correction functions for model signals and real-world signals, results analysis	3
Lab 5	The realization of individual calculation task for model or real-world signal, analysis of the results, preparation of reports	3
	Total hours	**15**

TEACHING TOOLS USED

N1. The lecture mainly using the board, usage of multimedia for presenting of examples
N2. Lecture materials are available on: https://zts.ita.pwr.wroc.pl
N3. MATLAB software
N4. Discussion of the tasks to be performed in the laboratory, the presentation of exemplary solutions, oral skills testing
N5. Individual realization of laboratory tasks, written skills testing
N6. Consultations
N7. Independent student work
N8. The implementation of e-test at the end of the course

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01-04	Oral knowledge test
F2	PEK_U01-05	Innovativeness of solution and presentation of results
F3	PEK_W01-08	Assessment of the number of correct answers obtained
C = 0.25*F1 + 0.25*F2 + 0.5*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Lyons R.G. Wprowadzenie do cyfrowego przetwarzania sygnałów, WKŁ, Warszawa 1997

[2] Oppenheim A.V, Schafer R.W, Cyfrowe przetwarzanie sygnałów, WKŁ, Warszawa 1979

[3] Zieliński T., Od teorii do cyfrowego przetwarzania sygnałów, WKŁ, Warszawa, 2006

[4] Papoulis A., Prawdopodobieństwo, zmienne losowe i procesy stochastyczne, Warszawa, PWN, 1972

SECONDARY LITERATURE:

[1] Szabatin J., Podstawy teorii sygnałów, Warszawa, WKŁ, 2000

[2] Bendat J.S., Piersol A.G., Metody analizy i pomiaru sygnałów losowych, Warszawa, PWN, 1976

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Fundamentals of signal processing

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

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)	K1TEL_W14, K1TIN_W14, K1INF_W15 K1EKA_W14, K1AIR_W15	C1	Lec1, Lec3, Lec4, Lec9, Lec 10	N1, N2, N6, N7, N8
PEK_W02	K1TEL_W14, K1TIN_W14, K1INF_W15 K1EKA_W14, K1AIR_W15	C1	Lec2, Lec5	N1, N2, N6, N7, N8
PEK_W03	K1TEL_W14, K1TIN_W14, K1INF_W15 K1EKA_W14, K1AIR_W15	C1	Lec6, Lec7, Lec8	N1, N2, N6, N7, N8
PEK_W04	K1TEL_W14, K1TIN_W14, K1INF_W15 K1EKA_W14, K1AIR_W15	C1	Lec11, Lec12	N1, N2, N6, N7, N8
PEK_U01 (skills)	K1TEL_U12, K1TIN_U13, K1INF_U13 K1EKA_U12, K1AIR_U14	C2	Lab1-Lab4	N3, N4, N5, N6
PEK_U02	K1TEL_U12, K1TIN_U13, K1INF_U13 K1EKA_U12, K1AIR_U14	C2	Lab2-Lab5	N3, N4, N5, N6

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-4 / DEPARTMENT I-6

SUBJECT CARD

Name in Polish	**Podstawy techniki mikroprocesorowej 1**
Name in English	**Foundations of Microprocessor Techniques 1**
Main field of study (if applicable):	**Control and Robotics, Electronics, Computer Science, Telecommunication, Teleinformatics**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code:	**ETEW006**
Group of courses:	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		15		
Number of hours of total student workload (CNPS)	60		30		
Form of crediting	Crediting with grade		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		1		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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SUBJECT OBJECTIVES

C1. Knowledge of architecture, rules of work and applications of microprocessors and microcontrollers in digital systems.
C2. Knowledge of internal structure and programming rules of microprocessors and microcontrollers.
C3. Knowledge of standard devices collaborating with microprocessors and microcontrollers.
C4. Skills of programming and debugging the code fixed to internal structure of microcontrollers using special tool environment.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – knows the architecture and the organization of microprocessors and microcontrollers.
PEK_W02 – knows the internal structure and programming methods of microprocessors and microcontrollers.
PEK_W03 – knows the peripheral devices and the rules of their collaboration with microprocessors and microcontrollers.
PEK_W04 – knows the foundations of algorithms and applications creation for microcomputer systems using selected programming environments.

relating to skills:

PEK_U01 – can use the environments for microprocessor systems programming.

PEK_U02 – can prepare the algorithms, implement and debug the programs fixed to internal structure of microcontrollers using selected environment.
PEK_U03 – can use the data taken from the microprocessor systems schema to create the program applications.
PEK_U04 – can use the assembler features to prepare the programs dedicated to microprocessors and microcontrollers

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Introduction – elementary definitions and names. Standard structures of microprocessor systems.	2
Lec 2	Microprocessor and microcontroller structure. Computer architecture: von Neumann and Harvard type.	2
Lec 3	Types of processors, rules of data processing.	2
Lec 4	Addressing modes, groups of operations, decoding rules and the main phases of the single processor operation.	2
Lec 5	Architecture of selected microcontrollers.	2
Lec 6	Computer memory: ROM, RAM – features.	2
Lec 7	Stack as hardware and software device, rules of stack usage.	2
Lec 8	Interrupts: classification, controller, priority.	2
Lec 9	Timers and counters (CTC). Structure and programming of timers in selected microcomputer systems.	2
Lec 10	Serial transmission – rules and serial port structure	2
Lec 11	A/D and D/A converters, rules of conversion, typical devices	2
Lec 12	DMA – features, rules of transmission, typical devices	2
Lec 13	Power reduction in microcontrollers. Electromagnetic compability. Reliability of user applications.	2
Lec 14	Future of microprocessors and microcontroller systems.	2
Lec 15	Repetitory	2
	Total hours	**30**

	Form of classes - laboratory	**Number of hours**
Lab 1	Arithmetic and logic operations, data transfer from/to registers and different types of memory using available addressing modes.	2
Lab 2	Program collaboration with simple I/O devices: LEDs, logic states buttons, rectangular wave generator, relays.	2
Lab 3	Program collaboration with matrix keyboard, problem of key repetition, problem of solid and stable state of key reading	2
Lab 4	Program collaboration with LCD – static and dynamic presentations, LCD driving	2
Lab 5	Program collaboration with timers: clock and stopper devices creation	2

Lab 6	Programs dedicated to processor interrupts.	2
Lab 7	Programs dedicated to serial transmission	2
	Total hours	**15**

TEACHING TOOLS USED

N1. Lecture using slides and multimedia presentation
N2. Additional files available via dedicated website
N3. Thematic discussions using different audio-visual utensils
N4. Practical exercises – the project phase, analysis and program implementation of algorithms for selected microprocessor systems
N5. Consultations
N6. Individual work focused on laboratory exercises
N7. Individual work about the microcomputer and microcontroller systems and the final test resume

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_U01-04	assessment of written reports about each laboratory exercise, evaluation of laboratory preparation and accuracy of the exercise realization
F2	PEK_W01-04	the final test
P = 0.2*F1 + 0.8*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Badźmirowski K., Pieńkos J., Myzik I., Piotrowski A.; Układy i systemy mikroprocesorowe cz.I i cz.II; WNT
[2] Chalk B.S.: Organizacja i architektura komputerów; WNT
[3] Grabowski J., Koślacz S.: Podstawy i praktyka programowania mikroprocesorów, WNT
[4] Janiczek J., A. Stępień; Systemy mikroprocesorowe. Mikrokontroler 80(C)51/52; Wydawnictwo EZN, Wrocław
[5] Janiczek J., Stępień A.: Laboratorium systemów mikroprocesorowych cz. I. WEZN, Wrocław
[6] Janiczek J., Stępień A.: Laboratorium systemów mikroprocesorowych cz. II. WCKP, Wrocław
[7] Skorupski A.: Podstawy budowy i działania komputerów; WKiŁ
[8] Wilkinson B., Układy cyfrowe. WKŁ, Warszawa
[9] Dokumentacje mikrokontrolerów: Atmel, Dallas, Infineon, Intel, Philips, Siemens, STmicroelectronics, Texas Instruments (Internet source)
[10] Dokumentacja programów narzędziowych firm: Keil Software, IAR, Raisonance, STMicroelectronics, TASKING, Texas Instruments (Internet source)

SECONDARY LITERATURE:

[1] Horowitz P., Hill W., Sztuka elektroniki. WKŁ, Warszawa
[2] Biernat J.: Arytmetyka komputerów. WNT, Warszawa
[3] Pieńkos J., Turczyński J., Układy scalone TTL w systemach cyfrowych. WKŁ, Warszawa
[4] Wirth N.: Algorytmy+struktury danych=programy. WNT, Warszawa
[5] Clements A.:The Principles of Computer Hardware, 4e, Oxford University Press
[6] Furber S.: ARM System – on – chip architecture. Addison Wesley
[7] Koopman P.Jr.: Stack computers. The New Wave, Mountain View Press

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Foundations of Microprocessor Techniques 1

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Control and Robotics, Electronics, Computer Science, Telecommunication, Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K1AIR_W17, K1EKA_W16, K1INF_W17, K1TEL_W16, K1TIN_W16	C1	Lec1,2,3,12,14	N1,N2,N3,N5,N7
PEK_W02	K1AIR_W17, K1EKA_W16, K1INF_W17, K1TEL_W16, K1TIN_W16	C2	Lec2,4,5,10	N1,N2,N3,N5,N7
PEK_W03	K1AIR_W17, K1EKA_W16, K1INF_W17, K1TEL_W16, K1TIN_W16	C3	Lec6,8,9,11,	N1,N2,N3,N5,N7
PEK_W04	K1AIR_W17, K1EKA_W16, K1INF_W17, K1TEL_W16, K1TIN_W16	C2, C4	Lec7,8,10,13	N1,N2,N3,N5,N7
PEK_U01	K1AIR_U16, K1EKA_U14, K1INF_U15, K1TEL_U14, K1TIN_U15	C4	Lab1,2	N2,N4,N5,N6
PEK_U02	K1AIR_U16, K1EKA_U14, K1INF_U15, K1TEL_U14, K1TIN_U15	C4	Lab3,4,5,6,7	N2,N4,N5,N6
PEK_U03	K1AIR_U16, K1EKA_U14, K1INF_U15, K1TEL_U14, K1TIN_U15	C4	Lab5,6,7	N2,N4,N5,N6
PEK_U04	K1AIR_U16, K1EKA_U14, K1INF_U15, K1TEL_U14, K1TIN_U15	C4	Lab1,2,3,4,5,6,7	N2,N4,N5,N6

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

Zał. nr 4 do ZW 64/2012

FACULTY OF ELECTRONICS / DEPARTMENT I-6

SUBJECT CARD

Name in Polish: Technologie informacyjne
Name in English: Information technologies
Main field of study: Control Engineering and Robotics, Electronics and Telecommunications, Computer Science, Teleinformatics
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: ETEW007
Group of courses: YES

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

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SUBJECT OBJECTIVES

C1. Acquisition of basic knowledge on information technology, hardware and network

C2. Acquisition of knowledge of services in computer networks and selected applications

C3. Acquisition of knowledge of method of acquire and process information

C4. Acquisition of knowledge of computer tools for text editing and perform simple engineering calculations

C5. Acquirement of skills of editing sophisticated text documents

C6. Acquirement of skills to use informatics tools for engineering calculations and graphical presentation of results

C7 Acquirement of skills to create sophisticated multimedia presentations

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge

PEK_W01 Knows the basic information technology

PEK_W02 Knows the computer and network hardware and network access technologies

PEK_W03 Knows the basic principles of editing texts

PEK_W04 Knows the tools to engineering calculations

PEK_W05 Knows the structure of relational databases, forms queries, data access technologies and methods to secure access to confidential data

PEK_W06 Knows the basic rules for creating multimedia presentations and programs and tools that support that process

PEK_W07 Knows the basic services in computer networks

PEK_W08 Knows the basic methods of obtaining information on the Internet.

relating to skills

PEK_U01 Is able to create advanced text documents

PEK_U02 Is able to use tools to engineering calculations and graphical presentation of results

PEK_U03 Is able to create powerful multimedia presentations

relating to social competences

PEK_K01 Is aware of the importance of information retrieval skills and their critical analysis,

PEK_K02 Understands the need for self-education and to develop the ability to independently apply their knowledge and skills.

PROGRAMME CONTENT		
Form of classes – lecture		**Number of hours**
Wy1	Fundamentals of information technology. Computer hardware and network hardware. Network access technologies. Software, copyrights, licenses (commercial software, shareware, freeware, open source). Issues of security, performance and reliability.	2
Wy2	Text processing. Text files and formatted files. Documents, templates, editing and rules of document formatting, mail merge.	2
Wy3	The spreadsheet. Formulas and conversion, filters, reports, scenarios, statistics.	2
Wy4	Database. Construction of a relational database. Forms queries. Data access technologies. Security, data protection, confidentiality, dispersion, coherence. Standards.	2
Wy5	Managerial and presentation graphics. Presentation software. Visualization of data and statistics. Multimedia presentations. Web Publishing. The site of the company.	2
Wy6	Services in computer networks. E-mail, e-bank, e-learning, e-commerce, e-business, e-work, e-advertising. Multimedia, integration of services. Electronic documents. Digital signature. Security of transactions.	2
Wy7	Acquisition and processing of information. Internet. Effective information retrieval, digital libraries, knowledge portals, knowledge extraction.	2
Wy8	Repertory	1
	Total hours	**15**
Form of classes – Laboratory		**Number of hours**
La1	Text processing (editing, formatting, organizing documents, lists: content, figures, tables, double signatures).	2
La2	Serial correspondence (templates, data sheets, word file, Excel file, CSV file, an Access database).	2
La3	The spreadsheet (formulas and conversion, filters, queries, selective filtering of information in the workbook).	2
La4	Spreadsheet - using solver to solve simple engineering tasks.	2
La5	Spreadsheet - scenarios, graphical presentation of results.	2
La6	Presentations - standard and advanced animations, navigation elements in the presentation	2
La7	Presentations - Multimedia items	2
La8	Repertory	1
	Total hours	**15**

TEACHING TOOLS USED	
N1	Lecture with a video projector.
N2	Laboratory exercises
N3	Consultations.

N4	Self-study – preparation for the final test.

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_W14	Test result
F2	PEK_U01 - PEK_U09	Evaluation of made exercise
P= 0.5*F1+0.5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

1. Tanenbaum A., Sieci Komputerowe, Helion, 2004

2. Flanczewski S i inni, MS Office 2003 PL w biznesie, Helion, 2006

SECONDARY LITERATURE:

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

Prof. dr hab. inż. Czesław Smutnicki, czesław.smutnicki@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT**:**
Information technologies
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY:
Control Engineering and Robotics, Electronics and Telecommunications, Computer Science, Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K1AIR_W18	C1	Wy1	N1, N2, N4
PEK_W02	K1AIR_W18	C2	Wy1	N1, N2, N4
PEK_W03	K1AIR_W18	C3, C4	Wy2	N1, N2, N4
PEK_W04	K1AIR_W18	C4	Wy3	N1, N2, N4
PEK_W05	K1AIR_W18	C1, C3	Wy4	N1, N2, N4
PEK_W06	K1AIR_W18	C1, C3	Wy5	N1, N2, N4
PEK_W07	K1AIR_W18	C1	Wy6	N1, N2, N4
PEK_W08	K1AIR_W18	C3	Wy7	N1, N2, N4
PEK_U01	K1AIR_U17	C5	La1, La2	N2, N3
PEK_U02	K1AIR_U17	C6	La3-La5	N2, N3
PEK_U03	K1AIR_U17	C7	La6, La7	N2, N3

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

Zał. nr 4 do ZW 64/2012

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish **Teoria Systemów**
Name in English **Systems Theory**
Main field of study: **Computer Science, Control Engineering and Robotics, Electronics, Telecommunications, Teleinformatics**
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code: **ETEW008**
Group of courses: **YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	15			
Number of hours of total student workload (CNPS)	30	60			
Form of crediting	crediting with grade	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		2			
including number of ECTS points for direct teacher-student contact (BK) classes	1	1			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. 1. K1AIR_W01, K1EKA_W01, K1INF_W01, K1TEL_W01, K1TIN_W01
2. K1AIR_U01, K1EKA_U01, K1INF_U01, K1TEL_U01, K1TIN_U01
3. K1AIR_W02, K1EKA_W02, K1INF_W02, K1TEL_W02, K1TIN_W02
4. K1AIR_U02, K1EKA_U02, K1INF_U02, K1TEL_U02, K1TIN_U02

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SUBJECT OBJECTIVES

C1 Acquisition of the knowledge about the methods of representation of systems, and about classification of systems
C2 Acquisition of the basic knowledge about properties of the compound systems, including systems of cascade structure, parallel structure, feedback structure, and mixed structures
C3 Acquisition of the knowledge in the formulating problems and problem solving in the areas of identification, recognition, analysis, decision making, and control
C4 Acquiring skills in creating the mathematical models of the system and the formal knowledge representation of the system in a form of block-diagrams and graphs structures
C5 Acquiring skills in designing and implementing algorithms for solving simple problems in the areas of identification, classification and control

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 is familiar with the representations of the knowledge about a system, and knows the methods of creating a mathematical model of the system

PEK_W02 knows properties of the compound systems structures

PEK_W03 is familiar with the ways of formulating and solving problems in the basic areas of identification, recognition, analysis, decision making, and control …

relating to skills:

PEK_U01 is able to construct a linear model in the matrix form for the static and dynamic systems

PEK_U02 is able to aggregate the systems of different structures

PEK_U03 is able to choose and is able to use a proper algorithm for solving a simple problem in systems area

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Basic concepts. Systems approach as a universal tool. Examples. Creating input-output systems. Systems classifications.	1
Lec 2	Methods of knowledge representation of the system. Mathematical models. State space. Block Diagram. Graphs structures. Knowledge representation on logical level – Expert systems.	2
Lec 3	The structure of compound systems – cascade (series of system), parallel, feedback, and mixed. Aggregation and decomposition.	2
Lec 4	Identification of the static systems. Measures of the quality of the model. Identification algorithms. Examples.	2
Lec 5	Recognition (classification) of the system. Simple recognition algorithms (NN and NM). Practical examples.	2
Lec 6	Task analysis and decision making for static systems. A comprehensive example.	2
Lec 7	Task analysis for dynamic systems. Finding state trajectory for discrete case.	2
Lec 8	Control problem. Review of methods for solving. The idea of adaptive control with model identification.	2
	Total hours	**15**

Form of classes - class		**Number of hours**
Cl 1	Organizational issues. Short repetition of matrix algebra. Creating an exemplary static input-output system	2
Cl 2	Description of simple systems in block-diagram form and by matrix equations. Description of systems by using other forms of knowledge representation.	2
Cl 3	Solving the problems for systems of the different structures. Finding the model of the aggregated system.	2
Cl 4	Solving the problems of identification of systems by using the identification algorithms. Finding the best models for different quality criteria.	2
Cl 5	Solving the problems of recognition - application of NN and NM	2

	algorithms in practical issues	
Cl 6	Solving the problems of analysis of static systems and decision making for static systems	2
Cl 7	Finding the state trajectories for dynamical systems for sample descriptions of discrete state space.	2
Cl 8	Solving the exemplary tasks concerning program of the course (repetition – preparing for the final test)	1
	Total hours	**15**

TEACHING TOOLS USED

N1. Lecture with multimedia resources
N2. Presentation of synthetic training issues (about 10 minutes - by the teacher)
N3. Solving the tasks designated by the teacher - followed by discussion
N4. Tutorials – short written test
N5. Consultations
N6. Own work - preparation for exercise
N7. Own work - self-study, preparation for the final test

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	Activity on lectures; percentage of the correct answers on the final test
F2	PEK_U01, PEK_U02, PEK_U03	Activity on classes (exercises); results of the written tests concerning selected exercises
P = 0.4*F1 + 0.6*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Koszałka L., Kurzyński M., *Tasks and Problems of Identification, Experiment and Recognition /Zbiór zadań i problemów z teorii identyfikacji, eksperymentu i rozpoznawania/*, OWPWr, Wrocław, 1991 /in Polish/

[2] Bubnicki Z., *Fundamentals of Management Information Systems /Podstawy informatycznych systemów zarządzania/*, OWPWr, Wrocław, 1993 /in Polish/.

[3] Cichosz J., *An introduction to system identification*, series: Advanced Informatics and Control, PWr., 2011.

SECONDARY LITERATURE:

References recommended by the lecturer at the end of each lecture.

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

Dr Leszek Koszałka, e-mail: leszek.koszalka@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

SYSTEMS THEORY

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Sciences, Control Engineering and Robotics, Electronics, Telecommunications, Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization	Subject objectives	Programme content	Teaching tool number
PEK_W01	K1AIR_W12, K1EKA_W11, K1INF_W12, K1TEL_W11, K1TIN_W11	C1, C4	Lec1, Lec2, Lec3, Lec8, Cl1, Cl2, Cl8	N1-N7
PEK_W02	K1AIR_W12, K1EKA_W11, K1INF_W12, K1TEL_W11, K1TIN_W11	C2, C4	Lec2, Lec3, Lec8, Cl3, Cl8	N1-N7
PEK_W03	K1AIR_W12, K1EKA_W11, K1INF_W12, K1TEL_W11, K1TIN_W11	C3, C5	Lec4, Lec5, Lec6, Lec7, Lec8, Cl4-Cl8	N1-N7
PEK_U01	K1AIR_U12, K1EKA_U10, K1INF_U11, K1TEL_U10, K1TIN_U11	C1, C4	Lec1, Lec2, Lec3, Lec8, Cl1, Cl2, Cl8	N1-N7
PEK_U02	K1AIR_U12, K1EKA_U10, K1INF_U11, K1TEL_U10, K1TIN_U11	C1, C2, C4	Lec3, Lec8, Cl3, Cl6, Cl8	N1-N7
PEK_U03	K1AIR_U12, K1EKA_U10, K1INF_U11, K1TEL_U10, K1TIN_U11	C3, C5	Lec4 - Lec7, Cl4 - Cl8	N1-N7

Zał. nr 4 do ZW 64/2012

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Inżynierskie zastosowania statystyki**
Name in English	**Mathematical Statistics with Applications in Engineering**
Main field of study:	**Computer Science**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**ETEW009**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	30			
Number of hours of total student workload (CNPS)	30	60			
Form of crediting	crediting with grade	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	3			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1AIR_W04, K1EKA_W04, K1INF_W04, K1TEL_W04, K1TIN_W04
    1. K1AIR_W02, K1EKA_W02, K1INF_W02, K1TEL_W02, K1TIN_W02

K1AIR_U02, K1EKA_U02, K1INF_U02, K1TEL_U02, K1TIN_U02

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SUBJECT OBJECTIVES

C1 Getting knowledge of testing hypothesis and basic tests on parameters and selected non-parametric tests

C2 Getting knowledge of requirements imposed on estimators, classic methods of their constructing and applications

C3 Getting knowledge of applications the estimation and hypotheses testing in information processing systems and telecommunication

C4 Getting skills in selecting and applying statistical tests

C5 Getting skills in selecting and applying estimation methods for simple statistical models.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 - has knowledge of testing hypothesis and basic tests on parameters and selected non-parametric tests

PEK_W02 - has knowledge of requirements imposed on estimators, classic methods of their constructing and applications

PEK_W03 - knows applications the estimation and hypotheses testing in information processing systems and telecommunication

relating to skills:

PEK_U01 – is able to to apply basic statistical tests

PEK_U02 – has skills that are necessary in selecting and applying estimation methods for simple statistical models.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Review of tasks of math statistics and its applications in Control Engineering and Robotics, Electronics, Telecomunication, Computer Science, Teleinformatics	2
Lec 2	Statistical tests – basic notions (errors of 1-st and 2-nd kind), example of a simple test	2
Lec 3	PDF's of basic statistics, tests for the mean and variance and their applications	2
Lec 4	Tests for correlatiion, selected non-parametric test, examples of selecting tests	2
Lec 5	Basic of the estimation theory, consistency, variance, Cramer-Rao inequality	2
Lec 6	Methodd of moment and max. likelihood, examples of appl.	2
Lec 7	Introduction to linear regression	2
Lec 8	Review of the cours	1
	Total hours	15

Form of classes - class		**Number of hours**
Cl 1	Repetition of basic notions of the probability theory (c.d.f., p.d.f.) and examples	2
Cl 2	Repetition of basic notions of the probability theory 2 the role of the position and scale parameters and their	2

	estimation	
Cl 3	Examples of formulating statistical hypothesis, examples of simple tests + review of statistical packages	2
Cl 4	Errors of 1-st and 2-nd kind. Examples illustrating practical consequences of selecting a significance level.	2
Cl 5	Data spreadshits in typical statistical packages. Detailed analysis of the test for the mean (var. known)	2
Cl 6	Quantiles of typical distributions. Basic properties of chi^2, Student-t, Snedecr-F distributions	2
Cl 7	Getting skills in applying the test for the mean (var. unknown)	2
Cl 8	Test for the variance and appl. For quality control	2
Cl 9	Kolmogorov-Smirnov and chi^2 Pearson tests on real-life data	2
Cl 10	Examples illustrating simple non-parametric tests	2
Cl 11	The test for the correlation coefficient (Spearman's)	2
Cl 12	Bias, variance and consistency of classic estimators for mean and var. (recall laws of large numbers and CLT)	2
Cl 13	MLE and method of moments for deriving estimators in simple problems	2
Cl 14	Linear regression	2
Cl 15	Review of statistical problems	2
	Total hours	30

TEACHING TOOLS USED
N1. Lectures + Video projector N2. Short presentation of a class content N3. Exercises with discussion N4 Short tests N5 Consulting N6 Homework - analysis of results N7 Homework – studies of selected methods

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	Questions and answers during lectures
F2	PEK_U01, PEK_U02, PEK_U03	Active participation – classes, tests
F3		
C=0.3*F1 + 0.7*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Koronacki J., Mielniczuk J., Statystyka dla kierunków technicznych i przyrodniczych. WNT Warszawa, 2001.

[2] Gajek, Kałuszka, “Wnioskowanie statystyczne”, WNT, Warszawa, 2000

[3] Wybrane rozdziały z podręczników prof. Magiery i prof. Krzyśko (będą wskazane na wykładzie)

SECONDARY LITERATURE:

[1] Kordecki W., Rachunek prawdopodobieństwa Oficyna Wydawnicza PWr, Wrocław 2003.

[2] Krysicki W. i inni, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, Część I i II, PWN, Warszawa, 1996.

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

Prof. dr hab. Rafajłowicz 320-27-95 ewaryst.rafajlowicz@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Mathematical Statistics with Applications in Engineering

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

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	K1AIR_W16, K1EKA_W15, K1INF_W16, K1TEL_W15, K1TIN_W15	C1, C4	Lec1, Lec5, Lec6, Lec7, Cl2, Cl3-Cl11	N1-N7
PEK_W02	K1AIR_W16, K1EKA_W15, K1INF_W16, K1TEL_W15, K1TIN_W15	C2, C3	Lec1, Lec3, Lec8, Cl12 - Cl14	N1-N7
PEK_W03	K1AIR_W16, K1EKA_W15, K1INF_W16, K1TEL_W15, K1TIN_W15	C3,-C5	Lec1, Lec3, Lec4, Lec7, Cl3, Cl4, Cl7-Cl11, Cl14	N1-N7
PEK_U01	K1AIR_U15, K1EKA_U13, K1INF_U14, K1TEL_U13, K1TIN_U14	C1, C4	Lec1, Lec5, Lec6, Lec7, Cl2, Cl8-Cl11	N1-N7
PEK_U02	K1AIR_U15, K1EKA_U13, K1INF_U14, K1TEL_U13, K1TIN_U14	C1, C2, C4	Lec1, Lec3, Lec8, Cl12 - Cl14	N1-N7

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

*** - from table above

Zał. nr2a do ZW16/2013

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Filozofia**
Name in English	**Philosophy**
Fields of study:	**Computer Science**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory, university-wide**
Subject code	**FLEW001**
Group of courses	**NO**

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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SUBJECT OBJECTIVES

C1 To acquaint students with specificity of philosophical reflection.
C2Systematize and deepen the knowledge of the basic methods of inference that regulate and organize our knowledge.
C3 Performance considerations of engineer's activity and to present the issue of social responsibility in science and technology.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEK_ HUM W07 The student gains knowledge of the basic methods of inference (deduction, induction and abduction).
PEK_ HUM W08 The student has knowledge that is essential to understanding and interpreting social and philosophical considerations of engineer's activity.

PROGRAMME CONTENT

Form of classes–lecture		**Number of hours**
Lec 1	The main issues and trends of philosophy	2
Lec 2	The similarities and differences between philosophy and religion	2
Lec 3	The similarities and differences between philosophy and science	2
Lec 4	The basic assumptions of epistemology	2

Lec 5	The basic assumptions of ontology	2
Lec 6	The basic assumptions of ethics	2
Lec 7,8	The overview of contemporary philosophical thought	4
Lec9,10	The basic principles of social philosophy	4
Lec 11, 12	The basic principles of the philosophy of science and technology	4
Lec 13, 14	The problem of social responsibility of science and technology	4
Lec 15	The social and philosophical considerations of engineer's activity.	2
	Total hours	30

TEACHING TOOLS USED

N1.Multimedia presentation.
N2. Lecture
N3.Interactive lecture

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation(F – forming (during semester), P – concluding (at semester end)	Educationaleffectnumber	Way of evaluating educational effect achievement
F1	PEK_ HUM W07 PEK_ HUM W08	Passing test, active participation in lectures
P=F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] [1] S. Blackburn, *Oksfordzki słownik filozoficzny*, Warszawa 2004;
[2] T. Buksiński, *Publiczne sfery i religie*, Poznań 2011,
[3] A. Chalmers, *Czym jest to, co zwiemy nauką*, Wrocław 1997;
[4] R. M. Chisholm, *Teoria poznania*,1994;
[5] Ch. Frankfort- Nachmiast, D. Nachmiast, *Metody badawcze w naukach społecznych*, Poznań 2001;
[6] A. Grobler, *Metodologia nauk*, Kraków 2004;
[7] M. Heidegger, *Budować mieszkać myśleć*, Warszawa 1977;
[8] M. Heller, *Filozofia przyrody*, Kraków 2005;
[9] T. Kuhn, *Dwa bieguny*, Warszawa 1985;
[10] B. Latour, *Polityka natury*, Warszawa 2009;
[11] E. Martens, H. Schnädelbach, Filozofia. Podstawowe pytania, Warszawa 1995;
[12] K.R. Popper, *Wiedza obiektywna*, Warszawa 1992;
[13] J. Woleński, *Epistemologia*, Warszawa 2005;
[14] M. Tempczyk, Ontologia świata przyrody, Kraków 2005.

SECONDARY LITERATURE:

[1] [1] A. Anzenbacher, *Wprowadzenie do filozofii*, Kraków 2000;
[2] R. Goodin, P. Pettit, *Przewodnik po współczesnej filozofii politycznej*;
[3] B. Depré, *50 teorii filozofii, które powinieneś znać*, Warszawa 2008.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
Marek Sikora m.sikora@pwr.wroc.pl

WYDZIAŁ ELEKTRONIKI

KARTA PRZEDMIOTU

Nazwa w języku polskim: **Fizyka 1.1A**
Nazwa w języku angielskim: **Physics 1.1A**
Kierunek studiów: **Automatyka i Robotyka, Elektronika, Informatyka, Telekomunikacja, Teleinformatyka**
Stopień studiów i forma: **I stopień, stacjonarna**
Rodzaj przedmiotu: **obowiązkowy, ogólnouczelniany**
Kod przedmiotu: **FZP1060**
Grupa kursów: **TAK**

	Wykład	Ćwiczenia	Laboratorium	Projekt	Seminarium
Liczba godzin zajęć zorganizowanych w Uczelni (ZZU)	30	15			
Liczba godzin całkowitego nakładu pracy studenta (CNPS)	100	50			
Forma zaliczenia	Egzamin	Zaliczenie na ocenę			
Dla grupy kursów zaznaczyć kurs końcowy (X)	X				
Liczba punktów ECTS	**5**				
w tym liczba punktów odpowiadająca zajęciom o charakterze praktycznym (P)	-	3			
w tym liczba punktów ECTS odpowiadająca zajęciom wymagającym bezpośredniego kontaktu (BK)	1	4			

WYMAGANIA WSTĘPNE W ZAKRESIE WIEDZY, UMIEJĘTNOŚCI I INNYCH KOMPETENCJI

1. K1AIR_W02, K1AIR_U02, K1EKA_W02, K1EKA_U02, K1INF_W02, K1INF_U02, K1TEL_W02, K1TEL_U02, K1TIN_W02, K1TIN_U02

CELE PRZEDMIOTU

C1. Nabycie podstawowej wiedzy z następujących działów fizyki : mechaniki klasycznej, ruchu falowego, termodynamiki fenomenologicznej, fizyki jądra atomu i fizyki fazy skondensowanej
C2. Zdobycie umiejętności jakościowego rozumienia, interpretacji oraz ilościowej analizy – w oparciu o prawa fizyki – wybranych zjawisk i procesów fizycznych z zakresu:

PRZEDMIOTOWE EFEKTY KSZTAŁCENIA

Z zakresu wiedzy:

PEK_W01 - Zna metody przedstawienia wielkości wektorowych oraz podstawy rachunku wektorowego w prostokątnym układzie współrzędnych

PEK_W02 – Zna i potrafi objaśnić podstawowe prawa mechaniki punktu materialnego, układu punktów materialnych i bryły sztywnej; w tym: prawa zachowania pędu, momentu pędu i energii

PEK_W03 – Zna i potrafi objaśnić podstawowe prawa kinematyki i dynamiki ruchu drgającego

PEK_W04 – Zna i potrafi objaśnić podstawowe prawa ruchu falowego; w tym: własności monochromatycznej fali płaskiej i fali stojącej, interferencji fal oraz transportu energii przez fale

PEK_W05 – Zna i potrafi objaśnić podstawowe prawa termodynamiki fenomenologicznej; w tym: model i własności gazu doskonałego, zasady termodynamiki, rozkłady Maxwella i Boltzmanna

PEK_W06 – Zna i potrafi objaśnić podstawowe własności jadra atomowego; w tym: modele jadra atomowego, własności sił jądrowych, reakcje rozpadu i syntezy jądrowej

PEK_W07 – Zna i potrafi objaśnić podstawowe własności krystalicznych ciał stałych; w tym: podstawy teorii pasmowej ciał stałych, własności elektryczne i optyczne półprzewodników, podstawy działania przyrządów półprzewodnikowych

Z zakresu umiejętności:

PEK_U01 – Potrafi opisać ilościowo i jakościowo zjawiska posługując się podstawowymi prawami mechaniki klasycznej, a w szczególności prawami dynamiki oraz zasadami zachowania

PEK_U02 – Potrafi opisać ilościowo i jakościowo własności drgań harmonicznych oraz ruchu faloowego

PEK_U03 – Potrafi opisać ilościowo i jakościowo zjawiska posługując się podstawowymi prawami oraz zasadami termodynamiki fenomenologicznej

TREŚCI PROGRAMOWE		
Forma zajęć - wykład		**Liczba godzin**
Wy 1	Sprawy organizacyjne	1
Wy 1	Przedstawienie wielkości wektorowych w kartezjańskim układzie współrzędnych	1
Wy 2, Wy3	Dynamika punktu materialnego. Równania ruchu dla prostych przypadków	3
Wy3	Praca i energia mechaniczna. Zasada zachowania energii mechanicznej	1
Wy4, Wy5	Dynamika układu punktów materialnych i bryły sztywnej. Zasady zachowania pędu i momentu pędu	4
Wy6	Dynamika bryły sztywnej, Prawo zachowania momentu pędu	2
Wy7, Wy8	Ruch drgający	3
Wy8,Wy9	Fale mechaniczne: równanie i energia fali, interferencja fal, fale stojące	3
Wy10	Zasady termodynamiki, energia wewnętrzna, zasada ekwipartycji energii	2
Wy11	Elementy teorii kinetyczno-molekularnej gazu doskonałego, rozkłady Maxwella i Boltzmanna	2
Wy12, Wy13	Fizyka jądrowa – budowa atomu, siły jądrowe, promieniotwórczość, reakcje rozpadu i syntezy jądrowej	2
Wy14, Wy15	Elementy fizyki fazy skondensowanej – struktura pasmowa ciał stałych, przewodnictwo cieplne izolatorów, własności elektryczne i optyczne ciał stałych	4
	Suma godzin	**30**

Forma zajęć - ćwiczenia		Liczba godzin
Ćw1	Sprawy organizacyjne. Rozwiązywanie zadań z zakresu rachunku wektorowego	2
Ćw2	Zastosowanie zasad Newtona do rozwiązywania równań ruchu; wyznaczanie zależności od czasu wartości podstawowych wielkości kinematycznych i dynamicznych	2
Ćw3	Rozwiązywanie wybranych zagadnień z zakresu dynamiki punktu materialnego	2
Ćw4	Rozwiązywanie zadań z zakresu kinematyki i dynamiki ruchu obrotowego bryły sztywnej wokół ustalonej osi oraz zasady zachowania momentu pędu	2
Ćw5	Analiza i rozwiązywania zadań z zakresu dynamiki ruchu drgającego	2
Ćw6	Rozwiązywanie zadań z zakresu fizyki fal mechanicznych	2
Ćw7	Rozwiązywanie zadań z wykorzystaniem zasad termodynamiki	2
Ćw8	Repetytorium	1
	Suma godzin	**15**

STOSOWANE NARZĘDZIA DYDAKTYCZNE
N1. Wykład – metoda tradycyjna z wykorzystaniem multimediów N2. Ćwiczenia rachunkowe – metoda tradycyjna, dyskusja nad rozwiązaniami zadań N3. Ćwiczenia rachunkowe – krótkie 10 min. sprawdziany pisemne N4. Konsultacje N5. Praca własna – przygotowanie do ćwiczeń N6. Praca własna – przygotowanie do egzaminu

OCENA OSIĄGNIĘCIA PRZEDMIOTOWYCH EFEKTÓW KSZTAŁCENIA

Oceny (F – formująca (w trakcie semestru), P – podsumowująca (na koniec semestru)	Numer efektu kształcenia	Sposób oceny osiągnięcia efektu kształcenia
F1	PEK_U01-U03	Pisemne sprawdziany
F2	PEK_W01-W07	Egzamin pisemno-ustny
P = F2 z uwzględnieniem F1		

LITERATURA PODSTAWOWA I UZUPEŁNIAJĄCA

LITERATURA PODSTAWOWA

[1] D. Halliday, R. Resnick, J. Walker, *Podstawy fizyki*, tom 1, 2,4-5, Wydawnictwo Naukowe PWN, Warszawa 2003
[2] J. Walker, *Podstawy fizyki. Zbiór zadań*, PWN, Warszawa 2005.

LITERATURA UZUPEŁNIAJĄCA

[1] I.W. Sawieliew, *Wykłady z fizyk*i, tom 1-3, Wydawnictwa Naukowe PWN, Warszawa, 2003.
[2] K. Sierański, K. Jezierski, B. Kołodka, *Wzory i prawa z objaśnieniami*, cz. 1. i 2., Oficyna Wydawnicza SCRIPTA, Wrocław 2005;
[3] K. Sierański, J. Szatkowski, *Wzory i prawa z objaśnieniami*, cz. 3., Oficyna Wydawnicza SCRIPTA, Wrocław 2008.
[4] K. Jezierski, B. Kołodka, K. Sierański, *Zadania z rozwiązaniami*, cz. 1., i 2., Oficyna Wydawnicza SCRIPTA, Wrocław 1999-2003.
[5] R R. A. Serway, *Physics for Scientists and Engineers*, 8th Ed., Brooks/Cole, Belmont 2009; *Physics for Scientists and Engineers with Modern Physics*, 8th Ed., Brooks/Cole, Belmont 2009.
[6] Paul A. Tipler, Gene Mosca, *Physics for Scientists and Engineers*, Extended Version, W. H. Freeman 2007.

OPIEKUN PRZEDMIOTU (IMIĘ, NAZWISKO, ADRES E-MAIL)

Prof. dr hab. Janusz M. Pawlikowski, 71 320 23 90; janusz.m.pawlikowski@pwr.wroc.pl

MACIERZ POWIĄZANIA EFEKTÓW KSZTAŁCENIA DLA PRZEDMIOTU
Fizyka 1.1A
Z EFEKTAMI KSZTAŁCENIA NA KIERUNKU
Automatyka i robotyka, Elektronika, Informatyka, Telekomunikacja, Teleinformatyka

Przedmiotowy efekt kształcenia	Odniesienie przedmiotowego efektu do efektów kształcenia zdefiniowanych dla kierunku studiów i specjalności	Cele przedmiotu	Treści programowe	Numer narzędzia dydaktycznego
PEK_W01	K1AIR_W06, K1EKA_W06, K1INF_W07, K1TEL_W06, K1TIN_W07	C1	Wy1	N1,N4,N6
PEK_W02	K1AIR_W06, K1EKA_W06, K1INF_W07, K1TEL_W06, K1TIN_W07	C1	Wy2÷Wy6	N1,N4,N6
PEK_W03	K1AIR_W06, K1EKA_W06, K1INF_W07, K1TEL_W06, K1TIN_W07	C1	Wy7÷Wy8	N1,N4,N6
PEK_W04	K1AIR_W06, K1EKA_W06, K1INF_W07, K1TEL_W06, K1TIN_W07	C1	Wy8÷Wy9	N1,N4,N6
PEK_W05	K1AIR_W06, K1EKA_W06, K1INF_W07, K1TEL_W06, K1TIN_W07	C1	Wy10÷Wy11	N1,N4,N6
PEK_W06	K1AIR_W06, K1EKA_W06, K1INF_W07, K1TEL_W06, K1TIN_W07	C1	Wy12÷Wy13	N1,N4,N6
PEK_W07	K1AIR_W06, K1EKA_W06, K1INF_W07, K1TEL_W06, K1TIN_W07	C1	Wy14÷Wy15	N1,N4,N6

PEK_U01	K1AIR_U04, K1EKA_U03, K1INF_U04, K1TEL_U03, K1TIN_U04	C2	Ćw1÷Ćw4	N2÷N6
PEK_U02	K1AIR_U04, K1EKA_U03, K1INF_U04, K1TEL_U03, K1TIN_U04	C2	Ćw5÷Ćw6	N2÷N6
PEK_U03	K1AIR_U04, K1EKA_U03, K1INF_U04, K1TEL_U03, K1TIN_U04	C2	Ćw7	N2÷N6

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WYDZIAŁ ELEKTRONIKI

KARTA PRZEDMIOTU

Nazwa w języku polskim:	**Fizyka 3.1**
Nazwa w języku angielskim:	**Physics 3.1**
Kierunek studiów:	**Automatyka i robotyka, Elektronika, Informatyka, Telekomunikacja, Teleinformatyka**
Stopień studiów i forma:	**I stopień, stacjonarna**
Rodzaj przedmiotu:	**obowiązkowy, ogólnouczelniany**
Kod przedmiotu:	**FZP2079**
Grupa kursów:	**NIE**

	Wykład	Ćwiczenia	Laboratorium	Projekt	Seminarium
Liczba godzin zajęć zorganizowanych w Uczelni (ZZU)			15		
Liczba godzin całkowitego nakładu pracy studenta (CNPS)			60		
Forma zaliczenia			Zaliczenie na ocenę		
Dla grupy kursów zaznaczyć kurs końcowy (X)					
Liczba punktów ECTS			**2**		
w tym liczba punktów odpowiadająca zajęciom o charakterze praktycznym (P)			2		
w tym liczba punktów ECTS odpowiadająca zajęciom wymagającym bezpośredniego kontaktu (BK)			2		

WYMAGANIA WSTĘPNE W ZAKRESIE WIEDZY, UMIEJĘTNOŚCI I INNYCH KOMPETENCJI

1. K1AIR_W06, K1AIR_U04, K1EKA_W06, K1EKA_U03, K1INF_W07, K1INF_U04, K1TEL_W06, K1TEL_U03, K1TIN_W07, K1TIN_U04
2. K1AIR_W02, K1AIR_U02, K1EKA_W02, K1EKA_U02, K1INF_W02, K1INF_U02, K1TEL_W02, K1TEL_U02, K1TIN_W02, K1TIN_U02

CELE PRZEDMIOTU

C1 Opanowanie umiejętności przeprowadzenia prostego eksperymentu
C2 Uzyskanie umiejętności opracowanie eksperymentu w postaci raportu
C3 Uzyskanie umiejętności szacowania niepewności uzyskanych rezultatów

PRZEDMIOTOWE EFEKTY KSZTAŁCENIA

Z zakresu umiejętności:

PEK_U01 - umie posługiwać się prostymi przyrządami pomiarowymi (do pomiaru długości, czasu oraz innych wielkości fizycznych)

PEK_U02 - potrafi wykonać pomiary podstawowych wielkości fizycznych z wykorzystaniem instrukcji stanowiska pomiarowego

PEK_U03 - potrafi, z wykorzystaniem narzędzi inżynierskich, opracować wyniki pomiarów oraz przeprowadzić analizę niepewności pomiarowych

TREŚCI PROGRAMOWE		
Forma zajęć – laboratorium		**Liczba godzin**
La1	Wprowadzenie do LPF: sprawy organizacji i przebiegu zajęć, zapoznanie studentów: a) z zasadami bezpiecznego wykonywania pomiarów (krótkie szkolenie z zakresu BHP), b) z zasadami pisemnego opracowania sprawozdań/raportów, c) z podstawami analizy niepewności pomiarowych. Wykonanie prostych pomiarów.	1
La2	Wykonanie pomiarów za pomocą mierników analogowych i cyfrowych układu elektrycznego. Statystyczne opracowanie otrzymanych wyników pomiarów prostych i złożonych, szacowanie niepewności pomiarów prostych i złożonych, graficzna prezentacja rezultatów pomiarów i niepewności pomiarowych, opracowanie sprawozdania.	2
La3	Wykonanie pomiarów wybranych wielkości fizycznych, opracowanie pisemnego sprawozdania	2
La4	Wykonanie pomiarów wybranych wielkości fizycznych, opracowanie pisemnego sprawozdania	2
La5	Wykonanie pomiarów wybranych wielkości fizycznych, opracowanie pisemnego sprawozdania	2
La6	Wykonanie pomiarów wybranych wielkości fizycznych, opracowanie pisemnego sprawozdania	2
La7	Wykonanie pomiarów wybranych wielkości fizycznych, opracowanie pisemnego sprawozdania	2
La8	Repetytorium	2
	Suma godzin	**15**

STOSOWANE NARZĘDZIA DYDAKTYCZNE

N1. Praca własna – przygotowanie do przeprowadzenia eksperymentu (zapoznanie się z instrukcją roboczą stanowiska pomiarowego, sposobem przeprowadzenia eksperymentu ćwiczeń oraz metodami opracowania rezultatów)

N2.Kilkuminutowe sprawdziany pisemne poprzedzające pomiary

N3. Samodzielne wykonanie eksperymentu

N4. Strona internetowa laboratorium z informacjami dotyczącymi regulaminu laboratorium, regulaminu BHP, spisu ćwiczeń, opisu ćwiczeń, instrukcji roboczych, przykładowych sprawozdań, pomocy dydaktycznych

N5. Konsultacje

OCENA OSIĄGNIĘCIA PRZEDMIOTOWYCH EFEKTÓW KSZTAŁCENIA

Oceny (F – formująca (w trakcie semestru), P – podsumowująca (na koniec semestru)	Numer efektu kształcenia	Sposób oceny osiągnięcia efektu kształcenia
F1	PEK_U01-U03	Odpowiedzi ustne, dyskusje, pisemne sprawdziany, ocena raportów z każdego wykonanego ćwiczenia
P = F1		

LITERATURA PODSTAWOWA I UZUPEŁNIAJĄCA

LITERATURA PODSTAWOWA:

[1] Ćwiczenia Laboratoryjne z Fizyki, Tomy 1-4, Oficyna Wydawnicza Politechniki Wrocławskiej (dostępne wraz z instrukcjami roboczymi na stronie http://www.if.pwr.wroc.pl/lpf)

[2] Opisy eksperymentów oraz instrukcje robocze dostępne na stronie http://www.if.pwr.wroc.pl/lpf

LITERATURA UZUPEŁNIAJĄCA:.

[1] D. Halliday, R. Resnick, J.Walker: *Podstawy Fizyki*, tomy 1-2, 4, Wydawnictwa Naukowe PWN, Warszawa 2003.

[2] I.W. Sawieliew, Wykłady z Fizyki tom1 i 2 , Wydawnictwa Naukowe PWN, Warszawa, 2003.

OPIEKUN PRZEDMIOTU (IMIĘ, NAZWISKO, ADRES E-MAIL)

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MACIERZ POWIĄZANIA EFEKTÓW KSZTAŁCENIA DLA PRZEDMIOTU

Fizyka 3.1

Z EFEKTAMI KSZTAŁCENIA NA KIERUNKU

Automatyka i robotyka, Elektronika, Informatyka, Telekomunikacja, Teleinformatyka

Przedmiotowy efekt kształcenia	**Odniesienie przedmiotowego efektu do efektów kształcenia zdefiniowanych dla kierunku studiów i specjalności (o ile dotyczy)**	**Cele przedmiotu**	**Treści programowe**	**Numer narzędzia dydaktycznego**
PEK_U01	K1AIR_U05, K1EKA_U04, K1INF_U05, K1TEL_U04, K1TIN_U05	C1	La1-La8	N1,N2,N3,N4,N5
PEK_U02	K1AIR_U05, K1EKA_U04, K1INF_U05, K1TEL_U04, K1TIN_U05	C1, C2	La1-La8	N1,N2,N3,N4,N5
PEK_U03	K1AIR_U05, K1EKA_U04, K1INF_U05, K1TEL_U04, K1TIN_U05	C3	La1-La8	N1,N2,N3,N4,N5

Zał. nr 4 do ZW 64/2012

FACULTY OF ELECTRONICS

SUBJECT CARD

Name in Polish: Logika układów cyfrowych
Name in English Logic of digital arrangments
Main field of study (if applicable): Computer science
Specialization (if applicable):
Level and form of studies: 1nd level, full-time
Kind of subject: obligatory
Subject code INEK001
Group of courses YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		35		
Number of hours of total student workload (CNPS)	90		30		
Form of crediting	Exam		crediting with grade		
For group of courses mark (X) final course	X				
Number of ECTS points	3		1		
including number of ECTS points for practical (P) classes	-		1		
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. Basic knowledge in mathematical analysis and discrete mathematics
2. Knows the basic axioms and rules of Bools algebra
3. Knows how to construct basic logic circuits using logic gates
4. Knows the software that aids in designing logic circuits
5. Knows the modern high-level programming language

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SUBJECT OBJECTIVES

C1. Gaining knowledge in logic functions deriving by using laws and axioms of Bools algebra
C2. Gaining knowledge in logical functions minimization by using Karnaugh and Quine-McCluskey mehods
C3. Gaining knowledge and skills of design various combinatorial and sequential logic circuits
C3. The acquisition and consolidation of skills to find information in the scientific literature.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 - knows the laws and axioms of Boolean algebra.
PEK_W02 - known method of Karnaugh nets to minimize Boolean function.
PEK_W03 - known method Quine - Mc Cluskey minimization of Boolean function to a greater number of Boolean variables.
PEK_W04 - knows the structure and wiring diagrams of basic combinational logic: encoders, decoders, adders, and comparators subtraktorów.
PEK_W05 - knows the structure and wiring diagrams of basic sequential logic circuits:

counters and registers.
PEK_W06 - knows the principles of operation and construction of finite state machines with input and output: Moore and Mealy.
PEK_W07 - knows the principles of operation and construction of finite automata without outputs: deterministic automaton niedeterministycznego DFA and NFA.
PEK_W08 - knows the principles of operation and construction of more complex finite state machines: machine with an internal parameter, the stack machine and Turing machine.
relating to skills:
PEK_U01 - can transform any Boolean function to a simpler form by using laws and axioms of Boolean algebra.
PEK_U02 - can minimize any Boolean function using a Karnaugh or Quine - Mc Cluskey methods.
PEK_U03 - can develop schematics and build any combinational logic and sequential.
PEK_U04 - can make the transition from Moore machine into an equivalent Mealy machine.
PEK_U05 - is able to carry out the synthesis of abstract and structural finite automata.
PEK_U06 - can perform computer implementation and analysis of finite automata.relating to social competences:
PEK_K01 - recognizes the importance of information retrieval skills and their critical analysis,
PEK_K02 - understands the need for self-education and to develop the ability to independently apply their knowledge and skills,

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Laws and axioms of Boolean algebra. Transformation of Boolean expressions. Canonical and normal form of Boolean functions.	2
Lec 2	Minimization of Boolean functions using Karnaugh networks and by Quine - Mc Cluskey method.	2
Lec 3	Basic combinational circuits: encoders, decoders, adders, subtractors, comparators.	2
Lec 4	Synchronous and asynchronous RS flip-flops, JK, D, T (excitation tables, logic). Basic sequential circuits: counters and registers	2
Lec 5	General characteristics of finite automata. Moore and Mealy Machines: definitions, in and out tables, automatic graphs, symbolic expressions.	2
Lec 6	Finite automata without outputs: deterministic automaton (DFA) and non-deterministic (NFA). Regular expressions.	2
Lec 7	More complex finite automata: automatic parametric Vending internal parameter, the stack machine, the Turing machine. Abstract Synthesis and structural finite automata.	3
	Total hours	15
Form of classes – laboratory		**Number of hours**
Lab1	Workplace training in health and safety. Organizational matters, the administration of the program and requirements. Introduction.	1
Lab2	Combinational circuits: encoders and decoders (implementation of the following tasks to be performed in the manual 202).	2
Lab3	Combinational circuits: arithmetic circuits (implementation of the	2

	following tasks to be performed in the manual 202).	
Lab4	Sequential Circuits: registers (implementation of the following tasks to be performed in the manual 203).	2
Lab5	Sequential Circuits: Counters (execution of subsequent tasks to be performed in the manual 203).	
Lab6	Moore and Mealy Machines (implementation of the following tasks to be performed in the manual 207).	
Lab7	Computer implementation of finite state machines (execution of subsequent tasks to be performed in the manual 208).	
Lab8	Non-deterministic automaton NFA (execution of subsequent tasks to be performed in the manual 204).	
Lab9	The use of regular expressions for the synthesis of finite state machines (execution of subsequent tasks to be performed in the manual 205).	
Lab10	Computer analysis of finite automata (implementation of the following tasks to be performed in the manual 209).	
Lab11	Automatic Parametric (implementation of the following tasks to be performed in the manual 206).	
Lab12	Hardware automatic implementation of an internal parameter (execution of subsequent tasks to be performed in the instructions 210 and 211).	2
Lab13	Automatic asynchronous (implementation of the following tasks to be performed in the manual 212).	2
Lab14	Outstanding exercises and evaluation reports of all laboratory exercises.	2
Lab15	Credits	2
	Total hours	30

TEACHING TOOLS USED

N1 Traditional lectures using video projector
N2 Exercises
N3 Consultation
N4 Own work - preparation for exercise
N5 Self-study and preparation for test

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 ÷ PEK_U06	Oral replies, short tests
F2	PEK_W01 ÷ PEK_W08	Exam

C= 0,25*F1+0,75*F1

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

1] Hopcroft J.E., Ullman J.D., Wprowadzenie do teorii automatów, języków i obliczeń, PWN, Warszawa 2003.

[2] Majewski W., Układy logiczne, WNT, Warszawa 1999.

[3] Morris Mano M., Projektowanie systemów logicznych maszyn cyfrowych, WNT, Warszawa 1999.

[4] Wilkinson B., Układy cyfrowe, WKiŁ, Warszawa 2000.

SECONDARY LITERATURE

1] Chmiel K., Teoria układów logicznych, Wydawnictwo Politechniki Poznańskiej, Poznań 1995.

[2] Pieńkos J., Turczyński J., Układy scalone TTL w systemach cyfrowych, WKiŁ, Warszawa 1986.

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

Adam Janiak, adam.janiak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Logic of digital arrangments AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer science

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	K1INF_W19	C1	Lec1	1,2,3,4,5
PEK_W02, PEK_W03	K1INF_W19	C2	Lec2	1,2,3,4,5
PEK_W04÷ PEK_W08	K1INF_W19	C3	Lec3÷Lec7	1,2,3,4,5
PEK_U01÷PEK_U03	K1INF_U17	C1	Lab2÷Lab5,	1,2,3,4,5
PEK_U01÷PEK_U03	K1INF_U17	C2	Lab2÷Lab5,	1,2,3,4,5
PEK_U04÷PEK_U06	K1INF_U17	C3	Lab2÷Lab13,	1,2,3,4,5
PEK_K01, PEK_K02	K1_K04	C4	Lec1÷Lec7 Lab1÷Lab15	1,2,3,4,5

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

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Architektura komputerów 1**
Name in English	**Computer Architecture 1**
Main field of study	**Computer Science**
Specialization	
Level and form of studies:	**1st level, full-time**
Kind of subject:	**optional**
Subject code	**INEK002**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	30			
Number of hours of total student workload (CNPS)	70	80			
Form of crediting	Crediting with grade	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		2,5			
including number of ECTS points for direct teacher-student contact (BK) classes	1	2,5			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W09, Ki1INF_U07, K1INF_U08
2. K1INF_W05, K1INF_U03

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SUBJECT OBJECTIVES

C1. Gaining knowledge about radix-complement arithmetic

C2. Gaining knowledge about floating-point arithmetic

C3. Gaining knowledge about residual arithmetic

C4. Gaining ability to design fast arithmetic circuits

C5. Gaining ability to check the correctness of arithmetical operations

C6. Gaining ability to design basic numerical algorithms

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – knows the principles of positional and radix-complement arithmetic

PEK_W02 – knows the principles of floating-point arithmetic

PEK_W03 – knows the principles of arithmetic of residues

PEK_W04 – knows the algorithms for elementary functions evaluation

PEK_W05 – knows the fundamental structures of arithmetic circuits

relating to skills:

PEK_U01 – can realize the basic arithmetic operations in radix-complement representation

PEK_U02 – can realize the basic arithmetic operations in floating-point representation

PEK_U03 – can check the correctness of arithmetical operations

PEK_U04 – can design the logic structures of arithmetic units

PEK_U05 – can design the logic structures of residual arithmetic units

PEK_U06 – can design the data structures for extended arithmetic

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Basic concepts of data processing in computers. Number representations: radix-complement, signed-digit, biased. Radix-complement addition and subtraction	3
Lec 2	Radix-conversion. Multi-operand addition, radix-complement multiplication	2
Lec 3	Radix-complement division, restoring vs non-restoring algorithm. Square root extraction	2
Lec 4	Congruences, residue number systems. Euclid's algorithm. Euler's theorem. Chineese Remainder Theorem	2
Lec 5	IEEE754-2008 floating-point standard. The principles of floating-point arithmetic. Rounding, precision control. FP exceptions	2
Lec 6	Architecture of arithmetic structures. Fast adders and multipliers.	2
Lec 7	Basic numerical algorithms. Evaluating of elementary functions. Precision control and extended range arithmetic.	2
Lec 8	Summary and comments	1
	Total hours	15

	Form of classes - class	**Number of hours**
Cl 1	Number representations: radix-complement, signed-digit, biased.	2
Cl 2	Radix-complement addition and subtraction. problem of overflow	2
Cl 3	Radix-conversion	2
Cl 4	Multi-operand addition, radix-complement multiplication. Booth-McSorley algorithm	2
Cl 5	Square root extraction	2
Cl 6	Radix-complement division, restoring vs non-restoring algorithm.	2
Cl 7	Congruences, residue number systems. Euclid's algorithm. Inverses	2
Cl 8	Euler's and Carmichael's theorem. Chineese Remainder Theorem	2
Cl 9	Architecture of arithmetic structures.	2
Cl 10	Fast adders, Parallel-Prefix Adders. Fast matrix and CSA-based multipliers	2
Cl 11	Realization of floating-point arithmetic..	2
Cl 12	Rounding methods, precision control, exceptions	2
Cl 13	Basic numerical algorithms. Evaluating of elementary functions.	2
Cl 14	Precision control and extended range arithmetic.	2
Cl 15	Summary and comments	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture supported with multimedia tools
N2. Access to supporting materials
N3. Access to commented list of problems and excercises and solution support
N4. Classes excersises
N5. Consultancy
N6. Sef-education of the student

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	Test of knowledge
F2	PEK_U01 ÷ PEK_U07	Test of advances in knowledge perception
C = 0,5*F1 + 0,5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] BIERNAT J., Architektura komputerów, Wrocław, Oficyna Wydawnicza Politechniki Wrocławskiej, 2005 (wyd. 4).

[2] BIERNAT J., Metody i układy arytmetyki komputerowej, Wrocław, Oficyna Wydawnicza Politechniki Wrocławskiej, 2001

[3] KOREN I., Computer Arithmetic Algorithms, A.K.Peters, Natick, MA, 2002 (wyd.1: Englewood Cliffs, NJ: Prentice Hall 1993)

SECONDARY LITERATURE:

[1] BIERNAT J., Architektura układów arytmetyki resztowej, Warszawa, EXIT, 2007

[2] PARHAMI B., Computer Arithmetic. Algorithms and Hardware Designs, Oxford University Press, 2000

[3] WARREN H.S., Uczta programistów, Gliwice, Helion, 2003

[4] OMONDI A., PREMKUMAR B., Residue Number Systems, Imperial College Press, London, 2007

Internet pages:
[1] http://www.zak.ict.pwr.wroc.pl/materialy/architektura

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

Janusz Biernat, janusz.biernat@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Computer Architecture 1
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science

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	K1INF_W20	C1	Lec1-Lec3	N1,N2,N3,N5,N6
PEK_W02	K1INF_W20	C2	Lec5	N1,N2,N3,N5,N6
PEK_W03	K1INF_W20	C3	Lec4	N1,N2,N3,N5,N6
PEK_W04	K1INF_W20	C4	Lec6	N1,N2,N3,N5,N6
PEK_W05	K1INF_U18	C5,6	Lec7	N1,N2,N3,N5,N6
PEK_U01	K1INF_U18	C1	Cl1 – Cl6	N2,N3,N4,N5
PEK_U02	K1INF_U18	C5	Cl11,Cl12	N2,N3,N4,N5
PEK_U03	K1INF_U18	C6	Cl4-Cl6,Cl14	N2,N3,N4,N5
PEK_U04	K1INF_U18	C2	Cl9,Cl10	N2,N3,N4,N5
PEK_U05	K1INF_U18	C3	Cl7,Cl8	N2,N3,N4,N5
PEK_U06	K1INF_U18	C4	Cl13,Cl14	N2,N3,N4,N5

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

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Architektura komputerów 2**
Name in English	**Computer Architecture 2**
Main field of study	**Computer Science**
Specialization	
Level and form of studies:	**1st level, full-time**
Kind of subject:	**optional**
Subject code	**INEK003**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30	15	
Number of hours of total student workload (CNPS)	50		65	65	
Form of crediting	Examination		Crediting with grade	Crediting with grade	
For group of courses mark (X) final course	X				
Number of ECTS points	**6**				
including number of ECTS points for practical (P) classes			4	2	
including number of ECTS points for direct teacher-student contact (BK) classes	1,5		2	1	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W20, Ki1INF_U18

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SUBJECT OBJECTIVES

C1. Gaining knowledge on principles of information processing in computers

C2. Gaining ability to design and run simple programs in assembly language

C3. Gaining knowledge on pipelining

C4. Gaining knowledge on acceleration mechanisms in information processing

C5. Gaining ability to design functional units of computer

C6. Gaining knowledge on aim and methods of memory management

C6. Gaining knowledge on principles and models of concurrent processing

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – knows the principles of computer operation, understands the concept of RISC

PEK_W02 – understands the principle of locality and knows about its application

PEK_W03 – knows the principles of program flow control, understands the idea of recursive functions

PEK_W04 – knows the concept of pipelining and understands the pipeline hazard problems

PEK_W05 – knows the idea of virtual memory space and virtual addressing

PEK_W06 – knows the aims and methods of memory management

PEK_W07 – understands the need for information protection and knows the methods for data security

PEK_W08 – knows the basic acceleration mechanisms of data processing

relating to skills:

PEK_U01 – can design recursive function and optimize the programs in assembly language

PEK_U02 – knows how to mix assembly and high level language written algorithms

PEK_U03 – can design elementary execution modules of a computer

PEK_U04 – can design programs for interrupt service, exception processing and I/O service

PEK_U05 – can check and verify program correctness

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Machine levels and machine languages, instruction set architecture (ISA)	2
Lec 2	Data representation and data types. Operations. Addressing modes.	2
Lec 3	Program flow control. Conditions and branching. Functions	2
Lec 4	Creating and running programs written in assembly language	2
Lec 5	Memory hierarchy and memory organization	2
Lec 6	Principle of locality. Caches – design and operation	2
Lec 7	Cache consistency, MESI model	2
Lec 8	Concurrent processing. Process model	2
Lec 9	Data protection and memory management	2
Lec 10	Virtual memory space. Paging and segmentation	2
Lec 11	Interrupt service and exception processing	2
Lec 12	Pipelined processing. Pipeline hazards	2
Lec 13	Tomasulo algorithm for massively parallel execution	2
Lec 14	Interface, busses, I/O service	2
Lec 15	Reliability of data processing and transmission	2
	Total hours	30

Form of classes - laboratory		**Number of hours**
Lab 1	Familiarizing with tools: compiler, linker, debugger, profiler.	2
Lab 2	Elementary program and data structures in machine-level programming	4
Lab 3	Design of functions and procedures, recursive functions	4
Lab 4	Combining programs written in C and assembly language	4
Lab 5	Floating point operations, processing of FP exceptions	4
Lab 6	Multimedia extensions in signal processing	4
Lab 7	Multitasking – system data structures, mode switching / or Cache observation and control	4
	Total hours	30

Form of classes – project	**Number of hours**

Proj 1	Formulating the design task	1
Proj 2	Completing source materials	2
Proj 3	Final definition of the task	1
Proj 4	Control of project progress and consultancy	10
Proj 5	Presentation of the result	1
	Total hours	15

TEACHING TOOLS USED
N1. Traditional lecture supported with multimedia tools
N2. Access to supporting materials
N3. Laboratory classes
N4. Control of project progress
N5. Consultancy
N6. Sef-education of the student

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_W08	Test of knowledge
F2	PEK_U01 ÷ PEK_U05	Supervising of laboratory classes
F3	PEK_U01 ÷ PEK_U05	Checking the progress of work on project
C = 0,4*F1 + 0,3*F2 + 0,3*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] BIERNAT J., Architektura komputerów, Wrocław, Oficyna Wydawnicza Politechniki Wrocławskiej, 2005 (wyd. 4).

[2] STALLINGS W. Organizacja i architektura systemu komputerowego, WNT, Warszawa 2004 (wyd. 2).

SECONDARY LITERATURE:

[1] HENNESSY J.L., PATTERSON D.A., Computer Architecture. A Quantitative Approach, San Mateo CA, Morgan Kaufmann, 2007.

[2] PATTERSON D.A., HENNESSY J.L., Computer Architecture. Hardware-Software Interface, San Mateo CA, Morgan Kaufmann, 2008.

[3] SILBERSCHATZ A., PETERSON J.L., GALVIN P.B., Podstawy systemów operacyjnych, Warszawa, WNT, 1999.

Internet pages:
[1] http://www.zak.ict.pwr.wroc.pl/materialy/architektura

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Computer Architecture 2
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science

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	K1INF_W21	C1,3,4	Lec1-Lec3	N1,N2,N5
PEK_W02	K1INF_W21	C4	Lec2,Lec5	N1,N2,N5
PEK_W03	K1INF_W21	C1,3	Lec1,Lec3,Lec4	N1,N2,N5
PEK_W04	K1INF_W21	C3	Lec12,Lec13	N1,N2,N5
PEK_W05	K1INF_W21	C6	Lec8-Lec10	N1,N2,N5
PEK_W06	K1INF_W21	C6,7	Lec6,Lec7	N1,N2,N5
PEK_W07	K1INF_W21	C6,7	Lec3,Lec15	N1,N2,N5
PEK_W08	K1INF_W21	C4	Lec3,Lec14	N1,N2,N5
PEK_U01	K1INF_U19	C1-C3	Lab1-Lab7	N2,N3,N5
PEK_U02	K1INF_U19	C1-C3	Lab1-Lab7	N2,N3,N5
PEK_U03	K1INF_U20	C4-C6	Proj2-Proj4	N2,N4,N5
PEK_U04	K1INF_U19	C1-C3	Lab1-Lab7	N2,N3,N5
PEK_U05	K1INF_U19	C1-C3	Lab1-Lab7	N2,N3,N5

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

Zał. nr 4 do ZW 64/2012

FACULTY OF ELECTRONICS

SUBJECT CARD

Name in Polish: **Języki programowania**
Name in English: **Programming languages**
Main field of study (if applicable): Computer Science

Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code: **INEK004**
Group of courses: **YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		15		
Number of hours of total student workload (CNPS)	40		50		
Form of crediting	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	-		2		
including number of ECTS points for direct teacher-student contact (BK) classes	1,5		1,5		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W09, K1INF_U07, K1INF_U08
2.
3.

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SUBJECT OBJECTIVES

C1. Acquisition of knowledge about the role of classes and their instances in a fully object-oriented programming language (Java).
C2. Acquisition of knowledge about the environments that use byte code and virtual machine.
C3. Acquisition of knowledge about the problems of concurrent programming (on the base of Java threads and monitors).
C4. Enrich design and implementation skills in a fully object-oriented programming language (Java) using IDE tools (Eclipse).
C5. Familiarizing with good programming practices and memory management in a platform that support garbage collection.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 - knows the specificity of application development in a fully object-oriented programming language.

PEK_W02 - knows the role of the bytecode and the advantages and disadvantages of a virtual machine.

PEK_W03 - knows the bases of the multithreaded applications design.

PEK_W04 - know the bases of the distributed applications design.

relating to skills:

PEK_U01 - is able to design and implement applications in a fully object-oriented programming language.

PEK_U02 - can use IDE effectively.

PEK_U03 - can benefit from design patterns when implementing applications on the platform with automatic memory management.

relating to social competences:

PEK_K01 – is aware of the impact of the quality of the code created on the possibility of its further development by other developers.

PEK_K02 – understands the need for self-education, especially in the face of constantly evolving technologies and changes in the vocabularies used in the communication between professionals.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction to Java by comparison to C/C++. Bytecode and virtual machine. Writing applications in an integrated development environment.	2
Lec 2	Classes, interfaces, objects and their life cycle, basic types and references, structured exception handling, design patterns.	2
Lec 3	Basic types, packages and technologies supported by Java SE (including: strings, arrays and collections, streams).	2
Lec 4	Event handling model. Construction of a graphical user interface.	2
Lec 5	The implementation of multi-threading, critical section and mutual exclusion.	2
Lec 6	Elements of distributed programming (client-server architecture, security mechanisms, remote procedure calls).	2
Lec 7	The package of classes to implement network connections.	2
Lec 8	Repetition and summary.	1
	Total hours	15

Form of classes - laboratory		**Number of hours**
Lab 1	Workplace training in health and safety. Organizational matters. Compilation and execution of sample programs in the integrated development environment and from the command line.	2
Lab 2	Zaprojektowanie i implementacja aplikacji pobierającej dane wejściowe z linii komend, zawierającej pętle, instrukcje warunkowe oraz obsługę wyjątków. Writing application reading attributes from the command line using loops, conditional statements, and exception handling.	2
Lab 3	Design and implementation of applications using data containers (arrays, collections) and templates.	2
Lab 4	Design and implementation of application with a graphical user interface (using frames, panels and other components).	2

Lab 5	Solving selected concurrent programming problem assisted with animation as a form of presentation.	2
Lab 6	Solving complex problems by parallel computations	2
Lab 7	Remote communication using classes existing within Java platform.	2
Lab 8	Summary of the work performed and additional tasks.	1
	Total hours	15

TEACHING TOOLS USED

N1. Traditional lectures using video projector
N2. Classes in the computer laboratory
N3. Consultation
N4. Self-study – preparation for laboratory assignments
N5. Self-study – preparation for the exam

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	PEK_U01 - PEK_U03 PEK_K01 - PEK_K02	Evaluation of the laboratory assignments outcomes (taking into account the quality of the generated code and the scope of functions implemented - partially in the classroom and partially on completion) assessment of the level of skills (based on the answers to questions on the tasks completed)
F2	PEK_W01 - PEK_W04	Written exam
C = 0,6 * F1 + 0,4 * F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE: :

[1] Bruce Eckel: Thinking in Java. Wydanie IV. Edycja polska, Helion.
[2] Cay Horstmann, Gary Cornell: Java 2. Podstawy, Helion.

SECONDARY LITERATURE:

[1] Course materials.
[2] Manuals, tutorials, specifications of Java platform published on the Internet.

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Programming languages

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

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	K1INF_W22	C1 – C3	Lec 1, Lec 2	N1, N3, N5
PEK_W02	K1INF_W22	C1 – C3	Lec 1 – Lec 4	N1, N3, N5
PEK_W03	K1INF_W22	C1 – C3	Lec 5	N1, N3, N5
PEK_W04	K1INF_W22	C1 – C3	Lec 6 – Lec 7	N1, N3, N5
PEK_U01	K1INF_U21	C4 – C5	Lab 1 – Lab 8	N2, N4
PEK_U02	K1INF_U21	C4 – C5	Lab 1 – La8	N2, N4
PEK_U03	K1INF_U21	C4 – C5	Lab 1 – La8	N2, N4
PEK_K01	K1INF_K01	C1 – C5	Lab 1 – Lab15	N1 – N5
PEK_K02	K1INF_K01	C1 – C5	Lec 1 – Lec15	N1 – N5

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-4 / DEPARTMENT I-6

SUBJECT CARD

Name in Polish **Niezawodność i diagnostyka układów cyfrowych 1**
Name in English **Reliability and Diagnostic of Digital Systems 1**
Main field of study (if applicable): **Computer Science**
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code: **INEK005**
Group of courses: **NO**

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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SUBJECT OBJECTIVES

C1. Fundamental knowledge of reliability related to digital systems and computer systems.
C2. Fundamental knowledge of diagnostics related to digital systems and computer systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – knows elementary definitions and notions related to reliability and diagnostics of systems.
PEK_W02 – knows the reliability models and the reliability classification of systems.
PEK_W03 – knows the methods of reliability measures evaluation as well as the foundations of digital and computer systems diagnostics.

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Basic definitions and notions related to reliability and diagnostics of digital systems. Elements and systems – reliability measures definitions.	2

Lec 2	Reliability models of systems. Dependability classification of systems. Hardware, functional, time, information reserve.	2
Lec 3	Markov models of system reliability. Sophisticated systems. Functional and reliability models.	3
Lec 4	Reliability modeling. Diagnostics and FTC – basic definitions.	2
Lec 5	Diagnostics of combinatorial systems.	2
Lec 6	Diagnostics of sequence systems.	2
Lec 7	Repetitory	2
	Total hours	**15**

TEACHING TOOLS USED

N1. Lecture using slides and multimedia presentation
N2. Additional files available via dedicated website
N3. Thematic discussions using different audio-visual utensils
N4. Consultations
N5. Individual work about the reliability of systems and the final test resume

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_W01-03	the final test
P = F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Friedman A. D., Menon P. R.; Wykrywanie uszkodzeń w układach cyfrowych. WNT
[2] Ireson W. G., Coombs C. F. Jr., Moss R. Y.; Handbook of Reliability Engineering and Management. McGraw-Hill
[3] Inżynieria niezawodności. Poradnik pod red. J. Migdalskiego. ATR Bydgoszcz, ZETOM Warszawa
[4] Niezawodność i eksploatacja systemów. Skrypt PWr. pod red. W. Zamojskiego
[5] Zamojski W.; Teoria i technika niezawodności. Skrypt PWr

SECONDARY LITERATURE:

[1] Dhillon B. S.; Reliability in Computer System Design. Ablex Publishing Corporation, Norwood, N. J.
[2] Holland R.; Testowanie i diagnostyka systemów mikrokomputerowych. WNT
[3] Kopociński B.; Zarys teorii odnowy i niezawodności. PWN

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Reliability and Diagnostic of Digital Systems 1

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

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	K1INF_W23	C1, C2	Lec1	N1,N2,N3,N4,N5
PEK_W02	K1INF_W23	C1	Lec2,3	N1,N2,N3,N4,N5
PEK_W03	K1INF_W23	C1, C2	Lec4,5,6	N1,N2,N3,N4,N5

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

Zał. nr 4 do ZW 64/2012

FACULTY OF ELECTRONICS

SUBJECT CARD

Name in Polish: Struktury danych i złożoność obliczeniowa
Name in English Data structures and computational complexity
Main field of study (if applicable): Computer science
Specialization (if applicable):
Level and form of studies: 1nd level, full-time
Kind of subject: obligatory
Subject code INEK006
Group of courses YES

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge in calculus and discrete mathematics
2. Skills in programming in modern object-oriented programming language

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SUBJECT OBJECTIVES

C1. The acquisition of knowledge in the analysis of combinatorial problems (mainly in terms of their computational complexity).
C2. The acquisition of knowledge and skills in the use of selected algorithms, such as construction and selection of the appropriate type algorithm for a particular problem.
C3. The acquisition of an ability to select the appropriate data structures for certain types of algorithms.
C4. The acquisition of knowledge and skills in the analysis of algorithms in terms of their effectiveness.
C5. Acquiring the ability to find information in the scientific literature and the use of documentation tools..

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 - knows the basic and advanced data structures (arrays, lists, stacks, queues, heaps, hash tables, trees, graphs) and the efficiency of the basic operations on them (add, delete, search for items).

PEK_W02 - is able to explain the design and operation of deterministic and non-deterministic Turing machines and the differences between them.

PEK_W03 - knows the input encoding problems, their effectiveness and impact on the size of the problem instance.

PEK_W04 - known polynomial and pseudopolynomial time algorithms.

PEK_W05 - knows the basic classes of computational complexity of combinatorial problems (P, NP, NP-complete, strongly NP-complete), the relationship between them and the consequences and constraints of the problem of belonging to a given class.

PEK_W06 - know the definitions of polynomial transformation.

PEK_W07 - know the steps of proving NP-completeness of decision problems as well as problems of belonging to the class P.

relating to skills:

PEK_U01 - is able to select the appropriate data structures and algorithms for problems to be solved in order to achieve a certain (the best) efficiency.

PEK_U02 - distinguishes between decision problems and optimization, can tell the difference between them and is able to formulate any optimization version of the decision problem.

PEK_U03 - can build programs to Deterministic Turing Machine.

PEK_U04 - is able to estimate the computational complexity of simple algorithms.

PEK_U05 - distinguishes polynomial, pseudopolynomial and exponential complexity

relating to social competences:

PEK_K01 - recognizes the importance of information retrieval skills and their critical analysis,

PEK_K02 - understands the need for self-education and to develop the ability to independently apply their knowledge and skills,

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Organizational activities: program requirements and references.	1
Lec 2	Introduction to the theory of computational complexity - the input encoding.	2
Lec 3-4	Combinatorial explosion. Polynomial algorithms. Complexity class of decision problems (P, NP, NP-complete and strongly NP-complete). The relationship between NP-completeness and NP-difficult..	4
Lec 5-6	Examples of problems polynomially solvable and NP-complete. Polynomial transformation. Outline proving the NP-completeness	4
Lec 7	Strong NP-completeness.	2
Lec 8	Final test	2
	Total hours	15

Form of classes – exercises	**Number of hours**

Ex1	Organizational matters, the administration of the program and requirements. A brief discussion of task lists..	1
Ex2	Execution of the tasks of basic data structures: lists, queues, stack	2
Ex3	Implementation tasks for complex data structures: heaps, binary search trees, hash tables -.	2
Ex4	Implementation of the algorithms for sorting, searching, etc. The analysis of the complexity of the algorithms	2
Ex5	Partial test	2
Ex6	Execution of the tasks of basic and advanced algorithms for graph	2
Ex7	Execution of the tasks on combinatorial problems belong to different classes of complexity.	2
Ex8	final test	2
	Total hours	15
Form of classes – project		**Number of hours**
Pr1	Organizational matters, the administration of the program and requirements. The allocation of design tasks.	2
Pr2	Implementation of the project tasks for implementation and comparison between the performance of each selected sorting algorithms depending on the size of sorted collection and data structures used.	7
Pr	Implementation of design task for the implementation of certain algorithms using deterministic Turing machines.	7
Pr4	Implementation of the project tasks for implementation and analysis of algorithms, graph-effectiveness of selected depending on how the graph representation in computer memory and the size and structure of the graph.	7
Pr5	Implementation of the project tasks for implementation and analysis of the effectiveness of optimal algorithms in computational complexity for some combinatorial problems.	7
	Total hours	30

TEACHING TOOLS USED

N1 Traditional lectures using video projector
N2 Exercises
N3 Consultation
N4 Own work - preparation for exercise
N5 Self-study and preparation for test

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during	Educational effect number	Way of evaluating educational effect achievement

semester), P – concluding (at semester end)		
F1	PEK_U01 ÷ PEK_U05 PEK_K01 ÷ PEK_K02	Oral replies, short tests, project tasks grades
F2	PEK_W01 ÷ PEK_W07	Final test grade
C= 0,5*F2+0,5*F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

1] T. Cormen, C.E. Leiserson, R.L. Rivest, „Wprowadzenie do algorytmów", WNT 2003.

[2] N. Wirth, „Algorytmy + struktury danych = programy", WNT 2004.

[3] J. Błażewicz, „Problemy optymalizacji kombinatorycznej", PWN, Warszawa 1996.

[4] A. Janiak, „Wybrane problemy i algorytmy szeregowania zadań i rozdziału zasobów", Akademicka Oficyna Wydawnicza PLJ, Warszawa 1999.

[5] C. Smutnicki, „Algorytmy szeregowania", Exit, Warszawa 2002.

[7] P. Wróblewski, „Algorytmy, struktury danych i techniki programowania", Helion 2003.

SECONDARY LITERATURE:

[1] M. Sysło, N. Deo, J. Kowalik, „Algorytmy optymalizacji dyskretnej", PWN, Warszawa 1999.

[2] T. Sawik, „Badania operacyjne dla inżynierów zarządzania", Wydawnictwa AGH, Kraków 1998.

[3] C. Papadimitriou, "Złożoność obliczeniowa", WNT, 2002

[4] M. Garey, D. Johnson, Computers and Intractability: A Guide to the Theory of NP-Completeness, W. H. Freeman & Co. New York, 1979

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT Data structures and computational complexity AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

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	K1INF_W24	C3	Lec1, Lec 2	1,2,3,4,5
PEK_W02	K1INF_W24	C2, C3, C4	Lec 1, Lec 3, Lec 4	1,2,3,4,5
PEK_W03 – PEK_W07	K1INF_W24	C1, C2,C3,C4	Lec 5… Lec 10	1,3,5
PEK_U01 PEK_U03	K1INF_U22	C1,C2, C4	Pr1-Pr5	1,2,3,4
PEK_U01-PEK_U05	K1INF_U23	C1, C2	Ex1-Ex8	1,2,3,4
PEK_K01, PEK_K02	K1_K04	C6	Lec 1÷ Lec 8 Ex1-Ex8 Pr1-Pr5	1,2,3,4,5

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

Zał. nr 4 do ZW 64/2012

FACULTY W-4 / DEPARTMENT I-6

SUBJECT CARD

Name in Polish **Niezawodność i diagnostyka układów cyfrowych 2**
Name in English **Reliability and Diagnostic of Digital Systems 2**
Main field of study (if applicable): **Computer Science**
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code: **INEK007**
Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)				30	
Number of hours of total student workload (CNPS)				90	
Form of crediting				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				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. K1INF_W23

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SUBJECT OBJECTIVES

C1. Skills of special environment usage for prototyping, modeling and simulation to the project phase of complex computer system characterized by reliability and functional features.
C2. Skills of special environment usage for parametric evaluation of reliability features of complex computer or digital system.

SUBJECT EDUCATIONAL EFFECTS

relating to skills:

PEK_U01 – can use the environments for prototyping, modeling and simulation to the project phase of complex computer system characterized by reliability and functional features.
PEK_U02 – can use the environments for parametric evaluation of reliability features of complex computer or digital system.

PROGRAMME CONTENT

	Form of classes - project	**Number of hours**
Proj 1	Scientific aspects of the project classes presentation. Subjects description and choosing, details of the project discussion and fixing	2

Proj 2	Collecting and improving the theoretical knowledge about the reliability and diagnostics of systems as well as about the necessary input data preparing, preprocessing, postprocessing	2
Proj 3	Features and aspects of the realized subject, tasks and project phases, scientific hypothesis and evaluation criteria for them, the project environment and the plan of the experiments	2
Proj 4	Individual project tasks realization to implement the necessary reliability and functional system modeling methods as well as the preprocessing of the input data and the postprocessing of the output data	10
Proj 5	Individual project tasks realization to start the system simulation, the tests to find the influence of the start-up and actual parameters for the system behavior and the system sensivity for the changes of the parameters.	10
Proj 6	Preparation of the written report describing the prepared system: implementation, used data sets, the results of the experiments and conclusions	2
Proj 7	The project results presentation during the seminar-like meeting chaired by the project supervisor, the audience – students from the same group	2
	Total hours	**30**

TEACHING TOOLS USED

N1. Additional files available via dedicated website
N2. Thematic discussions using different audio-visual utensils
N3. Practical exercises – the project phase, simulation, analysis of the complex computer systems behavior.
N4. Consultations
N5. Individual work focused on the all phases of the realized project
N6. The project results presentation during the seminar-like meeting

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-U02	assessment of the prepared system: project, implementation, experiments, assessment of the written report, assessment of the seminar-like presentation, the formal correctness of the project realization: regular presence at the project meetings and the level of the preparation to each of them, actual progress of project realization
P = F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Friedman A. D., Menon P. R.; Wykrywanie uszkodzeń w układach cyfrowych. WNT
[2] Ireson W. G., Coombs C. F. Jr., Moss R. Y.; Handbook of Reliability Engineering and Management. McGraw-Hill
[3] Inżynieria niezawodności. Poradnik pod red. J. Migdalskiego. ATR Bydgoszcz, ZETOM Warszawa
[4] Niezawodność i eksploatacja systemów. Skrypt PWr. pod red. W. Zamojskiego
[5] Zamojski W.; Teoria i technika niezawodności. Skrypt PWr

SECONDARY LITERATURE:

[1] Dhillon B. S.; Reliability in Computer System Design. Ablex Publishing Corporation, Norwood, N. J.

[2] Holland R.; Testowanie i diagnostyka systemów mikrokomputerowych. WNT
[3] Kopociński B.; Zarys teorii odnowy i niezawodności. PWN

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Reliability and Diagnostic of Digital Systems 2

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01	K1INF_U24	C1, C2	Proj1 – Proj7	N1,N2,N3,N4,N5,N6
PEK_U02	K1INF_U24	C1, C2	Proj1 – Proj7	N1,N2,N3,N4,N5,N6

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

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Bazy danych 1**
Name in English	**Database Systems 1**
Main field of study (if applicable):	**Computer Science**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INEK 008**
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		90		
Form of crediting	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	1.5		1.5		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. 1. K1INF_W18, K1INF_U16

SUBJECT OBJECTIVES

C1 know and understand the architecture of database systems
C2 acquisition of knowledge of database programming and database administration
C3 acquisition of knowledge in the field of data modeling and design of database systems.
C4 learning how to use tools to support the modeling of the data.
C5 getting ability to create and effectively use the database systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01- has knowledge of the typical architectures of database systems
PEK_W02 - has knowledge of data structures in database systems
PEK_W03 - has knowledge of programming in SQL
PEK_W04 - has knowledge of data modeling, verification and implement the model in selected environments

relating to skills:
PEK_U01 – can use SQL commands to retrieve data, update data, manage access to data, create database objects
PEK_U02 - can use SQL commands to implement stored procedures and triggers, transactions
PEK_U03 - Can apply CASE tools for data modeling, and create a simple database application

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Basic concepts. Architecture of database systems	2
Lec 2	The relational data model, functional dependencies, keys, referential integrity	2
Lec 3	Introduction to SQL - simple query examples	2
Lec 4	Requests from multiple tables, complex search criteria	2
Lec 5	Subqueries, aggregation and grouping in SQL,	1
Lec 6	Create database objects: tables, views, indexes	2
Lec 7	Stored Procedures, Functions	2
Lec 8	Triggers, referential integrity support	1
Lec 9	Transaction Processing	2
Lec 10	Control access to data, security policy	2
Lec 11	Stages of designing database systems, systems analysis	2
Lec12	Data modeling, entity relationship diagram	2
Lec 13	Verification of the data model, normalization of the database schema	2
Lec 14	Design of the physical layer of the database	2
Lec 15	User Interface Design, RAD tools	2
Lec 16	Improving performance, tuning system	2
	Total hours	**30**

Form of classes - laboratory		**Number of hours**
Lab 1	Client / server architecture, Oracle environment	2
Lab 2	SQL language, DML command group	4
Lab 3	SQL language, DDL command group	4
Lab 4	SQL language, Control access to data	2
Lab 5	Tools Case: DataArchitect	4
Lab 6	Data modeling	4
Lab 7	Database Schema: the physical layer	4
Lab 8	User Interface	4
Lab 9	Tuning system	2
	Total hours	**30**

TEACHING TOOLS USED

N1. Traditional lectures using multimedia presentations
N2. Synthetic Presentation (10 minutes) by conducting laboratory tasks
N3. Implementation of laboratory tasks (instructions) on a laboratory
N4. A written report on the implementation of the tasks of laboratory

N5. Consultation
N6. Own work

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01,PEK_W02, PEK_W03, PEK_W04	Activity at lectures, completion of written tests, written exam
F2	PEK_U01, PEK_U02, PEK_U03	Activity in the classroom laboratory, evaluation reports of laboratory tasks
P=0.6*F1+0.4*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Garcia-Molina H., Ullman J.D., Widom J., Database Systems: the Complete Book, Prentice Hall, 2002
[2] Poźniak-Koszałka I., Relacyjne Bazy danych w środowisku Sybase, 2004 (in polish)
[3] Celko J., SQL for Smarties, Morgan-Kaufman, 2010

SECONDARY LITERATURE:

[1] The literature on specific database systems (Oracle, Sybase, MySQL, MSSQL)

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Database Systems 1

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Computer Science**

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	K1INF_W25	C1	Lec1, Lab1	N1, N2, N5
PEK_W02	K1INF_W25	C1	Lec2, Lec14	N1, N5
PEK_W03	K1INF_W25	C2	Lec3, Lec4, Lec5, Lec6, Lec7, Lec8, Lec9, Lec10, Lab2, Lab3, Lab4	N1, N2, N5
PEK_W04	K1INF_W25	C3	Lec11, Lec12, Lec13, Lec14, Lec15, Lec16	N1, N2, N5
PEK_U01	K1INF_U25	C2, C5	Lab2, Lab3, Lab4	N2, N3
PEK_U02	K1INF_U25	C3, C5	Lab3	N2, N3
PEK_U03	K1INF_U25	C4, C5	Lab5, Lab6, Lab7, Lab8, Lab9	N4, N5, N6

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Technologie sieciowe 1**
Name in English	**Network technologies 1**
Main field of study (if applicable):	**Computer Science**
Specialization (if applicable):	
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INEK009**
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)	75		105		
Form of crediting	Examination		crediting with grade		
For group of courses mark (X) final course	X				
Number of ECTS points	**6**				
including number of ECTS points for practical (P) classes	-		3		
including number of ECTS points for direct teacher-student contact (BK) classes	1,5		1,5		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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SUBJECT OBJECTIVES

C1 To gain basic knowledge in the field of computer networks including applications and role in the modern world, technologies and protocols

C2 To gain practical knowledge and skills in construction, design and configuration of computer networks, analyzing of network traffic

C3 To gain and enforce social competences including the idea of normalization and certification in the field of computer networks

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 The course results with a student's ability to explain and describe basic information in the field of computer networks including applications and role in the modern world

PEK_W02 The course results with a student's ability to explain and describe basic standards of computer networks including cables, technologies and protocols

PEK_W03 The course results with a student's ability to explain and describe basic information related to design and configuration of computer networks

relating to skills:

PEK_U01 The course results with a student's ability to construct and configure a simple computer network including design of IP addressing, to use diagnostic tools

PEK_U02 The course results with a student's ability to use a network protocol analyzer

PEK_U03 The course results with a student's ability to configure and manage popular network services

relating to social competences:

PEK_K01 The course results with a student's ability to gain and enforce social competences including the idea of normalization and certification in the field of computer networks

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction to computer networks	4
Lec 2	Switching techniques and ISO/OSI model	2
Lec 3	TCP/IP model	2
Lec 4	Ethernet	2
Lec 5	Cables	2
Lec 6	LAN devices	2
Lec 7	VLAN and IP in LANs	2
Lec 8	Design of LANs	4
Lec 9	Wireless networks	3
Lec 10	Wide area networks	3
Lec 11	Computer network security	4
	Total hours	30

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

Lab 1	Organizational information, rules of laboratory, rules of grading. Presentation of laboratory tools.	2
Lab 2	Connecting devices into computer network – in network simulator and using network equipment. Checking the correctness of network operation.	2
Lab 3	Configuration and management of application-layer network services (http, e-mail, dns). Capturing and analyzing application-layer data in network frames.	2
Lab 4	Analysis of header structure and operation of transport-layer protocols – using network analyzer and network simulator. Identification and analysis of transport-layer sessions – at workstation level.	2
Lab 5	Analysis of header structure and operation of network-layer protocols using network analyzer. Addressing schemes in computer networks. Diagnostics of networks. Basis of path determining (routing) in computer networks. Remote work with remote terminal protocol.	4
Lab 6	Analysis of header structure and operation of data-link-layer protocols using network analyzer. Addressing rules at data link layer.	2
Lab 7	Ethernet technology, switching rules in Ethernet networks. Address resolution protocol.	2
Lab 8	Implementation of computer networks using switches and routers. Basic configuration of network devices.	2
Lab 9	Implementation of computer networks and configuration of network devices in network simulator. Simulation and correctness verification of network operation.	2
Lab 10	Implementation of computer networks and configuration of network devices. Correctness verification of network operation, solving typical configuration problems.	4
Lab 11	Individual practical assignment – implementing of small computer network	4
Lab 12	Review: network architectures, roles and protocols of network layers, communication rules in computer network.	2
	Total hours	**30**

TEACHING TOOLS USED

N1. Lecture with multimedia presentations.
N2. Problem-oriented lecture
N3. Discussion
N4. Practical tasks in laboratory
N5. Tests on e-learning platform
N6. Consultation
N7. Own work – preparation to lecture, laboratory.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

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

F1	PEK_W01-W03 PEK_K01	Test, oral exam
F2	PEK_U01 - U03	Test, evaluation of labaratory tasks, reports, e-learning tests
C = 0,5 *F1 + 0,5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Tannenbaum A., S., Computer Networks
[2] Cisco Systems slides

SECONDARY LITERATURE:

[1] RFC (ang. Request for Comments) standards www.ietf.org
[2] IEEE (ang. Institute of Electrical and Electronics Engineers) standards www.ieee.org

[3] Networld Journal
[4] Materials of computer network devices and software vendors

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Network technologies 1

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

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	K1INF_W26	C1	Lec1÷Lec11	N1÷N3, N6, N7
PEK_W02	K1INF_W26	C1	Lec2÷Lec11	N1÷N3, N6, N7
PEK_W03	K1INF_W26	C1	Lec3÷Lec8, Lec11	N1÷N3, N6, N7
PEK_U01	K1INF_U28	C2	Lab1, Lab2, Lab8÷Lab11	N4÷N7
PEK_U02	K1INF_U28	C2	Lab3÷Lab7, Lab12	N4÷N7
PEK_U03	K1INF_U28	C2	Lab3, Lab5, Lab12	N4÷N7
PEK_K01	K1INF_K04	C3	Lec1÷Lec11, Lab3÷Lab7	N1÷N7

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

*** - from table above

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FACULTY OF ELECTRONICS

SUBJECT CARD

Name in Polish: Projektowanie efektywnych algorytmów
Name in English Algorithms and computational complexity
Main field of study (if applicable): Computer science
Specialization (if applicable):
Level and form of studies: 1nd level, full-time
Kind of subject: obligatory
Subject code INEK010
Group of courses YES

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge in calculus and discrete mathematics
2. Basic knowledge in computational complexity theory
3. Skills in programming in modern object-oriented programming language

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SUBJECT OBJECTIVES

C1. The acquisition of knowledge and skills in the use of exact and approximate algorithmic techniques to solve combinatorial optimization problems.
C2. The consolidation of knowledge and skills in the classification of optimization problems in terms of their computational complexity and evaluating the effectiveness of the algorithms in terms of the quality of our solutions.
C3. The acquisition and consolidation of skills to find information in the scientific literature and the use of documentation tools.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 - knows the principles of operation, construction methods and the advantages and limitations of the method of division and limitations (called Branch and bound).
PEK_W02 - knows the principles of operation, construction methods and the advantages and limitations of the method of dynamic programming (Dynamic programming).
PEK_W03 - knows the principles of operation, construction methods and the advantages and limitations of polynomial and fully polynomial approximation scheme
PEK_W04 - knows the rules of operation, methods of construction and the advantages and

limitations of selected methods of local search (called local search), especially metaheuristic algorithms (eg searching for the bans, simulated annealing, genetic search).
PEK_W05 - knows other techniques of constructing exact and approximate algorithms solve combinatorial problems (eg, through the use of mathematical programming).
PEK_W06 - knows the rules for the classification of combinatorial problems in terms of their computational complexity.
PEK_W07 - known method of assessing the effectiveness of the algorithms in terms of the quality of our solutions, as well as measures of assessing the quality of approximate algorithms.
relating to skills:
PEK_U01 - can develop and implement a distribution algorithm and constraints to solve combinatorial problems.
PEK_U02 - can develop and implement a dynamic programming algorithm to solve combinatorial problems.
PEK_U03 - can develop and implement a polynomial and fully polynomial approximation schemes to solve combinatorial problems.
PEK_U04 - can develop, implement, and choose the parameters of local search algorithms (especially metaheuristic algorithms) to solve combinatorial problems.
PEK_U05 - can classify combinatorial problems in terms of their computational complexity.
PEK_U06 - can analyze experimental and worst case to assess the quality of the approximate algorithm.
relating to social competences:
PEK_K01 - recognizes the importance of information retrieval skills and their critical analysis,
PEK_K02 - understands the need for self-education and to develop the ability to independently apply their knowledge and skills,

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction to the course	1
Lec 1-2	reminder of the basic problems in the theory of computational complexity classification of exact and approximate solution techniques for designing algorithms for combinatorial problems.	3
Lec 3-4	Discussion of the branch and bound method for solving combinatorial problems.	4
Lec 5	Discussion of the dynamic programming method for solving combinatorial problems.	2
Lec 6	Discussion of the polynomial and fully polynomial approximation schemes for solving combinatorial problems.	2
Lec 7	Introduction to methods of local search..	2
Lec 8	Discussion of search methods to prohibitions for solving combinatorial problems	2
Lec 9	Discussion of the method of simulated annealing to solve combinatorial problems.	2
Lec 10	Discussion of the methods of searching for genetic and evolutionary algorithms for solving combinatorial problems.	2

Lec 11	Discussion of the methods of ant search for solving combinatorial problems.	2
Lec 12	Discussion of other techniques for constructing exact and approximate solutions to problems of combinatorial algorithms.	2
Lec 13	Discussion of experimental analysis, worst-case and probabilistic assessment and evaluation of the quality of approximate algorithms.	2
Lec 14	Summary of algorithmic techniques discussed combinatorial problem solving along with a discussion of the suitability of their application to problems of different classes of computational complexity.	2
Lec 15	Final test	2
	Total hours	30
Form of classes – laboratory		**Number of hours**
La1	Workplace training in health and safety. Organizational matters, the administration of the program and requirements. Introduction - appreciate the position of working, available software, etc.	1
La2	Classification of some optimization problems in terms of their computational complexity.	2
La3-4	Implementation and analysis of the effectiveness of branch and bound algorithm for the selected optimization problem.	4
La5-6	Implementation and performance analysis of a dynamic programming algorithm for the selected optimization problem.	4
La7-8	Implementation and performance analysis of polynomial and fully polynomial approximation schemes for the selected optimization problem.	4
	Total hours	15
Form of classes – project		**Number of hours**
Pr1	Organizational matters, the administration of the program and requirements.	1
Pr2	A detailed discussion of the project tasks.	2
Pr 3-4	Implementation and performance analysis of simulated annealing algorithm for the selected optimization problem.	4
Pr 5-6	Implementation and analysis of the effectiveness of the search algorithm with the prohibitions of the selected optimization problem.	4
Pr 7-8	Implementation and analysis of the effectiveness of the genetic algorithm and formic for the selected optimization problem.	4
	Total hours	15
TEACHING TOOLS USED		

N1 Traditional lectures using video projector
N2 Laboratory Exercises
N3 Consultation
N4 Own work – preparation for laboratory
N4 Own work – preparation of project taks
N5 Self-study and preparation for test

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 ÷ PEK_U03, PEK_U05, PEK_U06	Oral replies, short tests
F2	PEK_U04 ÷ PEK_U06, PEK_K01 ÷ PEK_K02	Project tasks grades
F3	PEK_W01 ÷ PEK_W07	Final test grade
C= 0,5*F3+0,25*F2+0,25*F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J. Błażewicz, „Problemy optymalizacji kombinatorycznej”, PWN, Warszawa 1996.

[2] A. Janiak (Ed.), „Scheduling in computer and manufacturing systems”, WKŁ, Warszawa 2006.

[3] A. Janiak, „Wybrane problemy i algorytmy szeregowania zadań i rozdziału zasobów”, Akademicka Oficyna Wydawnicza PLJ, Warszawa 1999.

[4] C. Smutnicki, „Algorytmy szeregowania”, Exit, Warszawa 2002.

[5] S. Kirkpatrick, C.D. Gelatt, M.P. Vecchi, “Optimization by Simulated Annealing”, Science 220 (4598), 671–680, 1983.

[6] F. Glover, “Tabu Search - Part I”, ORSA Journal on Computing, 1 (3), 190-206, 1989.

[7] F. Glover, “Tabu Search - Part II”, ORSA Journal on Computing, 2 (1), 4-32, 1990.

[8] Z. Michalewicz „Algorytmy genetyczne + struktury danych = programy ewolucyjne”, Warszawa, WNT 1996.

[9] M. Dorigo, „Ant Colony Optimization”, MIT Press, 2004.

SECONDARY LITERATURE:

[1] T. Cormen, C.E. Leiserson, R.L. Rivest, „Wprowadzenie do algorytmów”, WNT 2003.

[2] N. Wirth, „Algorytmy + struktury danych = programy”, WNT 2004.

[3] M. Sysło, N. Deo, J. Kowalik, „Algorytmy optymalizacji dyskretnej”, PWN, Warszawa 1999.

[4] T. Sawik, „Badania operacyjne dla inżynierów zarządzania”, Wydawnictwa AGH, Kraków 1998.

Journals:

European Journal of Operational Research, Annals of Operations Research, IEEE Trans. Systems, Man and Cybernetics, Part A, itp.

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Algorithms and computational complexity
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 – PEK_W05	K1INF_W28	C1	Lec3… Lec 12	1,2,3,4,5,6
PEK_W06, PEK_W07	K1INF_W28	C2	Lec 13, Lec 14	1,2,3,4,5,6
PEK_U01 – PEK_U04	K1INF_U31	C1	La3…La8, Pr3…Pr8	1,2,3,4,5,6
PEK_U05, PEK_U06	K1INF_U32	C2	La2…La8, Pr3…Pr8	1,2,3,4,5,6

PEK_K01, PEK_K02	K1_K04	C3	Lec 1÷ Lec 15 La1÷La8 Pr1÷Pr8	1,2,3,4,5,6
PEK_W01 – PEK_W05	K1INF_W28	C1	Lec 3… Lec 12	1,2,3,4,5,6

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

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FACULTY Electronics

SUBJECT CARD

Name in Polish Inżynieria oprogramowania
Name in English Software Engineering
Main field of study (if applicable): Computer Science
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code INEK011

Group of courses YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		120		
Form of crediting	Examination		Crediting with grade		
For group of courses mark (X) final course	X				
Number of ECTS points	6				
including number of ECTS points for practical (P) classes			4		
including number of ECTS points for direct teacher-student contact (BK) classes	1,5		1,5		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W13
2. K1INF_U12

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SUBJECT OBJECTIVES

C1. To have skills in system requirements specification preparation using UML use cases and activity diagrams

C2. To have skills in system structure construction using UML class, packet, and component diagrams

C3. To have skills in describing the system dynamics using UML sequence, communication, and state machines diagrams

C4. To have knowledge foundations in software project management

C5. To have knowledge in structural analysis and design methods

C6. To have knowledge in software testing, verification and validation

C7. To have skills in acceptance tests preparation using FitNesse tool

C8. To have skills in unit tests preparation using JUnit tool

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – Knows the system requirements specification methods using UML use cases and activity diagrams

PEK_W02 – Knows the system structure representation principles using UML class, packet, and component diagrams

PEK_W03 - Knows the system dynamics representation using UML sequence, communication, and state machines diagrams

PEK_W04 - Knows the foundations of software project management

PEK_W05 - Knows the structural analysis and design methods

PEK_W06 - Knows the foundations of software testing, verification and validation

relating to skills:

PEK_U01 – Can prepare system the requirements specification using UML use cases and activity diagrams

PEK_U02 – Can express the system structure using UML class, packet, and component diagrams

PEK_U03 - Can describe the system dynamics using UML sequence, communication, and state machines diagrams

PEK_U04 – Can prepare the acceptance tests using FitNesse tool

PEK_U05 – Can prepare the unit tests using JUnit tool

relating to social competences:

PEK_K01 – Can work in the team of two persons that prepare requirements specification, system structure and dynamics model, acceptance and unit tests

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction	2
Lec 2	Use case diagrams	2
Lec 3	Activity diagrams and class diagrams syntax	2
Lec 4	Class diagrams	2
Lec 5	Sequence diagrams and state machine diagrams	2
Lec 6	Design patterns	2
Lec 7	Software project definition, system live cycle models	2
Lec 8	Structure analysis – ERD diagrams	2

Lec 9	Data flow diagrams, state diagrams	2
Lec 10	Quality assurance in project	2
Lec 11	Verification and validation methods	2
Lec 12	Software security and maintenance	2
Lec 13	Conception, project and implementation of multi-layer system	2
Lec 14	Software testing – types of tests, test design techniques, FitNesse, Selenium	2
Lec 15	Software testing – unit tests, JUnit, mock objects, test driven development	2
	Total hours	30

Form of classes - laboratory		**Number of hours**
Lab 1	Familiarization with software engineering laboratory. Organizational matters. Safety instruction. Introduction into IBM Software Architect tool	2
Lab 2-Lab 4	Preparation of use case diagrams for designed system	6
Lab 5-Lab 6	Activity diagrams for chosen use cases	4
Lab 7-Lab 9	Elaboration of class and packet diagrams	6
Lab 10-Lab 11	Sequence diagrams for chosen use cases	4
Lab 12	Elaboration of communication diagrams and their generation from sequence diagrams	2
Lab 13	Introduction into software testing	2
Lab 14	Acceptance tests using FitNess tool	2
Lab 15	Unit tests using JUnit tool	2
	Total hours	30

TEACHING TOOLS USED
N1. Lectures using video-projector N2. Laboratory exercises N3. Consultations N4. Work without supervisor – preparation to laboratory exercises N5. Work without supervisor – self-studies

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 ÷ PEK_W03, PEK_U01 ÷ PEK_U05, PEK_K01	Observation how students are prepared to laboratory and how they execute the exercises
F2	PEK_W01 ÷ PEK_W03	½ written exam
F3	PEK_W04 ÷ PEK_W06	½ written exam

P= (0,5 F1 + 0,5 F3 if F1 ≥ 4.0) or (P = 0,5 F2 + 0,5 F3 if F1 <4.0)

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J. Górski, Inżynieria oprogramowania w projekcie informatycznym, Mikom, Warszawa, 1999.
[2] S. Wrycza, B. Marcinkowski, K. Wyrzykowski, Język UML 2.0 w modelowaniu systemów informatycznych, Helion, Gliwice, 2005.
[3] G. Booch, J. Rumbaugh, I. Jacobson, The Unified Modeling Language. User Guide, Addison-Wesley, 1999.
[4] M. Śmiałek, Zrozumieć UML 2.0, Metody modelowania obiektowego, Helion, Gliwice, 2005.
[5] M. Fowler, UML w kropelce, Wersja 2.0, LTP, Warszawa, 2005.
[6] E. Yourdon, Współczesna analiza strukturalna, WNT, Warszawa, 1996.
[7] P. Coad, E. Yourdon, Analiza obiektowa, ReadMe, Warszawa, 1994.
[8] A. Jaszkiewicz, Inżynieria oprogramowania, Helion, Warszawa, 1997.
[9] J. Roszkowski, Analiza i projektowanie strukturalne, Helion, Warszawa, 1998.
[10] R. Barker, C. Longman, Case Method. Modelowanie funkcji i procesów, WNT, Warszawa, 1996.
[11] R. Barker, Case Method. Modelowanie związków encji, WNT, Warszawa, 1996.

SECONDARY LITERATURE:

[1] M. Flasiński, Zarządzanie projektami informatycznymi, PWN, Warszawa, 2006

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Software engineering

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

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	K1INF_W29	C1	Lec 2–3	N1, N3, N4, N5
PEK_W02	K1INF_W29	C2	Lec 3–4, Lec 6, Lec 13	N1, N3, N4, N5
PEK_W03	K1INF_W29	C3	Lec 5, Lec 6	N1, N3, N4, N5
PEK_W04	K1INF_W29	C4	Lec 7, Lec 10, Lec 12	N1, N3, N4, N5
PEK_W05	K1INF_W29	C5	Lec 8,9	N1, N3, N4, N5
PEK_W06	K1INF_W29	C6	Lec 11, 14, 15	N1, N3, N4, N5
PEK_U01	K1INF_U33	C1	Lab 2÷6	N2, N3, N4
PEK_U02	K1INF_U33	C2	Lab 7÷9	N2, N3, N4
PEK_U03	K1INF_U33	C3	Lab 10÷12	N2, N3, N4
PEK_U04	K1INF_U33	C7	Lab 13÷14	N2, N3, N4
PEK_U05	K1INF_U33	C8	Lab 15	N2, N3, N4
PEK_K01	K1INF_K02	C 1÷3, C7, C8	Lab 1÷15	N2, N3, N4

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FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish **Grafika komputerowa i komunikacja człowiek-komputer**
Name in English **Computer graphics and human-computer communication**
Main field of study (if applicable): **Computer Science**
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code **INEK012**
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		60		
Form of crediting	crediting with grade*			crediting with grade*	
For group of courses mark (X) final course	X				
Number of ECTS points	**4**				
including number of ECTS points for practical (P) classes	-		2		
including number of ECTS points for direct teacher-student contact (BK) classes	1,5		1,5		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W21, K1INF_U19, K1INF_U20
2. K1INF_W01, K1INF_U01
3. K1INF_W09, K1INF_U07, K1INF_U08

SUBJECT OBJECTIVES

C1. Acquisition of knowledge of technology to create and display digital images.
C2. Acquisition of knowledge of elementary algorithms draw objects on a computer screen.
C3. Acquisition of knowledge about the organization of the 2-D visualization.
C4. Acquisition of knowledge on methods of modeling 3-D objects.
C5. Acquisition of knowledge of algorithms realistic visualization of 3-D scenes.
C6. The acquisition of knowledge and skills in the organization and design of graphical user interfaces.
C7. Learn how to write programs to visualize scenes 2-D and 3-D using the OpenGL graphics library.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 - knows the basic facts showing the progress of computer graphics in the context of the development of information technology

PEK_W02 - knows the basic numerical models used to describe the color

PEK_W03 - knows and understands the problems of algorithms for drawing graphics primitives in the raster

PEK_W04 - mastered the use of matrix as a tool for manipulation of graphical objects on the stage of the 2-D

PEK_W05 - knows the general procedure for the visualization of 2-D scene.

PEK_W06 - has knowledge of some mathematical models that describe the surfaces of 3-D objects, used in computer graphics.

PEK_W07 - understand the concept and know how the cast, as a method of visualizing 3-D scene on the plane

PEK_W08 - has knowledge of the methods and algorithms for generation of lighting and texturing objects in 3-D scenes

PEK_W09 - knows the rules and tools for building graphical user interfaces

relating to skills:

PEK_U01 - knows how to use a set of basic functions used to OpenGL graphics programming tasks 2-D and 3-D

PEK_U02 - is able to design and write a program in the field of 2-D graphics with elements interact with the user using the mouse and keyboard

PEK_U03 - can visualize and model the 3-D object is described by a set of parametric equations

PEK_U04 - can program the interaction process relies on controlling the position of an object in 3-D space using the mouse and keyboard

PEK_U05 - can programmatically implement basic lighting models and complete application to the surface of an object 3-D textures

PEK_U06 - can write a program that implements a simple scene for 3-D recursive ray tracing algorithm

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction, history of computer graphics systems and human-computer communication	2
Lec 2	Basic color theory, numerical models describing the color	2
Lec 3	Raster graphics systems. Algorithms for line and arc segment	2
Lec 4	Filling area, drawing images of letters	2
Lec 5	2-D transformation, the general procedure for 2-D visualization, clipping algorithms	2
Lec 6	Principles of 3-D graphics, object models, objects made of polygons, analytical equations of the surface, quadric	2
Lec 7	Polynomial approximation, Bezier and B-spline surfaces, NURBS	2

Lec 8	Transformations in 3-D space, parallel and perspective projection	2
Lec 9	Local illumination models on the 3-D scenes	2
Lec 10	Texture, texture generation and filtering	2
Lec 11	Methods of calculating global illumination, ray tracing method, the method of energy	2
Lec 12	API standard for interactive systems used in computer graphics, OpenGL, DirectX	2
Lec 13	General rules for the construction of a graphical user interface	2
Lec 14	Advanced methods of communication human - computer, motion detection, voice communication	2
Lec 15	Repertory	2
	Total hours	**30**

Form of classes - classes - laboratory		**Number of hours**
Lab 1	Workplace training in health and safety. Organizational matters. introduction	2
Lab 2	Basic of OpenGL, drawing a fractal 2-D objects	4
Lab 3	Graphical user interface, making a simple application of combinational logic simulator	4
Lab 4	Modeling of 3-D objects, drawing an image of object described by set of parametric equations	4
Lab 5	Interaction in 3-D space, the implementation of control the position of the object and the observer with the mouse	4
Lab 6	3-D image of the illuminated object drawing with the possibility of an interactive moving light sources	4
Lab 7	Texturing objects, drawing the textured images	4
Lab 8	Global illumination, application of ray tracing method for a simple 3-D scene	4
	Total hours	**30**

TEACHING TOOLS USED

N1. Traditional lectures using video projector
N2. Laboratories (programming)
N3. Consultation
N4. Own work - preparation for laboratory classes
N5. Self - Self-programming work and studying literature

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01÷PEK_U06	verbal response, analysis of the activities carried out programs

		a written report of the exercises
F2	PEK_W01÷PEK_W09	written test
P = 0,5*F1 + 0,5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Foley J. D., van Dam A., i inni , Wprowadzenie do grafiki komputerowej, WNT, 1995.
[2] Grafika komputerowa metody i narzędzia, pod red. J. Zabrodzkiego, WNT, 1994.
[3] Jankowski M., Elementy grafiki komputerowej, WNT, Warszawa 1990.
[4] Pavlidis T., Grafika i przetwarzanie obrazów, WNT, Warszawa 1987.
[5] Wright R. S., Sweet M., OpenGL. Księga eksperta, Helion, Gliwice, 2005
[6] D. Hearn, P. Baker, Computer Grphics, Prentice-Hall, Englewood Cliffs, 1986.
[7] Angel E., Interactive Computer Graphics A Top-Down Approach Using OpenGL, Addison Weslay, 2006.

SECONDARY LITERATURE:

[1] Journal: IEEE Computer Graphics and Applications, **ISSN:** 0272-1716 (dostępne w serwisie IEEE Explore http://ieeexplore.ieee.org)

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Computer graphics and human-computer communication
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science

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	K1INF_W30	C1	Lec1	N1, N3, N5
PEK_W02	K1INF_W30	C1	Lec2	N1, N3, N5
PEK_W03	K1INF_W30	C2	Lec3, Lec4	N1, N3, N5
PEK_W04	K1INF_W30	C3	Lec5	N1, N3, N5
PEK_W05	K1INF_W30	C3	Lec5	N1, N3, N5
PEK_W06	K1INF_W30	C4	Lec6, Lec7	N1, N3, N5
PEK_W07	K1INF_W30	C5	Lec8	N1, N3, N5
PEK_W08	K1INF_W30	C5	Lec9 ÷ Lec11	N1, N3, N5
PEK_W09	K1INF_W30	C6	Lec12 ÷ Lec14	N1, N3, N5
PEK_U01	K1INF_U34	C7	Lab2	N2, N3, N4, N5
PEK_U02	K1INF_U34	C6, C7	Lab3	N2, N3, N4, N5
PEK_U03	K1INF_U34	C7	Lab4	N2, N3, N4, N5
PEK_U04	K1INF_U34	C6, C7	Lab5	N2, N3, N4, N5
PEK_U05	K1INF_U34	C6	Lab6	N2, N3, N4, N5
PEK_U06	K1INF_U34	C6	Lab7	N2, N3, N4, N5

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

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FACULTY **Electronics**

SUBJECT CARD

Name in Polish	**Bazy danych 2**
Name in English	**Database Management Systems 2**
Main field of study (if applicable):	**Computer Science**
Level and form of studies:	**1st, full-time**
Kind of subject:	**obligatory**
Subject code:	**INEK013**
Group of courses:	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)				30	15
Number of hours of total student workload (CNPS)				35	25
Form of crediting				Crediting with grade	Crediting with grade
For group of courses mark (X) final course					X
Number of ECTS points					2
including number of ECTS points for practical (P) classes				1	1
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. K1INF_W25, K1INF_U25

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SUBJECT OBJECTIVES

C1. The acquisition of knowledge of current trends in the development of relational and non-relational database management systems.
C2. The acquisition of skills in the design and implementation of applications collaborating with database management system.
C3. The acquisition of knowledge about good practice to prepare technical presentations
C4. The acquisition of skills on preparing a computer presentation and conduct the seminar.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 - He knows the rules of preparation of computer presentations and their presentation in a public forum.
PEK_W02 - He knows the current trends in the development of database management systems.
PEK_W03 - He knows a good practice to create applications using database management systems (to ensure the performance, speed, accuracy and security of data).

relating to skills:

PEK_U01 - He can prepare a presentation and speech on a chosen topic.
PEK_U02 - He can develop a design and create a database for the selected problem / issue, and to develop its detailed documentation.
PEK_U03 - He can create an application that uses a database management system and executes

the posed task.
PEK_U04 - He can lead and speak in the debate, arguing essentially their opinions.

relating to social competences:
PEK_K01 - He is aware of the importance of proper way of presentation of their knowledge, opinions and ideas.

PROGRAMME CONTENT

Form of classes - project		Number of hours
Proj 1	Presentation and discussion of topics of projects	2
Proj 2-3	Choosing and preparing the initial assumptions on selected topics of projects	4
Proj 4-6	The design of structure of the database, the mechanisms for ensuring the correctness of stored information, and control access to data	6
Proj 7-9	Implementation and tests of database at a selected database management system	6
Proj 10-13	Implementation and tests of the application	8
Proj 14-15	Presentation and giving back of projects	4
	Total hours	30

Form of classes - seminar		Number of hours
Sem 1	Presentation and discussion of topics of seminars	1
Sem 2	Discussion of the good principles of preparing and delivering technical presentations	2
Sem 3-8	Student presentations on a selected topic	12
	Total hours	15

TEACHING TOOLS USED

N1. Own work - realization of a comprehensive design task carried out in groups of 2-3 people.
N2. Own work - to prepare a presentation of the chosen topic, conducted in groups of 2-3 people.
N3. Several dozen minutes of seminar presentations on a selected topic conducted in groups of 2-3 people.
N4. 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_U02, PEK_U03, PEK_W03,	Evaluation of the implementation and documentation of an application that uses a database management system
F2	PEK_U01, PEK_U04, PEK_W01, PEK_W02, PEK_K01	Uttering a seminar on a selected topic in the field of database management systems
C= 0,6*F1 + 0,4*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] H.Garcia-Molina, J.D.Ullman, J.Widom, „Systemy baz danych. Kompletny podręcznik”, Wydanie II, 2011

[2] Dokumentacje systemów zarządzania bazami danych

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Database Management Systems 2

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

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_U05, S1INS_U08, S2INS_U07	C3, C4	Sem 1-2 Sem 3-8 Proj 14-15	N4, N2, N3
PEK_W02	K1INF_U27	C1	Sem 3-8	N2, N3
PEK_W03	K1INF_U26, S2INS_U06	C2	Proj 1-14	N1
PEK_U01 (skills)	K2INF_U05, S1INS_U08, S2INS_U07	C3, C4	Sem 1-2 Sem 3-8 Proj 14-15	N4, N2, N3
PEK_U02	K1INF_U26, S2INS_U06	C2	Proj 1-14	N1
PEK_U03	K1INF_U26, S2INS_U06	C2	Proj 1-14	N1
PEK_U04	S1INS_U08, S2INS_U07	C4	Sem 3-8 Proj 14-15	N2, N3
PEK_K01 (competences)	K1INF_K02	C4	Sem 3-8 Proj 14-15	N2, N3

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

*** - from table above

FACULTY ELECTRONICS

SUBJECT CARD

Name in Polish	**Technologie sieciowe 2**
Name in English	**Network Technologies 2**
Main field of study (if applicable):	**Computer Science**
Specialization (if applicable):	
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INEK014**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		15	15	
Number of hours of total student workload (CNPS)	30		50	40	
Form of crediting	crediting with grade*		crediting with grade*	crediting with grade*	
For group of courses mark (X) final course	X				
Number of ECTS points	**4**				
including number of ECTS points for practical (P) classes	-		2	1	
including number of ECTS points for direct teacher-student contact (BK) classes	1		1	1	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W26
2. K1INF_U28

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SUBJECT OBJECTIVES

C1. Knowledge in the field of basic standards and in the field of technologies uses on websites and technology of sharing information in computer networks.
C2. Competence of designing and configuration of computer networks.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – The course results with a student's ability to explain and describe basic information in the field of computer network applications in the modern world.
PEK_W02 – The course results with a student's ability to explain and describe systems architecture and selected software environment.
PEK_W03 – The course results with a student's ability to explain and describe in the field of design and configuration of computer networks.

relating to skills:

PEK_U01 – The course results with a student's ability to properly describe properties of protocols, technologies, devices and web services in the context of their application to local area networks satisfying specific requirements.
PEK_U02 – The course results with a student's ability to use equipment catalogs and network software.
PEK_U03 – The course results with a student's ability to perform logical design, addressing scheme and cabling for local computer network having regard to the requirements of the user.
PEK_U04 – The course results with a student's ability to configure network devices and control web services.
PEK_U05 – The course results with a student's ability to present information on the dynamic web page.

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Internet Architecture; protocols, services.	**2**
Lec 2	Protocols of the application layer.	**1**
Lec 3	Web Applications- models of architecture.	**2**
Lec 4	Security of network solutions.	**3**
Lec 5	The hierarchical network model.	**2**
Lec 6	Optimization of connection to the Internet.	**2**
Lec 7	Technology MPLS	**2**
Lec 8	Areas of using personal area networks.	**1**
	Total hours	**15**

Form of classes - laboratory		**Number of hours s**
Lab 1	Introduction.	**1**
Lab 2	Processing and presentation of data on the web page.	**4**
Lab 3	Optimization access link to the Internet.	**4**
Lab 4	Universal cabling system.	**2**
Lab 5	Broadband service in the company.	**2**
Lab 6	Services addressing IP.	**2**
	Total hours	**15**

Form of classes - project		**Number of hours**
Proj 1	Inventory local area network.	**2**
Proj 2	Analysis of requirements of users of local area network.	**2**
Proj 3	Project guidelines of local area network	**1**
Proj 4	Logical design and equipment selection for the local area network.	**3**
Proj 5	Addressing scheme for the local area network.	**2**
Proj 6	Cabling project for the local area network.	**2**
Proj 7	Analysis of security and reliability for the local area network.	**1**
Proj 8	Estimate cost for the local area network	**2**
	Total hours	**15**

TEACHING TOOLS USED

N1. Lecture with multimedia presentations.
N2. Problem-oriented lecture
N3. Practical tasks in laboratory.
N4. Consultation
N5. Discussion
N6. Own work – preparation to lecture, laboratory and project.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educationaleffectnumber	Way of evaluating educational effect achievement
F1	PEK_W01 ÷ PEK_W03	Tests, oral answers
F2	PEK_U01 ÷ PEK_U03	Project work, presentation of project, participation in discussion
F3	PEK_U01,PEK_U02, PEKU04,PEK_U05	Summation of exercises in laboratory, laboratory reports, oral answers.
P = (F1 + F2 + F3)/3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Tannenbaum A., S., Computer Networks
[2] R. Breyer, S. Rileyi, Switched, Fast i Gigabit Ethernet
[3] Cisco Academy resources,
[4] K. Nowicki, J. Woźniak, PrzewodoweibezprzewodowesieciLAN, OficynaWydawniczaPolitechnikiWarszawskiej, Warszawa 2002
[5] D. E. Comer, Siecikomputeroweiintersieci, WNT 2001.
[6] M. Hall, L. Brown, SerwisyInternetowe. Programowanie, Helion 2003
[7] Bill Evjen, ASP.NET 3.5 z wykorzystaniem C# i VB. Zaawansowaneprogramowanie, Helion 2010.

SECONDARY LITERATURE:

[1] RFC (ang. Request for Comments) standards www.ietf.org
[2] IEEE (ang. Institute of Electrical and Electronics Engineers) standards www.ieee.org

[3] NetworldJournal
[4] Materials of computer network devices and software vendors

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Network Technologies 2

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

Subjecteducationaleffect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subjectobjectives***	Programmecontent***	Teachingtoolnumber***
PEK_W01	K1INF_W27	C1	Lec1, Lec4, Lec6÷Lec8	N1, N2, N5,N6
PEK_W02	K1INF_W27	C1	Lec1÷Lec3	N1, N2, N5,N6
PEK_W03	K1INF_W27	C1, C2	Lec4÷Lec6	N1, N2, N5,N6
PEK_U01	K1INF_U30	C2	Proj1÷Proj4, Proj7, Lab1	N3÷N6
PEK_U02	K1INF_U30	C2	Proj4, Proj6, Proj8, Lab5	N3÷N6
PEK_U03	K1INF_U30	C2	Proj1÷ Proj8	N3÷N6
PEK_U04	K1INF_U30; K1INF_U29	C1, 2	Lab3, Lab5, Lab6	N3÷N6
PEK_U05	K1INF_U29	C1	Lab2, Lab3	N3÷N6

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF ELECTRONICS

SUBJECT CARD

Name in Polish **Urządzenia peryferyjne**
Name in English **Computer peripherals**
Main field of study (if applicable): **Computer Science**
Specialization (if applicable):
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code **INEK015**
Group of courses **YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		30		
Number of hours of total student workload (CNPS)	30		60		
Form of crediting	crediting with grade		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	-		2		
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. 1. K1INF_W09, K1INF_U07, K1INF_U08
2. K1INF_W21, K1INF_U19, K1INF_U20

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SUBJECT OBJECTIVES

C1 mastering the skills of designing algorithms Device using basic algorithmic techniques,
C2 mastery of writing simple programs at the level of programming languages the use of input-output and operating system services,
C3 acquisition of knowledge in solving classic problems in the use of equipment such as the synchronization of multi-tasking, communication, resource sharing and service matching algorithm to the specifics of the problem,
C4 mastering software development skills using the API procedures, operational, and use tools to support the creation of graphical user interfaces for the implementation of the application.
C5 mastering the skills of software development and testing and evaluation of risks and responsibilities associated with programmable devices.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 - knows the basic techniques of input-output operations,

PEK_W02 - knows selected peripherals, their construction and operation and programming.

PEK_W03 - knows the rules of service matching algorithm to specifics of the device.

relating to skills:

PEK_U01 - knows how to design, write, run, and test software for the selected peripherals

PEK_U02 - knows how to use the services of the operating system API to handle peripherals.

relating to social competences:

PEK_K01 - recognizes the importance of the proper way of user interface design, and software that works with devices.

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Caring for the I / O devices in Windows. Hardware conditions 'owe (protected mode ring 0,1,2,3,). Software conditions. The structure of Windows. The structure of the Windows Executive. IOPM, IOCTL, the priorities of tasks. Stock registry in Windows. Stock aids. Registration functions. Support software serial port. The CreateFile function, structure, service port, DCB, COMMSTAT	2
Lec 2	Magnetic cards. Physical format, fields embossing (tipping, filling), the signature of the owner. Paths IATA, ABA, NRI (recording density, types of characters). LOCO cards, HICO, hysteresis, coercion, record F/2F.Zagrozenia (theft, multiplication, caching, modifying). Optical cards. Recording density, drunk, lands, paths. Reed-Solomon coding (272.190), BER, interlace. Cards visible.	2
Lec 3	Smart card indicator for the presence of goods: electro-magnetic, electro-acoustic, acoustic-magnetic. RFID systems. Types of RFID: Tiris, Unique, Mifare, Hitag. Modulation AM, ASK, PSK, 32QAM.	2
Lec 4	Microprocessor and memory cards. Communication interfaces, contacts, ATR sequence, byte procedure, the command APDU.	2
Lec 5	Optical storage media, cards, discs. The structure of the optical card. Laser Disc, CD reading technology, coding information, write movies, poobrazy, cylidryczny and analog recording, digitizing, digitization, drunk, lands, a path CLV, CAV.	2
Lec 6	DVDs, storage and retrieval of information, control head radial 3-5-7, DVD R + / R-, BluRay, and CD, DVD, BD comparison (wavelength, numerical aperture, write / read speed, capacity). Magneto-optical recording. Drives HVD (Holographic). Memory Polymer.	2
Lec 7	Entering information into computer graphics. Optical character OMR, OCR readers letters and barcodes. OMR-sync reading. OCR handwriting recognition and ink block. PostNet Postal codes, Orange codes, codes of 4-state. Social Security Code, IBAN, ISBN, ISSN. Colloquium.	3
	Total hours	15

	Form of classes - laboratory	**Number of hours**
Lab 1	Introduction to the laboratory. Workplace training, health and safety.	4
Lab 2	Principles of cooperation with peripherals for Windows (serial port, parallel port, Direct X, Bloutooth, WinSDK, libraries for each device.	4

	Developing applications using visual compiler (Visual C + + 2008. Net).	
Lab 3	Caring for the printer (dot matrix, inkjet or laser).	4
Lab 4	Stepper motor control via USB.	4
Lab 5	Bluetooth - communication with a mobile phone.	4
Lab 6	Support sound card using DirectSound API and ActiveX.	4
Lab 7	Smart card reader	4
Lab 8	Service flatbed scanner (TWAIN or WIA).	4
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lectures using video projector N2. laboratory exercises N3. Consultation N4. Own work - preparation for laboratory

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01, PEK_W02, PEK_W03, PEK_K01	Colloquium
F2	PEK_U01, PEK_U02, PEK_K01	verbal response, monitoring exercise, a written report of the exercises
P=0.4*F1+0.6*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] BUCHANAN W : Applied PC, Interfacing, Graphics and Interrupts, Addison-Wesley, 1996, ISBN 0-201-87728-7
[2] KOLAN Z., Urządzenia techniki komputerowej, SCREEN, Wrocław 1994.
[3] MESSMER H: The Indispensable PC Hardware Book, Addison-Wesley, 1997, ISBN 0-201-40399-4

SECONDARY LITERATURE:

[1] Gniadek K.: Optyczne przetwarzanie informacji, PWN, Warszawa 1992
Smith N.: Drukarki laserowe HP Laser Jet, MOKOM, Warszawa 1995

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Computer peripherals

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01, PEK_W02, PEK_W03)	K1INF_W31	C1, C2, C3, C4	Lec1- Lec7, Lab2-Lab8	N1, N4,N3
PEK_U01, PEK_U02	K1INF_U35, K1INF_U21,	C1, C3, C4	Lec1- Lec7, Lab2-Lab8	N1, N2, N3, N4
PEK_U01, PEK_U02	K1INF_U35, K1INF_U21,	C1, C3, C4	Lec1- Lec7, Lab2-Lab8	N1, N2, N3, N4

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

*** - from table above

FACULTY OF **ELECTRONICS**

SUBJECT CARD

Name in Polish: **Systemy operacyjne 1**
Name in English: **Operating systems 1**
Main field of study: **Computer Science**
Specialization:
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code: **INEK016**
Group of courses: **NO**

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

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W21, K1INF_U19, K1INF_U20
2. K1INF_W09, K1INF_U07, K1INF_U08

SUBJECT OBJECTIVES

C1 Acquisition of knowledge on the design of modern operating systems, services realized by the system, basic subsystems.
C2 Learning process scheduling algorithms used in operating systems.
C3 Learning interprocess synchronization and communication mechanisms, and techniques used to solve simple synchronization tasks.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01	knows how an operating system is designed, understands process and memory management, file access mechanisms
PEK_W02	knows the basic process scheduling algorithms, preemptive and non-preemptive
PEK_W03	knows the mechanisms used in interprocess synchronization and communication, as well as typical synchronization problems

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	General operating systems structure: subsystems, system functions, shell, OS classification	2
Lec 2	Concept of process and thread, process context, process state, scheduling algorithms	2
Lec3	Process hierarchy, creation, exiting, signal handling	2
Lec 4	Process management in Unix and Linux	2
Lec 5	Memory management: core image, segmentation and paging, memory fragmentation	2
Lec 6	Virtual memory, demand paging	2
Lec 7	Memory management in Unix	2
Lec8	Interprocess synchronization and communication, Dijkstra semaphores, critical section	2
Lec9	Deadlocks: conditions of occurrence, detection and removal	2
Lec10	File systems – direct access storage, file abstraction, allocation maps, fragmentation, cache	2
Lec 11	File systems – directory structure, protection and access control	2
Lec 12	Windows file systems – FAT, VFAT, NTFS	2
Lec 13	Unix file system (allocation, folders, inode’s, superblock)	2
Lec 14	Unix kernel functions supporting cache’ing and file system	2
Lec 15	Recapitulation	2
	Total hours	30

TEACHING TOOLS USED

N1. Traditional lecture using video projector

N2. Consultations

N3. Individual work – literature study

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

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

F1	PEK_W01÷PEK_W03	Written test
P = F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] A. Silberschatz, P.B. Galvin, G. Gagne, Operating systems concepts
[2] M.J. Bach, The design of the Unix operating system

SECONDARY LITERATURE:

[1] A.S. Tanenbaum, Operating System: Design and Implementation
[2] M. Beck, Linux Kernel Programming

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Operating systems 1
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science

Subjecteducationaleffect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)	Subjectobjectives	Programmecontent	Teachingtoolnumber
PEK_W01	K1INF_W32	**C1**	**Lec1÷Lec14**	**N1, N2, N3**
PEK_W02	K1INF_W32	**C2**	**Lec2, Lec3**	**N1, N2, N3**
PEK_W03	K1INF_W32	**C3**	**Lec8÷Lec9**	**N1, N2, N3**

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FACULTY of ELECTRONICS

SUBJECT CARD

Name in Polish Układy cyfrowe i systemy wbudowane 1
Name in English Digital circuits and embedded systems 1
Main field of study (if applicable): Computer science
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code INEK017
Group of courses YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		45		
Number of hours of total student workload (CNPS)	30		60		
Form of crediting	Crediting with grade		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	-		2		
including number of ECTS points for direct teacher-student contact (BK) classes	1		2		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W19
2. K1INF_U17

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SUBJECT OBJECTIVES

C1 To learn the process of specification, design, simulation and implementation of a digital circuit.
C2 To learn the syntax, semantics and simulation model of a hardware description language.
C3 To master the ability of using a hardware description language in specification and testing of a digital circuit.
C4 To learn internal architecture and application features of simple programmable devices.
C5 To master the ability of using simple programmable devices in implementation of a digital design.
C6 To master the ability of searching and exploiting documentation made available by manufacturers of digital devices.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – understanding the process of specification, logic design, simulation and implementation of a digital circuit

PEK_W02 – knowledge of a selected hardware description language and understanding its application in modelling of a digital circuit operation

PEK_W03 – essential knowledge of basic internal organization of configurable digital devices

relating to skills:

PEK_U01 – ability to apply a hardware description language in design and testing of a digital circuit

PEK_U02 – working with the specialized software environment, ability to design a simple digital circuit (approx. size of hundreds of logic gates), to implement it in a configurable device, and to verify its operation in simulation and in hardware

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	The process of specification, logic design, simulation and implementation of a digital circuit.	2
Lec 2	Hardware Description Languages (HDL): describing structure and functionality of a digital circuit at different levels.	2
Lec 3	Syntax of a HDL: types, operators, instructions.	2
Lec 4	Expressing in the HDL typical constructs found in combinational and sequential circuits.	2
Lec 5	Simulation model of the language, preparation and execution of tests.	2
Lec 6	Configurable digital devices: overview of architectures and programming technologies.	2
Lec 7	Internal architecture of basic programmable devices.	2
Lec 8	Tests, evaluating student’s knowledge.	1
	Total hours	15
Form of classes - laboratory		**Number of hours**
Lab 1	Organization of the lab, safety and security issues. Introduction to the software and hardware utilized in the classes.	3
Lab 2, Lab 3	Design, simulation and implementation of basic combinational circuits in an environment of the integrated development software.	6
Lab 4,	Modularization of the project: working with hierarchically structured	6

Lab 5	source files.	
Lab 6, Lab 7	Time-driven circuits: using timing simulation for analysis of circuit operation.	6
Lab 8, Lab 9	Finite State Machines (FSM): reacting to sequences of events.	6
Lab 10	HDL descriptions of typical combinational and sequential circuits.	3
Lab 11, Lab 12	Simple peripheral interfaces: using keyboard, mouse and serial port in a digital design.	6
Lab 13, Lab 14	Working with LCD and VGA displays.	6
Lab 15	Summary, final evaluation.	3
	Total hours	45

TEACHING TOOLS USED

N1. Traditional lecture with a table and computer projector.
N2. Laboratory classes.
N3. Consultations during contact hours.
N4. Individual student work – preparations for lab classes.
N5. Individual student work – writing reports after lab classes.
N6. Individual student work – individual studies and preparations for the tests.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 – PEK_U02	Oral examinations during lab classes, grades given at the end of every lab class and for the report submitted in paper afterwards.
F2	PEK_W01 – PEK_W03	Written test at the end of the lecture.
P = 0.4 * F1 + 0.6 * F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Łuba T. (red.), *Synteza układów cyfrowych*, WKŁ, Warszawa
[2] Zwoliński M., *Projektowanie układów cyfrowych z wykorzystaniem języka VHDL*, WKŁ, Warszawa
[3] Documentation of the programmable devices discussed in the lecture and used in the lab classes, e.g. *XC9500XL High-Performance CPLD Family Data Sheet*, http://www.xilinx.com/support/documentation/data_sheets/ds054.pdf
[4] Documentation of the software tools used for synthesis and implementation of digital circuits, e.g. *XST User Guide for Virtex-4, Virtex-5, Spartan-3, and Newer CPLD Devices*, http://www.xilinx.com/support/documentation/sw_manuals/ xilinx14_1/xst.pdf

SECONDARY LITERATURE:

[1] Chu P.P, *RTL hardware design using VHDL*, J.Wiley & Sons, Hobokon
[2] Rushton A., *VHDL for logic synthesis*, J.Wiley & Sons, Chichester

[3] Pasierbiński J., Zbysiński P., *Układy programowalne w praktyce*, WKŁ, Warszawa
[4] Skahill K., *Język VHDL. Projektowanie programowalnych układów logicznych*, WNT, Warszawa
[5] Kalisz J. (red.), *Język VHDL w praktyce*, WKŁ, Warszawa

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Digital circuits and embedded systems 1

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Computer science**

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	K1INF_W33	C1	Lec 1	N1, N3, N6
PEK_W02	K1INF_W33	C2	Lec 2 – 5	N1, N3, N6
PEK_W03	K1INF_W33	C4, C6	Lec 6 – 7	N1, N3, N6
PEK_U01	K1INF_U37	C3	Lab 1 – 15	N2, N4, N5
PEK_U02	K1INF_U37	C5, C6	Lab 1 – 15	N2, N4, N5

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

*** - from table above

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish: **Sztuczna inteligencja**
Name in English **Artificial Intelligence**
Main field of study (if applicable): **Computer Science**
Specialization (if applicable):
Level and form of studies: **1nd level, full-time**
Kind of subject: **optional**
Subject code **INEK018**
Group of courses **YES**

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge in discrete mathematics, mathematical logic and Propositional calculus.
2. Basic knowledge related to algorithms and data structures

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SUBJECT OBJECTIVES

C1. Gaining knowledge and skills in the use of selected methods of artificial intelligence (state space search, knowledge representation and reasoning, decision making, machine learning) for the design of information systems.
C2. Acquisition of the ability to apply appropriate methods of artificial intelligence to solve a specific problem.
C3. The acquisition and consolidation of skills to find information in the scientific literature.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 - knows the basics representation of selected problems in the state space
PEK_W02 - known classical and heuristic state space search methods
PEK_W03 - knows the basic concepts of game theory
PEK_W04 - known method to determine the optimal strategy in the game based on the algorithm of minima
PEK_W05 - know the basic methods for knowledge representation (propositional calculus, predicate calculus, semantic networks), and reasoning strategies (forward, backward, resolution)

PEK_W06 - knows the basics of Prolog and examples of its use
PEK_W07 - knows the basic concepts of fuzzy set theory and methods based on uncertain or incomplete knowledge
PEK_W08 - knows the basic design of fuzzy controllers
PEK_W09 - knows the basic concepts and algorithms for machine learning
PEK_W10 - known method to generate decision trees from a set of examples
PEK_W11 - knows the basic tasks and methods for natural language processing
relating to skills:
PEK_U01 - can use artificial intelligence tools to solve some problems
PEK_U02 - can design fuzzy controllers
PEK_U03 - can use methods of decision support in situations of incomplete knowledge, or uncertain data.
PEK_U04 - can design a genetic algorithm to solve the problem
relating to social competences:
PEK_K01 - recognizes the importance of information retrieval skills and their critical analysis,
PEK_K02 - understands the need for self-education and to develop the ability to independently apply their knowledge and skills,

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Organizational activities: program requirements and references. General characteristics of artificial intelligence. Examples of applications.	2
Lec 2	Description of the problem in the state space. Solving problems by searching AI.	2
Lec 3	Heuristic search methods. Improving the efficiency of search methods.	2
Lec 4	Search algorithms for the determination of strategy games. Minimax theorem.	2
Lec 5	Knowledge representation. Basic methods of inference.	2
Lec 6	Basics of Prolog. Examples of applications.	2
Lec 7	Uncertain lnowledge. The theory of fuzzy sets.	2
Lec 8	The inference based on uncertain knowledge. Fuzzy Control.	2
Lec 9	Learning machines. Induction of decision trees.	2
Lec 10	Genetic algorithms. Theoretical foundations and applications.	2
Lec 11	Genetic Programming.	2
Lec 12	Natural Language Processing. Basic problems.	2
Lec 13	Selected applications of natural language processing systems.	2
Lec 14	Examples of the use of artificial intelligence in the design of information systems.	2
Lec 15	Final test.	2
	Total hours	30
Form of classes – exercises		**Number of hours**
Cl1	Organizational matters, discussion of the program and requirements.	1

Cl2	Solving problems by space searching	2
Cl3	Heuristic search methods. Determination of strategy in games	2
Cl4	Knowledge representation (propositional calculus, predicate calculus). Methods of inference	2
Cl5	Applications of Prolog language (knowledge representation, state space search)	2
Cl6	Fuzzy sets. Fuzzy Inference..	2
Cl7	Induction of decision trees	2
Cl8	Final test	2
	Total hours	15

TEACHING TOOLS USED

N1 Traditional lectures using video projector
N2 Exercises
N3 Consultation
N4 Own work - preparation for exercise
N5 Self-study and preparation for test

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-U04, PEK_K01, PEK_K02	Oral replies, short tests
F2	PEK_W01-W11	Final test grade
C= 0,6*F2+0,4*F1		

PRIMARY AND SECONDARY LITERATURE

LITERATURA PODSTAWOWA:

[1] S. Russell, P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, 2003
[2] L. Rutkowski, "Metody i techniki sztucznej inteligencji", PWN, 2005
[3] P. Cichosz, "Systemy uczące się", WNT, 2007
[4] D. E. Goldberg, "Algorytmy genetyczne i ich zastosowania", WNT, 2003
[5] W.F. Clocksin, C.S. Mellish, "Prolog. Programowanie", Helion, 2003

LITERATURA UZUPEŁNIAJĄCA:

[1] L. Bolc, J. Cytowski, "Metody przeszukiwania heurystycznego", PWN, 1989 i 1991
[2] M. Ben-Ari, "Logika matematyczna w informatyce", WNT, 2005
[3] M. DeLoura, „Perełki programowania gier. Vademecum profesjonalisty", Helion, 2002 (tom 1-3)

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Artificial Intelligence

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 –PEK_W11	K1INFW_35	C1	Lec1-Lec15	N1,N3,N5
PEK_U01-U04	K1INF_U39	C1,C2,C3	Cl1-Cl8	N2,N3,N4
PEK_K01 PEK_K02	K1_K04	C3	Cl1-Cl8, Lec1-Lec15	N1,N2,N3,N4,N5

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

*** - from table above

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FACULTY OF **ELECTRONICS**

SUBJECT CARD

Name in Polish: **Systemyoperacyjne2**
Name in English: **Operating systems 2**
Main field of study: **Computer Science**
Specialization:
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code: **INEK019**
Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)			30		
Number of hours of total student workload (CNPS)			120		
Form of crediting			Examination		
For group of courses mark (X) final course					
Number of ECTS points			**4**		
including number of ECTS points for practical (P) classes			3		
including number of ECTS points for direct teacher-student contact (BK) classes			2		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W32
2. K1INF_W09, K1INF_U07, K1INF_U08

SUBJECT OBJECTIVES

C1 Gaining skills in using OS command from a console.

C2 Gaining skills in developing shell scripts.

C3 Gaining experience in developing multithread programs using the Posix threads library.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_U01 can manage an operating system using shell commands

PEK_U02 can automate typical administrative tasks by developing shell scripts

PEK_U03 develops multithread applications, requiring inter-threat synchronization

PROGRAMME CONTENT

Form of classes - laboratory		**Number of hours**
Lab1	Introduction to laboratory	2
Lab2	Shell scripts *sh*	2
Lab3	Operations on symboliclinks	2
Lab4	Operations on directory trees (*find*)	2
Lab5	Streamprocessing	2
Lab 6	Stream processing of text (*grep, awk*)	2
Lab 7	Use of extended regular expressions	2
Lab 8	*Perl* scripts	2
Lab 9	Operations on directory trees in *Perl* scripts	2
Lab 10	Use of extended regular expressions in *Perl* scripts	2
Lab 11	Operations on symlinks in *Perl* scripts	2
Lab 12	Multithread application using POSIX threads	4
Lab 13	Threads synchronization using *pthread* mechanisms	2
Lab 14	Elaboration of the multithread application code	2
	Total hours	30

TEACHING TOOLS USED

N1. Laboratory exercises

N2. Consultations

N3. Individual work – preparatory to laboratory assignments

N4. Individual work – preparatory to the examination

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01÷PEK_U02	Assessment of the laboratory progress and reports
F2	PEK_U03	Assessment of the code
F3	PEK_U01÷PEK_U02	Examination
P = 0,4*F3 + 0,4*F1+0,2*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Siever, E.: Linux in a Nutshell
[2] Wall, Larry et al: Programming Perl
[3] Christiansen T.: Perl Cookbook
[4] Gray J.S.: Interprocess Communications in Unix – The Nooks and Crannies

SECONDARY LITERATURE:

[5] A. Silberschatz, P.B. Galvin, G. Gagne, Operating systems concepts
[6] M.J. Bach, The design of the Unix operating system

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Operating systems 2
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science

Subjecteducationaleffect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)	Subjectobjectives	Programmecontent	Teachingtoolnumber
PEK_U01	K1INF_W36	**C1**	**Lab1÷Lec7**	**N1, N2, N3**
PEK_U02	K1INF_W36	**C2**	**Lab2, Lab11**	**N1, N2, N3**
PEK_U03	K1INF_W36	**C3**	**Lab12÷Lab14**	**N1, N2, N3**

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FACULTY of ELECTRONICS

SUBJECT CARD

Name in Polish Układy cyfrowe i systemy wbudowane 2
Name in English Digital circuits and embedded systems 2
Main field of study (if applicable): Computer science
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code INEK020
Group of courses YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload (CNPS)	30			100	
Form of crediting	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	1.5			2	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W33
2. K1INF_U37

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SUBJECT OBJECTIVES

C1 To learn internal organization, available resources and application particulars of VLSI Field Programmable Gate Array (FPGA) devices.
C2 To learn architectures of embedded systems and use of embedded processors.
C3 To be able to integrate software and hardware in digital systems design and to use such integration in digital circuit optimization and reliability improvement.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – knowledge of FPGA programmable devices and their particulars in implementations of complex digital systems

PEK_W02 – knowledge of organization of embedded systems and applications of embedded processors within them

relating to skills:

PEK_U01 – ability to use resources of FPGA devices in implementation of a digital system

PEK_U02 – ability to design an embedded system for a particular task and, using a specialized software environment, to accomplish its implementation and verification in hardware

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1–3	Architectures of FPGA devices: the array of configurable logic blocks and specialized auxiliary resources.	5
Lec 4–5	Implementation and synchronization problems in VLSI programmable devices: synthesis and distribution of synchronization signals, metastability, routing concerns.	4
Lec 6	Specifics of embedded systems. Embedded processors.	2
Lec 7	Software and hardware partitioning in single-chip systems.	2
Lec 8	Real time operating systems.	2
	Total hours	15

Form of classes - project		**Number of hours**
Proj 1	Selecting subject of the project. Learning the hardware resources.	4
Proj 2	Discussion of the preliminary project requirements. Settlement of the intended project span and the time schedule of the work.	4
Proj 3-7	Designing the circuit at the system and logic level, its simulation, implementation and verification in hardware.	20
Proj 8	Discussion and evaluation of the project and its documentation.	2
	Total hours	30

TEACHING TOOLS USED

N1. Traditional lecture with a table and computer projector.
N2. Project classes.
N3. Consultations during contact hours.

N4. Individual student work – working on the project design.
N5. Individual student work – working on the project documentation.
N6. Individual student work – individual studies and preparations for the examination.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 – PEK_U02	Evaluations of the progress of the work on the project subject during the classes, final grades of the project and its documentation.
F2	PEK_W01 – PEK_W02	Written examination.
P = 0.4 * F1 + 0.6 * F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Łuba T., *Programowalne układy przetwarzania sygnałów i informacji*, WKŁ, Warszawa
[2] Documentation of the FPGA devices discussed in the lecture and used in the project classes, e.g. *Spartan-3 Generation FPGA User Guide*, http://www.xilinx.com/support/documentation/user_guides/ug331.pdf
[3] Documentation of the software used for management of the selected embedded platform, e.g. *Embedded System Tools Reference Manual (EDK)*, http://www.xilinx.com/support/documentation/sw_manuals/xilinx14_1/est_rm.pdf

SECONDARY LITERATURE:

[1] Salcic Z., Smailagi A., *Digital System Design and Prototyping Using Field Programmable Logic*, Kluwer Academic Publishers, Boston
[2] Chu P.P., *RTL hardware design using VHDL*, J.Wiley & Sons, Hobokon
[3] Majewski J., Zbysiński P., *Układy FPGA w przykładach*, Wyd. BTC, Warszawa

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Digital circuits and embedded systems 2

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Computer science**

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	K1INF_W34	C1	Lec 1-5	N1, N3, N6
PEK_W02	K1INF_W34	C2	Lec 6-8	N1, N3, N6
PEK_U01	K1INF_U38	C3	Proj 1-8	N2, N4, N5
PEK_U02	K1INF_U38	C3	Proj 1-8	N2, N4, N5

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish **Metody sztucznej inteligencji**
Name in English **Methods of artificial intelligence**
Main field of study (if applicable): **Computer science**
Specialization (if applicable):
Level and form of studies: **1st level, full-time**
Kind of subject: **optional**
Subject code **INEK021**
Group of courses **YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	15			
Number of hours of total student workload (CNPS)	30	60			
Form of crediting	crediting with grade	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	2	1			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W04, K1INF_W05, K1INF_W06, K1INF_W16, K1INF_U07, K1INF_U11

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SUBJECT OBJECTIVES

C1 Knowing some methods of artificial intelligence and its important meaning for practical applications of modern computer science
C2 Learn how to create algorithms for computer-aided decision making under uncertainty
C3 The acquisition of ability to use of evolutionary techniques to solving optimization problems

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 student knows the basic concepts of artificial intelligence in decision-making systems, including methods of knowledge representation and machine learning
PEK_W02 student knows the pattern recognition algorithms based on Bayesian model
PEK_W03 student knows selected classification algorithms with supervised learning
PEK_W04 student knows the basic concepts of fuzzy set theory
PEK_W05 student knows Mamdani and TSK fuzzy inference systems and their learning methods
PEK_W06 student knows the basic concepts of artificial neural networks
PEK_W07 student knows the basic models of artificial neurons and their methods of learning
PEK_W08 student knows the back propagation algorithm for learning of feed-forward neural network

PEK_W09 student knows the action of selected evolutionary methods
PEK_W10 student knows genetic algorithm scheme and procedures of its particular steps.
relating to skills:
PEK_U01 student is able to apply pattern recognition algorithms to solve the practical problem of classification and knows how to evaluate the quality of the solution
PEK_U02 student is able to apply the theory of fuzzy sets to the formal representation of uncertainty of linguistic type
PEK_U03 student is able to apply fuzzy inference method to solve the practical problem of decision-making and knows how to evaluate the quality of the solution
PEK_U04 student is able to apply artificial neural networks to solve a practical problem of decision-making and knows how to evaluate the quality of the solution
PEK_U05 student knows how to use a genetic algorithm to solve the optimization problem

relating to social competences:
PEK_K01 student is aware of the important meaning of non-standard methods of computer science in solving difficult problems of practical decision making
PEK_K02 student understands the need for self-education and continuous development of skills

PROGRAMME CONTENT

Form of classes - lecture		**Number of**
Lec 1	Artificial intelligence as a branch of computer science that provides methods and techniques for solving difficult problems of decision making	1
Lec 2	The paradigms of machine learning and the process of building decision making algorithms	1
Lec 3	Decision making under uncertainty of probabilistic type. The pattern recognition as a particular problem of decision-making	1
Lec 4	Probabilistic model of pattern recognition – the optimal Bayes classifier	3
Lec 5	Pattern recognition algorithms with supervised learning	2
Lec 6	The basic theory of fuzzy sets: a fuzzy set, membership function, operations, t (s) norm, fuzzy numbers, fuzzy relations, extension principle linguistic variable	2
Lec 7	Fuzzy rule as a formal representation of linguistic variable and linguistic rule	1
Lec 8	Mamdani fuzzy inference system	3
Lec 9	TSK fuzzy inference system	2
Lec 10	Learning procedures of Mamdani and TSK systems	2
Lec 11	Introduction to artificial neural networks - artificial neural network as a learning computing structure	1
Lec 12	Selected models of neurons (Perceptron, Adaline, sigmoidal neuron) and their learning algorithms	3
Lec 13	Feed-foreward neural network and back propagation algorithm	2
Lec 14	Fundamentals of evolutionary algorithms	1

Lec 15	A genetic algorithm with binary coding	3
Lec 16	Recapitulatory lecture	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1	Introduction - Overview of class program and requirements	1
Cl 2	Examples and problems concerning classification methods (classifying functions, decision regions, Bayes algorithms)	4
Cl 3	Examples and problems concerning theory of fuzzy set (operations on fuzzy sets, de Morgan principle, fuzzy numbers, t(s) norms)	2
Cl 4	Examples and problems concerning Mamdani fuzzy system – generating fuzzy rules from learning set	2
Cl 5	Examples and problems concerning TSK fuzzy system – generating fuzzy rules from learning set	2
Cl 6	Examples and problems concerning genetic algorithm	2
Cl 7	Recapitulatory class	2
	Total hours	**15**

TEACHING TOOLS USED

N1. Traditional lecture using multimedia techniques
N2. Class
N3. Consultation
N4. Individual work - preparation for classes and for the test

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 ÷ PEK_U05	Activity during classes
F2	PEK_W01 ÷ PEK_W15	Test result
P = 1/3 F1 + 2/3 F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] M. Kurzyński, Rozpoznawanie obiektów – metody statystyczne, Oficyna Wyd. Politechniki Wrocławskiej, Wrocław 1998
[2] M. Kurzyński, Metody sztucznej inteligencji dla inżynierów, Oficyna Wyd. PWSZ w Legnicy, Legnica 2008
[3] J.Łęski, Systemy neuronowo-rozmyte, PWN, Warszawa 2004
[4] M. Flasiński, Wstęp do sztucznej inteligencji, PWN, Warszawa 2011
[5] J. Koronacki, J.Ćwik, Statystyczne systemy uczące się, WNT, Warszawa 2005
[6] L. Rutkowski, Metody i techniki sztucznej inteligencji, PWN, Warszawa 2005

SECONDARY LITERATURE:

[1] K. Krawiec, J. Stefanowski, Uczenie maszynowe i sieci neuronowe, Wydawnictwo Pol. Poznańskiej, Poznań 2004
[2] M. Krzyśko, Systemy uczące się, WNT, Warszawa 2008
[3] Sieci Neuronowe, seria: Biocybernetyka i Inżynieria Biomedyczna, tom 6, Akademicka Oficyna Wydawnicza EXIT, Warszaw 2000
[4] K. Stąpor, Metody klasyfikacji obiektów w wizji komputerowej, PWN, Warszawa 2011
W. Sobczak, W. Malina, Metody selekcji i redukcji informacji, WNT, Warszawa 1988

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Methods of artificial intelligence

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

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	K1INF_W35	C1, C2	Lec1, Lec2, Lec3	N1, N3, N4
PEK_W02	K1INF_W35	C1, C2	Lec3, Lec4, Lec5	N1, N3, N4
PEK_W03	K1INF_W35	C1, C2	Lec5	N1, N3, N4
PEK_W04	K1INF_W35	C1, C2	Lec6, Lec7	N1, N3, N4
PEK_W05	K1INF_W35	C1, C2	Lec8, Lec9, Lec10	N1, N3, N4
PEK_W06	K1INF_W35	C1, C2	Lec11	N1, N3, N4
PEK_W07	K1INF_W35	C1, C2	Lec12	N1, N3, N4
PEK_W08	K1INF_W35	C1, C2	Lec13	N1, N3, N4
PEK_W09	K1INF_W35	C3, C2	Lec14	N1, N3, N4
PEK_W10	K1INF_W35	C3, C2	Lec15	N1, N3, N4
PEK_U01	K1INF_U39	C1, C2	Cl2	N2, N3, N4
PEK_U02	K1INF_W35	C1, C2	Cl3	N2, N3, N4
PEK_U03	K1INF_W35	C1, C2	Cl4, Cl5	N2, N3, N4
PEK_U04	K1INF_W35	C1, C2	Lec11, Lec12, Lec13	N1, N2, N3, N4
PEK_U05	K1INF_W35	C3, C2	Cl6	N2, N3, N4
PEK_K01	K1INF_K04	C1, C2, C3	Lec1 – Lec13 Cl1 – Cl6	N1, N2, N3, N4
PEK_K02	K1INF_K04	C1, C2, C3	Lec1 – Lec13 Cl1 – Cl6	N1, N2, N3, N4

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

*** - from table above

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Organizacja i architektura komputerów**
Name in English	**Computer Architecture and Organisation**
Main field of study	**Computer Science**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**optional**
Subject code	**INEK022**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30	15	
Number of hours of total student workload (CNPS)	50		65	65	
Form of crediting	Examination		Crediting with grade	Crediting with grade	
For group of courses mark (X) final course	X				
Number of ECTS points	**6**				
including number of ECTS points for practical (P) classes			4	2	
including number of ECTS points for direct teacher-student contact (BK) classes	1,5		2	1	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W20, Ki1INF_U18

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SUBJECT OBJECTIVES

C1. Gaining knowledge on principles of information processing in computers

C2. Gaining ability to design and run simple programs in asembly language

C3. Gaining knowledge on pipelining

C4. Gaining knowledge on acceleration mechanisms in information processing

C5. Gaining ability to design functional units of computer

C6. Gaining knowledge on aim and methods of memory management

C6. Gaining knowledge on principles and models of concurrent processing

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – knows the principles of computer operation, understands the concept of RISC

PEK_W02 – understands the principle of locality and knows about its application

PEK_W03 – knows the principles of program flow control, understands the idea of recursive functions

PEK_W04 – knows the concept of pipelining and understands the pipeline hazard problems

PEK_W05 – knows the idea of virtual memory space and virtual addressing

PEK_W06 – knows the aims and methods of memory management

PEK_W07 – understands the need for information protection and knows the methods for data security

PEK_W08 – knows the basic acceleration mechanisms of data processing

relating to skills:

PEK_U01 – can design recursive function and optimize the programs in assembly language

PEK_U02 – knows how to mix assembly and high level language written algorithms

PEK_U03 – can design elementary execution modules of a computer

PEK_U04 – can design programs for interrupt service, exception processing and I/O service

PEK_U05 – can check and verify program correctness

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Machine levels and machine languages, instruction set architecture (ISA)	2
Lec 2	Data representation and data types. Operations. Addressing modes.	2
Lec 3	Program flow control. Conditions and branching. Functions	2
Lec 4	Creating and running programs written in assembly language	2
Lec 5	Memory hierarchy and organization. Acceleration of memory access	2
Lec 6	Principle of locality. Caches – design and operation, cache consistency	2
Lec 7	Cache controllers, memory buffers	2
Lec 8	Process model of operating system, concurrent processing	2
Lec 9	Data protection, virtual memory space and memory management. Paging	2
Lec 10	External and internal interrupts, exception processing	2
Lec 11	Pipelined processing. Pipeline hazards	2
Lec 12	Tomasulo algorithm for massively parallel execution	2
Lec 13	Peripheral interfaces, busses, I/O service	2
Lec 14	Error-correcting and error-detecting codes	2
Lec 15	Reliability of computer and dependability of data processing	2
	Total hours	30

Form of classes - laboratory		**Number of hours**
Lab 1	Familiarizing with tools: compiler, linker, debugger, profiler.	2
Lab 2	Elementary program and data structures in machine-level programming	4
Lab 3	Design of functions and procedures, recursive functions	4
Lab 4	Combining programs written in C and assembly language	4
Lab 5	Floating point operations, processing of FP exceptions	4
Lab 6	Multimedia extensions in signal processing	4
Lab 7	Multitasking – system data structures, mode switching / or Cache observation and control	4
	Total hours	30

Form of classes – project		**Number of hours**
Proj 1	Formulating the design task	1

Proj 2	Completing source materials	2
Proj 3	Final definition of the task	1
Proj 4	Control of project progress and consultancy	10
Proj 5	Presentation of the result	1
	Total hours	15

TEACHING TOOLS USED
N1. Traditional lecture supported with multimedia tools
N2. Access to supporting materials
N3. Laboratory classes
N4. Control of project progress
N5. Consultancy
N6. Sef-education of the student

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_W08	Test of knowledge
F2	PEK_U01 ÷ PEK_U05	Supervising of laboratory classes
F3	PEK_U01 ÷ PEK_U05	Checking the progress of work on project
C = 0,4*F1 + 0,3*F2 + 0,3*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] STALLINGS W. Organizacja i architektura systemu komputerowego, WNT, Warszawa 2004 (wyd. 2).

[2] NULL L., LOBUR J., Struktura organizacyjna i architektura systemów komputerowych, Gliwice, Helion, 2004.

[3] BIERNAT J., Architektura komputerów, Wrocław, Oficyna Wydawnicza Politechniki Wrocławskiej, 2005 (wyd. 4).

SECONDARY LITERATURE:

[1] HENNESSY J.L., PATTERSON D.A., Computer Architecture. A Quantitative Approach, San Mateo CA, Morgan Kaufmann, 2007.

[2] PATTERSON D.A., HENNESSY J.L., Computer Architecture. Hardware-Software Interface, San Mateo CA, Morgan Kaufmann, 2008.

[3] SILBERSCHATZ A., PETERSON J.L., GALVIN P.B., Podstawy systemów operacyjnych, Warszawa, WNT, 1999.

Internet pages:

[1] http://www.zak.ict.pwr.wroc.pl/materialy/architektura

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Computer Architecture and Organisation
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science

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	K1INF_W21	C1,3,4	Lec1-Lec3	N1,N2,N5
PEK_W02	K1INF_W21	C4	Lec2,Lec5	N1,N2,N5
PEK_W03	K1INF_W21	C1,3	Lec1,Lec3,Lec4	N1,N2,N5
PEK_W04	K1INF_W21	C3	Lec12,Lec13	N1,N2,N5
PEK_W05	K1INF_W21	C6	Lec8-Lec10	N1,N2,N5
PEK_W06	K1INF_W21	C6,7	Lec6,Lec7	N1,N2,N5
PEK_W07	K1INF_W21	C6,7	Lec3,Lec15	N1,N2,N5
PEK_W08	K1INF_W21	C4	Lec3,Lec14	N1,N2,N5
PEK_U01	K1INF_U19	C1-C3	Lab1-Lab7	N2,N3,N5
PEK_U02	K1INF_U19	C1-C3	Lab1-Lab7	N2,N3,N5
PEK_U03	K1INF_U20	C4-C6	Proj2-Proj4	N2,N4,N5
PEK_U04	K1INF_U19	C1-C3	Lab1-Lab7	N2,N3,N5
PEK_U05	K1INF_U19	C1-C3	Lab1-Lab7	N2,N3,N5

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

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Arytmetyka komputerów**
Name in English	**Computer Arithmetic**
Main field of study	**Computer Science**
Specialization	
Level and form of studies:	**1st level, full-time**
Kind of subject:	**optional**
Subject code	**INEK023**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15	30			
Number of hours of total student workload (CNPS)	70	80			
Form of crediting	Crediting with grade	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		2,5			
including number of ECTS points for direct teacher-student contact (BK) classes	1	2,5			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W09, Ki1INF_U07, K1INF_U08
2. K1INF_W05, K1INF_U03

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SUBJECT OBJECTIVES

C1. Gaining of knowledge about radix-complement arithmetic

C2. Gaining of knowledge about standard floating-point arithmetic

C3. Gaining of knowledge about residual arithmetic

C4. Gaining of ability to design fast arithmetic circuits

C5. Gaining of ability to check the correctness of arithmetical operations

C6. Gaining of ability to design structures to realize elementary functions

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – knows the principles of positional and radix-complement arithmetic

PEK_W02 – knows the principles of floating-point arithmetic

PEK_W03 – knows the principles of arithmetic of residues

PEK_W04 – knows the fundamental structures of standard and fast arithmetic circuits

PEK_W05 – knows the algorithms and structures for elementary functions evaluation

relating to skills:

PEK_U01 – can realize the basic arithmetic operations in radix-complement representation

PEK_U02 – can realize the basic arithmetic operations in floating-point representation

PEK_U03 – can check the correctness of arithmetical operations

PEK_U04 – can design the logic structures of radix-complement and floating-point arithmetic units

PEK_U05 – can design the logic structures of residual adders, multipliers and converters

PEK_U06 – can design the data structures and arithmetic units for extended arithmetic

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Fundamentals of data processing in computers. Encoding of umbers: radix-complement, signed-digit, biased. Radix-complement addition and subtraction	3
Lec 2	Radix-conversion. Multi-operand addition, radix-complement multiplication	2
Lec 3	Radix-complement division, restoring vs non-restoring algorithm. Square root extraction. Acceleration of division and squar-root extraction	2
Lec 5	Architecture of arithmetic structures. Fast adders and multipliers.	2
Lec 6	IEEE754-2008 floating-point standard. The principles of floating-point arithmetic. Rounding, precision control. FP exceptions	2
Lec 7	Basic numerical algorithms. Evaluating of elementary functions. Precision control and extended range arithmetic.	2
Lec 4	Congruences, residue number systems. Chineese Remainder Theorem and its applications. Euclid's algorithm. Euler's theorem. Carmichael function	2
Lec 8	Summary and comments	1
	Total hours	15

	Form of classes - class	**Number of hours**
Cl 1	Number representations: radix-complement, signed-digit, biased.	2
Cl 2	Radix-complement addition and subtraction. problem of overflow	2
Cl 3	Radix-conversion in radix-complement representation	2
Cl 4	Multi-operand addition of in positional and radix-complement representation. Radix-complement multiplication. Booth-McSorley algorithm	2
Cl 5	Square root extraction	2
Cl 6	Radix-complement division, restoring vs non-restoring algorithm.	2
Cl 7	Architecture of arithmetic structures.	2
Cl 8	Fast adders, Parallel-Prefix Adders. Fast matrix and CSA-based multipliers	2
Cl 9	Emulation of algorithms of floating-point arithmetic. FP units	2
Cl 10	Rounding methods, precision control, exceptions	2
Cl 11	Basic numerical algorithms. Evaluating of elementary functions.	2
Cl 12	Precision control and extended range arithmetic.	2
Cl 13	Congruences, residue number systems. Euclid's algorithm. Inverses	2
Cl 14	Euler's and Carmichael's theorem. Chineese Remainder Theorem	2
Cl 15	Summary and comments	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture supported with multimedia tools
N2. Access to supporting materials
N3. Access to commented list of problems and excercises and solution support
N4. Classes excersises
N5. Consultancy
N6. Sef-education of the student

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	Test of knowledge
F2	PEK_U01 ÷ PEK_U07	Test of advances in knowledge perception
C = 0,5*F1 + 0,5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] BIERNAT J., Architektura układów arytmetyki resztowej, Warszawa, EXIT, 2007
[2] KOREN I., Computer Arithmetic Algorithms, A.K.Peters, Natick, MA, 2002 (wyd.1: Englewood Cliffs, NJ: Prentice Hall 1993)

SECONDARY LITERATURE:

[1] BIERNAT J., Metody i układy arytmetyki komputerowej, Wrocław, Oficyna Wydawnicza Politechniki Wrocławskiej, 2001
[2] BIERNAT J., Architektura komputerów, Wrocław, Oficyna Wydawnicza Politechniki Wrocławskiej, 2005 (wyd. 4).
[3] PARHAMI B., Computer Arithmetic. Algorithms and Hardware Designs, Oxford University Press, 2000
[4] WARREN H.S., Uczta programistów, Gliwice, Helion, 2003
Internet pages:
[1] http://www.zak.ict.pwr.wroc.pl/materialy/architektura

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Computer Arithmetic
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science

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	K1INF_W20	C1	Lec1-Lec3	N1,N2,N3,N5,N6
PEK_W02	K1INF_W20	C2	Lec5	N1,N2,N3,N5,N6
PEK_W03	K1INF_W20	C3	Lec4	N1,N2,N3,N5,N6
PEK_W04	K1INF_W20	C4	Lec6	N1,N2,N3,N5,N6
PEK_W05	K1INF_U18	C5,6	Lec7	N1,N2,N3,N5,N6
PEK_U01	K1INF_U18	C1	Cl1 – Cl6	N2,N3,N4,N5
PEK_U02	K1INF_U18	C5	Cl11,Cl12	N2,N3,N4,N5
PEK_U03	K1INF_U18	C6	Cl4-Cl6,Cl14	N2,N3,N4,N5
PEK_U04	K1INF_U18	C2	Cl9,Cl10	N2,N3,N4,N5
PEK_U05	K1INF_U18	C3	Cl7,Cl8	N2,N3,N4,N5
PEK_U06	K1INF_U18	C4	Cl13,Cl14	N2,N3,N4,N5

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

Zał. nr 4 do ZW 64/2012

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Informatyka medyczna 1**
Name in English	**Medical Informatics 1**
Main field of study (if applicable):	**Computer Science**
Specialization (if applicable):	**Applied Computer Engineering in Medicine**
Level and form of studies:	**1st* level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES101**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30				
Number of hours of total student workload (CNPS)	50				
Form of crediting	Examination				
For group of courses mark (X) final course	X				
Number of ECTS points	3				
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,5				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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SUBJECT OBJECTIVES

C1 Understanding the basic issues of the use of information systems in medical applications
C2 Learning about the methods of information processing in medical information systems

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01-Knows the basic functional requirements of medical information systems
PEK_W02-Has knowledgeable about specialized medical databases
PEK_W03-Knows the types of medical records and knows the structure and classification of medical data
PEK_W04-Knows methods and technology of medical data acquisition
PEK_W05-Knows medical signal processing algorithms
PEK_W06-Knows methods of information processing in medical imaging
PEK_W07-Has knowledge about algorithms for decision support in medicine
PEK_W08-Knows the basic structure of health systems, their advantages and disadvantages
PEK_W09- Has knowledge about medical information systems' modules

relating to competences:

PEK_U01 - Can produce functional assumptions for selected modules of medical information systems

PEK_U02 - Be able to construct algorithms for processing medical information
PEK_U03 - Be able to design a decision-making system for medical applications

relating to social competences:

PEK_K01-Understands the importance of information technology in practical applications
PEK_K02-Knows that the use of information technology brings economic, social and functional benefits

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Basic concepts of medical informatics (medical information, models, systems).	2
Lec 2	Information systems in medicine (objectives, requirements, tasks, examples)	2
Lec 3	Specialized databases in medicine	2
Lec 4	Medical Records	2
Lec 5	Classification systems, methods of coding of medical information	3
Lec 6	Acquisition of medical data	2
Lec 7	Algorithms for bio-signals analysis and interpretation	4
Lec 8	Algorithms for the analysis and interpretation of medical images	3
Lec 9	Computer systems for medical decision support	3
Lec 10	Artificial iIntelligence systems in medicine	3
Lec 11	The structure of medical information systems	2
Lec 12	Selected modules of information systems in medicine	2
	Total hours	30

Form of classes - seminar		Number of hours
Sem 1	Multimedia presentations (made by students) concerning the practical examples of the use of information systems in medicine. The Structure, function, user requirements, hardware configuration, software	15
	Total hours	15

TEACHING TOOLS USED

N1. lecture,
N2. multimedia presentation
N3. students' multimedia presentations
N4. discussion
N5.case study

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 – W09 PEK_K01 – W02	Examination
F2	PEK_U01 – U03	Rating of multimedia presentation (prepared by the student)
P = 0.8 F1 + 0.2F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Coiera Enrico, Guide to Medical Informatics, the Internet and Telemedicine, Arnold Edi., 1997.
[2] Kompendium Informatyki Medycznej, [red] P. Szczepaniak, M. Kurzyński, R. Zajdel, Alfa Medica Press, 2002
[3] Nałęcz M.[red], *Problemy Biocybernetyki i Inżynierii Biomedycznej*, tom V Informatyka Medyczna, WKiŁ, Warszawa 2000

SECONDARY LITERATURE:

[1] Wymagania Funkcjonalno-Użytkowe Oprogramowania Aplikacyjnego dla ZOZ. (Ruch Chorych, Apteka, Rachunek Kosztów Leczenia), wyd. MZiOS, Biuro Przekształceń Systemowych w Ochronie Zdrowia, Warszawa 1996
[2] Internet

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Medical Informatics 1

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION Applied Computer Engineering in Medicine

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01- PEK_W09	S1IMT_W01	C1, C2	Lec1-Lec12, Sem1	N1, N2
PEK_U01- PEK_U03	S1IMT_U01	C1,C2	Lec1-Lec12, Sem1	N3, N4, N5
PEK_K01 – PEK_K02	S1IMT_K01	C1	Sem1	N1

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Informatyka medyczna 2**
Name in English	**Medical Informatics 2**
Main field of study (if applicable):	**Computer Science**
Specialization (if applicable):	**Applied Computer Engineering in Medicine**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES102**
Group of courses	**NO**

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. S1IMT_W01, S1IMT_U01

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SUBJECT OBJECTIVES

C1 Learning methods of building applications in the field of information processing in medical information systems
C2 Presentation of functional and operational requirements of medical information systems
C3 Understanding procedures for the use of medical information systems

SUBJECT EDUCATIONAL EFFECTS

relating to skills:

PEK_U01 - knows determine the functional requirements of medical information systems
PEK_U02 - is able to design the basic functions of selected modules of medical information systems
PEK_U03 - is able to deploy computer applications in medicine

PROGRAMME CONTENT

Form of classes - project		Number of hours
Proj 1	Analysis of literature and online resources	4
Proj 2	User characteristics of implemented applications	2
Proj 3	Compilation of functional requirements for applications	4
Proj 4	Compilation of a computer program	8
Proj 5	Designing of user interface	4
Proj 6	Application testing	4
Proj 7	Compilation of conclusions	2
Proj 7	Compilation of report	2
	Total hours	30

TEACHING TOOLS USED

N1. discussion about the problem,
N2. Consultations,
N3. case study,
N4. analysis of existing solutions

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 – PEK_U03	Evaluation of the project with an evaluation of the presentation way
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Coiera Enrico, Guide to Medical Informatics, the Internet and Telemedicine, Arnold Edi., 1997.
[2] Kompendium Informatyki Medycznej, [red] P. Szczepaniak, M. Kurzyński, R. Zajdel, Alfa Medica Press, 2002
[3] Nałęcz M.[red], *Problemy Biocybernetyki i Inżynierii Biomedycznej*, tom V Informatyka Medyczna, WKiŁ, Warszawa 2000

SECONDARY LITERATURE:

[1] Wymagania Funkcjonalno-Użytkowe Oprogramowania Aplikacyjnego dla ZOZ. (Ruch Chorych, Apteka, Rachunek Kosztów Leczenia), wyd. MZiOS, Biuro Przekształceń Systemowych w Ochronie Zdrowia, Warszawa 1996
[2] Internet

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Medical Informatics 2

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION **Applied Computer Engineering in Medicine**

Subject educational effect	**Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)****	**Subject objectives*****	**Programme content*****	**Teaching tool number*****
PEK_U01	S1IMT_U02	C2	Proj1, Proj2, Proj3	N1, N2
PEK_U02	S1IMT_U02	C1,C2	Proj3 – Proj6	N3, N4
PEK_U03	S1IMT_U02	C3	Proj6 – Proj8	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 **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Cyfrowe przetwarzanie sygnałów i obrazów**
Name in English	**Digital signal and image processing**
Main field of study (if applicable)	**Computer Science**
Specialization (if applicable):	**Applied Computer Engineering in Medicine**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES103**
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		90		
Form of crediting	crediting with grade		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		3		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. relating to knowledge: K1INF_W01, K1INF_W02, K1INF_W03, K1INF_W04, K1_INF_W09, K1INF_W13, K1INF_W15, K1INF_W22, K1INF_W24

2. relating to skills: K1INF_U02, K1INF_U07, K1INF_U08, K1INF_U12, K1INF_U13,

3. relating to other competences: S1IMT_K01, S1IMT_K02

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SUBJECT OBJECTIVES

C1 . To be familiar with the methods of digital image processing and analysis of the information contained in the signals and digital images, especially in the field of medical informatics

C2. Learn how to implement computer systems for image and signal analysis with the use of open source software libraries

C3. Learn how to construct patterns of processing and analysis of images and signals to the problems encountered in health informatics

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01: knowledge on the basics of the 1 - and 2-dimensional signals (images) digital

PEK_W02: detailed knowledge on the elements of the model describing the digital image, i.e. the image sampling theory (2D FFT) color models (RGN, HSI, Lab), radiometric and geometric model

PEK_W03 : knowledge on the methods of linear filtering of signals and images used in medical informatics and their interpretation in the field of time- and frequency- based domain.

PEK_W04: knowledge on the the image pre-processing methods i.e. brightness and contrast modification, histogram equalization and uneven lighting removal.

PEK_W05 : knowledge on methods of non-linear image filtering

PEK_W06 : detailed knowledge on the methods of segmentation of digital images and their use for the selection and extraction of information useful in the analysis and interpretation of digital image.

relating to skills:

PEK_U01: to be able to apply the methods of linear filtering 1-2 D signals in the time-spatial frequency- based domain

PEK_U02 : to be able to construct algorithms for solving the problems encountered in the analysis and interpretation of images and signals in health informatics

PEK: U03: implementation of algorithms able to perform pre-processing, nonlinear filtering and segmentation of digital images

relating to social competences:

PEK_K01: know how to look at the functioning of computer systems for image processing and analysis and bio-signal processing used in medical science through awareness of the role played by science in modern medicine.

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Introduction - Overview of the theory of signals, determine the terms of : 1-2D signal and digital image, linear operator Discussion of the components of a mathematical model describing the digital image including : model sampling frequency (2D FFT), color models (RGB, HSI, Lab), radiometric and geometric model and statistical Discussion of ways to represent images and digital signals	3
Lec 2	Discussion of the methods of acquisition, filtering and analysis of bio-signals on the basis of ECG signal	3
Lec 3	Image pre-processing: the pixel-based transformations - correction of brightness and contrast of the image, image histogram modification method. Arithmetic operations on multiple images	2
Lec 4	Linear filtering of image and signal in the time-, spatial- and frequency-based domain	2
Lec 5	Linear and nonlinear image low-pass filtering. Image noise removing filters	4
Lec 6	Linear and nonlinear image high-pass filtering. Image sharpening and edge detection filters.	4

Lec 7	Morphological operators in digital image processing (erosion, dilation, opening, closing)	2
Lec 8	Image segmentation by thresholding and cluster analysis	2
Lec 9	Image segmentation by region growing	2
Lec 10	Methods for image segmentation by edge detection - detection of specific shapes in the image	2
Lec 11	Methods for labeling of binary objects, calculation of shape descriptors	2
Lec 12	Final test	2
	Total hours	30

Form of classes - laboratory		Number of hours
Lab 1	Get to know the available open source libraries for image processing and analysis in C #, C + +, Java (e.g. AForge, OpenCV, ImageJ). Trial implementation of application in C # or C + + using certain functions from the software libraries.	4
Lab 2	Test your own implementation of arithmetic operator on digital image content	2
Lab 3	Getting the selected open source library for ECG signal filtering and analysis. Test your own implementation of an application for detection of ECG features based on a library of open source software (e.g. EP limited)	4
Lab 4	Implementation of the selected image pre-processing algorithms such as global and local image histogram modification	2
Lab 5	The use of open source software (e.g. IPLab, ImageJ) for linear filter design to remove certain distortions in the frequency domain using the 2D Fourier transform	2
Lab 6	Implementation of selected non-linear filtering algorithms to remove noise in a digital image	2
Lab 7	The implementation of certain algorithms of image segmentation	6
Lab 8	The use of open source software (e.g. IPLab) to filter images using morphological operators	2
Lab 9	The implementation of specific patterns detection algorithms for single and multiple images (video stream) using software libraries of image analysis (e.g. AForge, OpenCV)	2
Lab 10	The team project	4
	Total hours	30

TEACHING TOOLS USED
N1. Lectures N2. The laboratory place having computer with Internet access N3. Stand-alone working

N4. Working in the team

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01, PEK_W02, PEK_W03, PEK_W04, PEK_W05, PEK_W06	Final Test
F2	PEK_U01 PEK_U02 PEK_U03 PEK_K01	Rating for problems resolved during laboratory form
P = 0.3*F1 + 0.7*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] [1] M. Sonka , V. Hlavac, R. Boyle – *Image Processing , Analysis and Machine Vision*
[2] R. Klette , P. Zamperoni – *Handbook of Image Processing Operators*
[3] *W*illis J. Tompkins Biomedical Digital Signal Processing
[4] R. Tadeusiewicz , P. Korohoda – *Komputerowa analiza i przetwarzanie Obrazów*

SECONDARY LITERATURE:

[1] J.*R. Parker – Algorithms for Image Processing and Computer Vision*
[2] *M. Petrou, P. Bosdogiani, Image Processing The Fundamentals*
[3] J. Serra *Mathematical morphology and image analysis*

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Digital signal and image processing

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION **Applied Computer Engineering in Medicine**

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)	S1IMT_W05	C1	Lec 1	N1
PEK_W02	S1IMT_W05	C1	Lec1	N1
PEK_W03	S1IMT_W05	C1	Lec2, Lec4, Lec5, Lec6	N1
PEK_W04	S1IMT_W05	C1	Lec3	N1
PEK_W05	S1IMT_W05	C1	Lec5, Lec6	N1
PEK_W06	S1IMT_W05	C1	Lec8,Lec9, Lec10,Lec11	N1
PEK_U01 (skills)	S1IMT_U10	C2,C3	Lab1, Lab5,Lab3	N2,N3
PEK_U02	S1IMT_U10	C2,C3	Lab3,Lab4,Lab6	N2,N3
PEK_U03	S1IMT_U10	C2	Lab2, Lab4,Lab6, Lab7, Lab9	N2,N3
PEK_K01 (competences)	S1IMT_K01	C2,C3	Lab10	N4

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Zarządzanie projektem informatycznym**
Name in English	**IT project management**
Main field of study (if applicable):	**Computer Science**
Specialization (if applicable):	**Applied Computer Engineering in Medicine**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES104**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				30
Number of hours of total student workload (CNPS)	60				60
Form of crediting	crediting with grade				crediting with grade
For group of courses mark (X) final course	X				
Number of ECTS points	**4**				
including number of ECTS points for practical (P) classes	-				2
including number of ECTS points for direct teacher-student contact (BK) classes	1				1,5

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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SUBJECT OBJECTIVES

C1 Acquisition of knowledge on project management.

C2 Acquisition of knowledge on user's requirement discovering.

C3. Acquisition of practical skills on writing the project's documentation.

C4. Acquisition of skills on choosing appropriate technics of project management process implementation.

C5. Acquisition of practical skills on searching and selecting knowledge required for the presentation.

C6 Acquisition of practical skills on preparing multimedia presentation illustrated own concepts and solutions related to team project.

C7 Acquisition of practical skills on creative discussion.

C8 Acquisition of practical skills on team work.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:

PEK_W01 The course results with a student's ability to describe and explain the main management processes and related documents.

PEK_W02 The course results with a student's ability to describe and explain the main techniques of the project scheduling and estimating. Students understand role of project life cycle.

PEK_W03 The course results with a student's ability to describe and explain the chosen methods of user's requirement acqusition and description, and the main documents related to the project.

PEK_W04 The course results with a student's ability to describe and explain team management rules.

relating to skills:

PEK_U01 The course results with a student's ability to criticize a proposed concept or solution

PEK_U02 The course results with a student's ability to argue own concepts and solutions

PEK_U03 The course results with a student's ability to prepare multimedia presentation on chosen project management techniques on the basis of the literature survey.

PEK_U04 The course results with a student's ability to prepare multimedia presentation on project concept and proposed solutions applied in the team project.

relating to social competences:

PEK_K01 The course results with a student's ability to work in the group on a given problem.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction, main definitions related to the project management	1
Lec 2	Project and product life cycle, management processes, integrated project management	1
Lec 3	Project planning	2
Lec 4	User's requirements discovering methods and techniques	2
Lec 5	Project estimating and scheduling	2
Lec 6	Risk management	2
Lec 7	Quality management	2
Lec 8	Team management	2
Lec 9	Project monitoring and final stages (project closing)	1
	Total hours	**15**

Form of classes - seminar		**Number of hours**
Sem 1	Introduction, seminar topic describing, seminar's rule presentation	2
Sem 2	Seminat topics and scope discussion	2
Sem 3	Presentation of team project's requirements and constrains	3
Sem 4	Presentation of team project's scopes	3
Sem 5	Presentation of team project's functional requirements	3
Sem 6	Methods of software testing	1
Sem 7	Methods of training	1
Sem 8	Presentation of team project's non-functional requirements	3
Sem 9	Presentation of the norms related to the software quality	1

Sem 10	House of quality – description on the basis of a chosen project	1
Sem 11	Presentation of team project's risk management concept	3
Sem 12	Parametric methods of project estimating - COCOMO	1
Sem 13	Parametric methods of project estimating - FPA	1
Sem 14	Presentation of team project's schedule and tasks' estimation	3
Sem 15	Portfolio management using MS Project	1
Sem 16	Review of the chosen project management softwares	1
	Total hours	**30**

TEACHING TOOLS USED

N1. Lecture with the multimedia presentation
N2. Lecture devoted to a problem
N3. Consultations
N4. Discussion
N5. Self-learning– preparing to lectures and seminars
N6. Multimedia presentation
N7. Discussion on a given problem
N8. Literature survey

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_W04	Test
F2	PEK_U01-PEK_U04, PEK_K01	Discussion and presentation
C=0.5F1+0.5F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Robertson S., Robertson J., *Mastering the Requirements Process*, Addison-Wesley, 2006.
[2] A Guide to Project Management Body of Knowledge (PMBOK Guide) 4th Ed.
[3] Davidson J., *Kierowanie projektem. Praktyczny poradnik dla tych, którzy nie lubią tracić czasu*, Wyd. Liber, Warszawa, 2002
[4] Philips J., *Zarządzanie projektami* IT, Helion Gliwice, 2005.

SECONDARY LITERATURE:

[1] Yourdon E., Współczesna *analiza stru*kturalna, WNT, Warszawa, 1996.
[2] Brooks, Jr.,F.P., *Mityczny osobomiesiąc – eseje o inżynierii oprogramowania*, WNT, Warszawa 2000.
[3] Yourdon E., Marsz ku klęsce. Poradnik dla projektanta systemów, WNT, Warszawa 1999.
[4] Bainey K.R., Integrated IT Project Management, Artech House, Boston, 2003.
[5] Jones C., Estimating *Software Costs*, McGraw Hill, New York 2007.

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

IT project management

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION **Applied Computer Engineering in Medicine**

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	S1IMT_W02, S1IMT_W07, K1INF_W29, K1INF_W39	C1-C3	Lec 1-Lec 9	N1-N5
PEK_W02	S1IMT_W02, S1IMT_W07	C1, C3	Lec 2, Lec 3, Lec 5	N1-N5
PEK_W03	S1IMT_W02, K1INF_W29	C2, C3	Lec 1, Lec 2, Lec 4	N1-N5
PEK_W04	S1IMT_W02, K1INF_W39	C1	Lec 1, Lec 2, Lec 5, Lec 8	N1-N5
PEK_U01	S1IMT_U03	C1, C2, C4, C7	Sem 3-Sem 16	N2-N8
PEK_U02	S1IMT_U03	C1-C4, C7	Sem 1-Sem 5, Sem 8, Sem 11, Sem 14	N2-N8
PEK_U03	S1IMT_U07, K1INF_U40, K1INF_U41	C1, C4, C5, C7, C8	Sem 2, Sem 6, Sem 7, Sem 9, Sem 10, Sem 12, Sem 13, Sem 15, Sem 16	N2-N8
PEK_U04	S1IMT_U03, S1IMT_U04	C1-C4, C6-C8	Sem 1-Sem 5, Sem 8, Sem 11, Sem 14	N2-N8
PEK_K01	S1IMT_K02, K1INF_K05	C8	Sem 8, Sem 11, Sem 14	N2-N8

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

*** - from table above

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Metody techniki systemów w medycynie 1**
Name in English	**Methods of systems engineering in medicine 1**
Main field of study (if applicable):	**Computer science**
Specialization (if applicable):	**Applied Computer Engineering in Medicine**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES105**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				15
Number of hours of total student workload (CNPS)	30				30
Form of crediting	crediting with grade				crediting with grade
For group of courses mark (X) final course	X				
Number of ECTS points	2				
including number of ECTS points for practical (P) classes					1
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. K1INF_W12, K1INF_U11

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SUBJECT OBJECTIVES

C1 Gaining basic knowledge of recognition algorithms with supervised and unsupervised learning, and the methods of feature selection and reduction

C2 Gaining knowledge of selected applications of computer systems in medicine

C3 Getting beliefs about universalism of system engineering methods and great usefulness of technical knowledge to solve problems in a wide variety of practical applications area.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 student knows the pattern recognition algorithms based on Bayesian model

PEK_W02 student knows selected heuristic classification algorithms with supervised learning

PEK_W03 student knows multiclassifier systems

PEK_W04 student knows fundamental methods of clustering and unsupervised learning

PEK_W05 student has knowledge of the basic methods of feature selection and reduction

PEK_W06 student knows the construction of pharmacokinetic compartment models

PEK_W07 student has knowledge of perfusion models and models of pharmacodynamics processes

relating to skills:

PEK_U01 student is able to obtain information related to the subject from various sources

(literature, data bases, Internet)
PEK_U02 student is able to prepare a presentation on the problem-oriented system or method in the field of systems engineering
PEK_U03 student can cooperate with members of the project team performing assigned task in a creative and responsible manner
PEK_U04 student can take part in discussion commenting and complementing presentation and questioning about the relevant details

relating to social competences:
PEK_K01 student is aware of the role that computer science plays in modern medicine, contributing significantly to the improvement of patient care
PEK_K02 student is aware of the rapid development of medical informatics – he knows, that creative work in the field of medical informatics requires continuous updating of knowledge
PEK_K03 student understands the need for teamwork

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction – tasks, methods and techniques of systems engineering	2
Lec 2	Compartmental modeling of pharmacokinetic process	2
Lec 3	Perfusion models. Modeling of pharmacodynamics process	2
Lec 4	Pattern recognition problem – fundamentals, cases, formal description and examples	2
Lec 5	Pattern recognition algorithms with supervised learning – examples of applications in medical diagnostics	2
Lec 6	Methods and algorithms of feature selection and reductions	2
Lec 7	Multiclassifier systems – methods of fusion and selection of base classifiers	2
Lec 8	Recapitulatory lecture	1
	Total hours	**15**

Form of classes - seminar		**Number of hours**
Sem 1	Organizational matters: distribution and discussion of topics of seminar presentations	1
Sem 2	Seminar presentation on multicompartment models and models of pharmacokinetic process	2
Sem 3	Seminar presentation on applications of classification algorithms to computer-aided medical diagnostics	2
Sem 4	Seminar presentation on fuzzy inference systems and their applications to medical diagnostics	2
Sem 5	Seminar presentation on decision tree classification methods and their applications to medical diagnostics	2
Sem 6	Seminar presentation on methods and algorithms of feature selection and reduction	2

Sem 7	Seminar presentation on unsupervised learning and methods of clustering and their applications to medical diagnostics	2
Sem 8	Seminar presentation on multiclassifier systems and their applications to medical diagnostics	2
	Total hours	**15**

TEACHING TOOLS USED

N1. Traditional lecture using multimedia techniques
N2. Seminar classes – multimedia presentation of seminar topics
N3. Seminar classes – active participation
N4. Consultations
N5. Individual work – preparation of seminar presentation
N6. Individual work - preparation for the test

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 ÷ PEK_U04	Seminar presentation – quality and activity
F2	PEK_W01 ÷ PEK_W07	Test results
P= 1/3F1 + 2/3F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Jakub Gutenbaum, Modelowanie matematyczne systemów, Omnitech Press, Warszawa 1996
[2] Marek Kurzyński, Rozpoznawanie obiektów – metody statystyczne, Oficyna Wyd. Politechniki Wrocławskiej, Wrocław 1998
[3] Stanisław Bielawski, Modele farmakokinetyczne, WKiŁ, Warszawa 1989
[4] J.Łęski, Systemy neuronowo-rozmyte, PWN, Warszawa 2004
[5] J. Koronacki, J.Ćwik, Statystyczne systemy uczące się, WNT, Warszawa 2005
[6] W. Sobczak, W. Malina, Metody selekcji i redukcji informacji, WNT, Warszawa 1988
[7] E. Tkacz, P. Borys, Bionika, WNT, Warszawa 2006

SECONDARY LITERATURE:

[1] Biocybernetyka i Inżynieria Biomedyczna, M Nałęcz [red.], tom 3 Sztuczne narządy, Akademicka Oficyna Wydawnicza EXIT, Warszawa 2001
[2] K. Krawiec, J. Stefanowski, Uczenie maszynowe i sieci neuronowe, Wydawnictwo Pol.Poznańskiej, Poznań 2004
[3] L. Kuncheva, Combining Pattern Classifiers, John Wiley Interscience 2004
[4] M. Krzyśko, Systemy uczące się, WNT, Warszawa 2008

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Methods of systems engineering in medicine 1

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer science

AND SPECIALIZATION **Applied Computer Engineering in Medicine**

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)	S1IMT_W03	C1, C2.1, C3	Lec1, Lec4, Sem3	N1 ÷ N6
PEK_W02	S1IMT_W03	C1, C2.1, C3	Lec5, Sem3, Sem5	N1 ÷ N6
PEK_W03	S1IMT_W03	C1, C2.1, C3	Lec7, Sem8, Sem5	N1 ÷ N6
PEK_W04	S1IMT_W03	C1, C2.1, C3	Lec4, Sem7	N1 ÷ N6
PEK_W05	S1IMT_W03	C1, C2.1, C3	Lec6, Sem6	N1 ÷ N6
PEK_W06	S1IMT_W03	C2.2, C3	Lec2, Sem2	N1 ÷ N6
PEK_W07	S1IMT_W03	C2.2, C3	Lec3, Sem2	N1 ÷ N6
PEK_U01 (skills)	S1IMT_U05	C1 ÷ C3	Sem1 ÷ Sem8	N2, N3, N4, N5
PEK_U02	S1IMT_U05	C1 ÷ C3	Sem1 ÷ Sem8	N2, N3, N4, N5
PEK_U03	S1IMT_U05	C1 ÷ C3	Sem1 ÷ Sem8	N2, N3, N4, N5
PEK_U04	S1IMT_U05	C1 ÷ C3	Sem1 ÷ Sem8	N2, N3, N4, N5
PEK_K01 (competence)	S1IMT_K01	C3	Lec1 ÷ Lec7 Sem1 ÷ Sem8	N1 ÷ N6
PEK_K02	S1IMT_K01	C1 ÷ C2	Lec1 ÷ Lec7 Sem1 ÷ Sem8	N1 ÷ N6
PEK_K03	S1IMT_K01	C1 ÷ C2	Sem1 ÷ Sem8	N2, N5

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Projekt zespołowy**
Name in English	**Team project**
Main field of study (if applicable):	**Computer Science**
Specialization (if applicable):	**Applied Computer Engineering in Medicine**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES106**
Group of courses	**NO**

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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SUBJECT OBJECTIVES

C.1 Acquisition of practical skills on project management.
C2. Acquisition of practical skills on planning, work decomposition, task allocation.
C3. Acquisition of practical skills on cost estimation and cost-effectiveness of the project.
C4. Acquisition of practical skills on team work.
C5. Acquisition of practical skills on writing the project's documentation.
C6. Acquisition of practical skills on using a project management software.

SUBJECT EDUCATIONAL EFFECTS

relating to skills:

PEK_U01 The course results with a student's ability to analyse user's requirements and present them in the standardized notation.
PEK_U02 The course results with a student's ability to apply appropriate tools to schedule and estimate the project. Students understand their role in project's monitoring.
PEK_U03 The course results with a student's ability to apply appropriate methods of risk's identification and monitoring, quality's identification and monitoring, and change management. Students understand their role and interactions among the processes.

PEK_U04 The course results with a student's ability to design an appropriate team structure, identify project's roles and create employment matrix.
PEK_U05 The course results with a student's ability to prepare the main documents related to project management.
PEK_U06 The course results with a student's ability to use project management software.

relating to social competences:
PEK_K01 The course results with a student's ability to understand team work rules during working on the technical project.
PEK_K02 The course results with a student's ability to understand that the members of the project team should identify with team goals, understand the soft team management methods, conflict solving techniques, and motivation techniques.

Form of classes - project		**Number of hours**
Proj 1	Introduction, project's rules, discussion of the exemplary project subjects.	2
Proj 2	Choosing project title, describing a project's scope, and preparing a document of initiating a project.	6
Proj 3	Identification of project's constrains, available resources, choosing an appropriate project life cycle.. Developing user's requirement using *Volere* Requirements Specification Template.	10
Proj 4	Preparing Work Breakdown Structure, project schedule, identification of the critical path, mile Stones. Preparing project schedule using a chosen software as MS Project.	8
Proj 5	Proposing project orgaznition chart, discusion the influence of the project on company organization, identification of the roles, developing i.a., employment matrix, responsibility matrix, and communication plan.	12
Proj 6	Identification, description, and quantitative analysis of the project risk using e.g., brainstorm technique. Preparing risk matrix.	8
Proj 7	Developing quality policies, objectives, and responsibilities. Using quality house to identify the project quality, developing quality assurance and management plan.	8
Proj 8	Developing deployment plan.	4
Proj 9	Developing documents reated to the final stages of the project (closing project) Discussion and conclusions.	2
	Total hours	**60**

TEACHING TOOLS USED

N1. Consultations
N2. Self work on the project
N3 Moderated and non-moderated discussion

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

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

concluding (at semester end)		
F1	PEK_U01-PEK_U06 PEK_K01-PEK_K02	Evaluation of the project parts and final report, discussion on project
C=F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Robertson S., Robertson J., *Mastering the Requirements Process*, Addison-Wesley, 2006.
[2] A Guide to Project Management Body of Knowledge (PMBOK Guide) 4th Ed.
[3] Davidson J., *Kierowanie projektem. Praktyczny poradnik dla tych, którzy nie lubią tracić czasu*, Wyd. Liber, Warszawa, 2002
[4] Philips J., *Zarządzanie projektami* IT, Helion Gliwice, 2005.

SECONDARY LITERATURE:

[1] Yourdon E., Współczesna *analiza stru*kturalna, WNT, Warszawa, 1996.
[2] Brooks, Jr.,F.P., *Mityczny osobomiesiąc – eseje o inżynierii oprogramowania*, WNT, Warszawa 2000.
[3] Yourdon E., Marsz ku klęsce. Poradnik dla projektanta systemów, WNT, Warszawa 1999.
[4] Bainey K.R., Integrated IT Project Management, Artech House, Boston, 2003.
[5] Jones C., Estimating *Software Costs*, McGraw Hill, New York 2007.

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Team project

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION **Applied Computer Engineering in Medicine**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01	S1IMT_U04	C5, C6	Proj 1-Proj 3	N1-N3
PEK_U02	S1IMT_U03, S1IMT_U04	C1-C3	Proj 4	N1-N3
PEK_U03	S1IMT_U03, S1IMT_U04	C1	Proj 6, Proj 7	N1-N3
PEK_U04	S1IMT_U03, S1IMT_U04	C1, C4	Proj 2, Proj 5	N1-N3
PEK_U05	S1IMT_U04	C5, C6	Proj 3-Proj 9	N1-N3
PEK_U06	S1IMT_U04	C6	Proj 3, Proj 4	N1-N3
PEK_K01	S1IMT_K02	C4	Proj 2, Proj 5	N1-N3
PEK_K02	S1IMT_K02	C4	Proj 2, Proj 5	N1-N3

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Seminarium dyplomowe**
Name in English	**Diploma seminar**
Main field of study (if applicable):	**Computer science**
Specialization (if applicable):	**Applied Computer Engineering in Medicine**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES110**
Group of courses	**NO**

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

SUBJECT OBJECTIVES

C1 Allowing students to present subsequent phases of the engineering project
C2 Familiarizing students with the requirements which diploma engineering project has to meet, form and structure of diploma thesis and the course of diploma exam.
C3 Acquisition of experience in the public presentation of the results of research work

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 student has current knowledge on development trends and the most important new developments in the field of computer systems in medicine
relating to skills:
PEK_U01 student can prepare presentation containing engineering aspect, objectives and, scope of the thesis project,
PEK_U02 student can prepare presentation containing the final results of work and justify findings and conclusions

PROGRAMME CONTENT

Form of classes - seminar		**Number of hours**
Sem 1	Introduction: information about crediting rules, set a schedule of seminar presentations, information about requirements which engineering diploma project has to fulfill	2
Sem 2 – Sem 5	The first seminar presentation containing engineering aspects,	8

	objectives, scope and origin of the thesis project	
Sem 6	Information about the form, layout, content and editorial principles of engineering thesis	2
Sem 7 – Sem 14	The second seminar presentation containing discussion of the results of the engineering diploma project	16
Sem 15	Summary of seminar presentation, information on diploma exam	2
	Total hours	30

TEACHING TOOLS USED

N1. The first seminar presentation
N2. The second seminar presentation
N3. Consultations with thesis supervisor
N4. Individual work – prepare seminar 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	PEK_W01 PEK_U01	The first seminar presentation – quality and activity
F2	PEK_W01 PEK_U02	The second seminar presentation – quality and activity
P = 0.5 F1 + 0.5 F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Literature recommended by the supervisor
[2] Hindle T., *Sztuka prezentacji.* Wydawnictwo Wiedza i Życie, Warszawa 2000
[3] Negrino T., *PowerPoint. Tworzenie prezentacji. Projekty,* Wydawnictwo HELION,Gliwice 2005
[4] Furmanek W., Zasady przygotowywania prac dyplomowych (licencjackich, inżynierskich oraz magisterskich), Rzeszów 2009
[5] Kozłowski R., Praktyczny sposób pisania prac dyplomowych, Warszawa 2009

SECONDARY LITERATURE:

[1] Literature of the area covered by the engineering thesis topic

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

Prof. Marek Kurzyński marek.kurzynski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Diploma seminar

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer science

AND SPECIALIZATION **Applied Computer Engineering in Medicine**

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)	S1IMT_W07	C1, C2, C3	Sem1 ÷ Sem15	N1, N2, N3, N4
PEK_U01 (skills)	S1IMT_U07	C1, C3	Sem2 ÷ Sem5	N1, N2, N3, N4
PEK_U02	S1IMT_U07	C1, C3	Sem7 ÷ Sem14	N1, N2, N3, N4

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

*** - from table above

FACULTY OF ELECTRONICS

SUBJECT CARD

Name in Polish:	**Hurtownie i eksploracja danych**
Name in English:	**Data warehouses and data mininig**
Main field of study (if applicable):	**Computer Science**
Specialization (if applicable):	**Applied Computer Engineering in Medicine**
Level and form of studies:	**1st* level, full-time**
Kind of subject:	**obligatory**
Subject code:	**INES113**
Group of courses:	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		15	15	
Number of hours of total student workload (CNPS)	30		30	30	
Form of crediting	Crediting with grade		Crediting with grade	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	1	
including number of ECTS points for direct teacher-student contact (BK) classes	1		1	1	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W25, K1INF_U25
2. K1INF_U26, K1INF_U27

SUBJECT OBJECTIVES

C1 Acquiring knowledge referring to creating analytic databases.
C2 Acquiring knowledge of data exploration methods and their utilization.
C3 Acquiring skills referring to analytic databases design and creation.
C4 Acquiring skills referring to the use of the selected database exploration algorithms.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge**:**

PEK_W01 – possesses knowledge of the stages in the process of knowledge discovery in databases
PEK_W02 – possesses knowledge of models and logical layers of data warehouses
PEK_W03 – possesses knowledge of the extraction, transformation and data loading processes
PEK_W04 – possesses knowledge of the selected data exploration algorithms

Relating to skills**:**

PEK_U01 – is able to create and implement a logical model of data warehouses in the selected environment
PEK_U02 – is able to model and implement the ETL process in the selected environment
PEK_U03 – is able to create analytical reports in the selected environment
PEK_U04 – is able to conduct a research experiment related to the use of data exploration algorithms

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec1	Organizational issues	1
Lec1	Stages of knowledge discovery in databases	1
Lec2	Development of database systems and the need for data warehouses existence	2
Lec3-4	Logical models of data warehouses	3
Lec4-5	The extraction, transformation and loading processes	3
Lec6	Analytical reporting in the selected environment	2
Lec7-8	Selected algorithms of data exploration	3
	Total hours	**15**

Form of classes - laboratory		**Number of hours**
Lab1	Organizational issues.	1
Lab1	Introduction to the multidimensional data analysis model.	1
Lab2	Creating a multidimensional data cube in the selected environment.	2
Lab3	Creating relational data warehouse model in the selected environment.	2
Lab4	Conducting the ETL process in the selected environment.	2
Lab5	Analytical reporting.	2
Lab6	Introduction to the selected environment for data exploration.	2
Lab7	Preparation of a plan of experiments.	1
Lab7-8	Conducting experiments for the selected data exploration algorithms and their parameters	2
	Total hours	**15**

Form of classes - project		**Number of hours**
Proj1	Organizational issues. Discussing the content of the project.	2
Proj2-3	Compilation of user requirements concerning knowledge discovery in databases for the selected example.	4
Proj4	Formulation of requirements concerning reporting services.	2
Proj5-6	Constructing a logical model of data warehouses	3
Proj6-	Designing the ETL process	2

7		
Proj7-8	Environment proposal for project implementation	2
	Total hours	**15**

TEACHING TOOLS USED
N1. An informative lecture with the use of a multimedia presentation. N2. A problem solving lecture with the use of a multimedia presentation. N3. Preparation of a laboratory class course in the form of a report. N4. Consultation classes. N5. Self-study- preparation for laboratory classes. N6. Self-study- preparation for a project. N7. Self-study- individual study and preparation for getting credits for a lecture. N8. Project presentation

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	S1IMT_W04	Oral tests, a written test
F2	S1IMT_U08	A report on laboratory activities
F3	S1IMT_U09	Evaluation of the project preparation, the defense of the project, participation in problem-solving discussions.
P = 1/3*F1 +1/3*F2 +1/3*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Pelikant A., Hurtownie danych. Od przetwarzania analitycznego do raportowania, Helion, Gliwice, 2011

[2] Todman C., Projektowanie hurtowni danych. Wspomaganie zarządzania relacjami z klientam, Helion, Gliwice 2011

[3] Jiawei H. i inni, Data mining : concepts and techniques, Morgan Kaufmann, Amsterdam, 2012

SECONDARY LITERATURE:

[1] Gorawski M., Zaawansowane hurtownie danych. Silesian University of Technology Press, Gliwice, 2009

[2] Mendrala D., Microsoft SQL Server: modelowanie i eksploracja danych, Helion, Gliwice, 2012

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

PhD Robert Burduk, robert.burduk@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Data warehouses and data mininig
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Applied Computer Engineering in Medicine

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	S1IMT_W04	C1	Lec1, Lec2, Lec6	N1, N2, N4, N7
PEK_W02	S1IMT_W04	C1	Lec3-4	N1, N2, N4, N7
PEK_W03	S1IMT_W04	C1	Lec4-5	N1, N2, N4, N7
PEK_W04	S1IMT_W04	C2	Lec7-8	N1, N2, N4, N7
PEK_U01	S1IMT_U09	C3	Lab1-3, Proj1-6	N3, N4, N5, N6, N8
PEK_U02	S1IMT_U09	C3	Lab4, Proj6-8	N3, N4, N5, N6, N8
PEK_U03	S1IMT_U09	C3	Lab5	N3, N4, N5
PEK_U04	S1IMT_U08	C4	Lab6-8	N3, N4, N5, N6, N8

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FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish **Metody techniki systemów w medycynie 2**
Name in English **Methods of systems engineering in medicine 2**
Main field of study (if applicable): **Computer science**
Specialization (if applicable): **Applied Computer Engineering in Medicine**
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code **INES114**
Group of courses **NO**

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. S1IMT_W03, S1IMT_U05

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SUBJECT OBJECTIVES

C1 Acquisition of skills at modeling of pharmacokinetic process and its application to drug delivery and identification of model parameters from experimental data
C2 Acquisition of experience in application of supervised classification algorithms to practical medical diagnosis problems and experimental evaluation of the effectiveness of the algorithm on real data

SUBJECT EDUCATIONAL EFFECTS

relating to skills:
PEK_U01 student is able to assess the suitability of features in the pattern recognition task
PEK_U02 student can practically apply the recognition algorithms for computer-aided medical diagnosis task
PEK_U03 student can evaluate the effectiveness of the classification algorithm in the task of medical diagnosis using real data
PEK_U04 student can built compartmental model of pharmacokinetic process
PEK_U05 student can apply pharmacokinetic model to determining drug concentration
PEK_U06 student can identify parametric compartmental model using experimental data
relating to social competences:
PEK_K01 student is aware of the role that computer science plays in modern medicine, contributing significantly to the improvement of patient care
PEK_K02 student understands the need for cooperation with other members of the project team performing assigned task in a creative and responsible manner

Form of classes - project		Number of hours
Proj 1	Organizational matters: distribution and discussion of topics of project tasks	2
Proj 2	Discussion of the project objectives and implementation steps	2
Proj 3	Implementation of projects	7
Proj 4	Presentations and discussions of the projects results	4
	Total hours	**15**

TEACHING TOOLS USED

N1. Consultations
N2. Individual work – implementation of the project and elaboration of the report

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U02, PEK_U04	Evaluating mathematical model and algorithms used in the project
F2	PEK_U02, PEK_U05	Evaluating the computer implementation of algorithms
F3	PEK_U01, PEK_U03, PEK_U06	Evaluating the results of experimental investigations and rightness of conclusion
P = 1/3 * F1 + 1/3 * F2 + 1/3 * F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Marek Kurzyński, Rozpoznawanie obiektów – metody statystyczne, Oficyna Wyd. Politechniki Wrocławskiej, Wrocław 1998
[2] Stanisław Bielawski, Modele farmakokinetyczne, WKiŁ, Warszawa 1989
[3] W. Sobczak, W. Malina, Metody selekcji i redukcji informacji, WNT, Warszawa 1988
[4] J. Ćwik, J. Mielniczuk, Statystyczne systemy uczące się. Ćwiczenia w oparciu o pakiet R, Oficyna Wyd. Pol. Warszawskiej, Warszawa 2009

SECONDARY LITERATURE:

[1] K. Krawiec, J. Stefanowski, Uczenie maszynowe i sieci neuronowe, Wydawnictwo Pol.Poznańskiej, Poznań 2004
[2] Biocybernetyka i Inżynieria Biomedyczna, M Nałęcz [red.], tom 3 Sztuczne narządy, Akademicka Oficyna Wydawnicza EXIT, Warszawa 2001

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

Prof. Marek Kurzyński, marek.kurzynski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Methods of systems engineering in medicine 2

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer science

AND SPECIALIZATION **Applied Computer Engineering in Medicine**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	S1IMT_U05	C2	Proj1 – Proj4	N1, N2
PEK_U02	S1IMT_U05	C2	Proj1 – Proj4	N1, N2
PEK_U03	S1IMT_U05	C2	Proj1 – Proj4	N1, N2
PEK_U04	S1IMT_U06	C1	Proj1 – Proj4	N1, N2
PEK_U05	S1IMT_U06	C1	Proj1 – Proj4	N1, N2
PEK_U06	S1IMT_U06	C1	Proj1 – Proj4	N1, N2
PEK_K01 (competence)	S1IMT_K01	C1, C2	Proj1 – Proj4	N1, N2
PEK_K02	S1IMT_K02	C1, C2	Proj1 – Proj4	N1, N2

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

*** - from table above

FACULTY OF ELECTRONICS

SUBJECT CARD

Nazwa w języku polskim:	**Projektowanie telemedycznych systemów internetowych i mobilnych**
Name in Polish:	**Telemedicine WEB and mobile system developement**
Main field of study (if applicable):	**Computer Science**
Specialization (if applicable):	**Applied Computer Engineering in Medicine**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code:	**INES115**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			15	
Number of hours of total student workload (CNPS)	30			60	
Form of crediting	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	-			2	
including number of ECTS points for direct teacher-student contact (BK) classes	1			1	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_U26, K1INF_U27
2. K1INF_W09, K1INF_U07, K1INF_U08

SUBJECT OBJECTIVES

C1 Knowledge acquisition on peculiarities of telemedicine applications
C2 Knowledge acquisition on selected techniques of application development with access to data on mobile devices such as smartphone, laptop
C3 Knowledge acquisition on selected techniques of Internet application development
C4 Gathering practical skills in development of integrated information systems
C5 Gathering practical skills in cooperation in project teams

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student has knowledge on peculiarities of telemedicine applications

PEK_W02 Student has knowledge on selected techniques of Internet or mobile application development

PEK_W03 Student has knowledge on rules of designing and development of integrated information systems

relating to skills:

PEK_U01 Student can work out project documentation of telemedicine system

PEK_U02 Student can develop mobile or Internet application with access to database and exchanging data between remote devices

PEK_U03 Student can cooperate in integration of compound information system

PEK_U04 Student can report work progress

relating to social competences:

PEK_K01 Student can cooperate in project team

PROGRAMME CONTENT

Form of classes – lecture		**Number of hours**
Lec 1	Peculiarities of telemedicine systems	3
Lec 2	Designing application forms and using server controls in Internet application with HTML, C# using ASP.NET in Visual Studio 2010	2
Lec 3	Master pages and CSS	2
Lec 4	Database access using C# in ASP.NET in Internet application, data exchange standards.	2
Lec 5	Architecture and application life cycle of Windows Phone 7 application	2
Lec 6	Designing pages for Windows Phone 7	2
Lec 7	Data management in Windows Phone 7, Access to database, , data exchange standards.	2
	Total hours	**15**

Form of classes - project		**Number of hours**
Proj 1	Selecting Project topic	1
Proj 2	Working out project and user requirements documentations	1
Proj 3	Designing database	1
Proj 4	Developing module of the system	8
Proj 5	Module integrations	2
Proj 6	Tests	1
Proj 7	Working out final documentation	1
	Total hours	**15**

TEACHING TOOLS USED

N1 Lecture with the multimedia presentation

N2 Lecture devoted to a problem

N3 Consultation

N4 Literatury study

N5 Own work on project

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	Final test
F2	PEK_U01 PEK_U02 PEK_U03 PEK_U04 PEK_U05	Assessment of work progress, and assessment of project documentation
P = 0,5*F1+0,5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Bill Evjen, ASP.NET 3.5 z wykorzystaniem C# i VB. Zaawansowane programowanie, Helion 2010

[2] Eugene Chuvyrov, Henry Lee , Windows Phone 7. Tworzenie efektownych aplikacji, Helion 2011

[3] Robert B. Dunaway , Visual Studio. NET, Mikom 2003

SECONDARY LITERATURE:

[1] Alexander I., Beus-Dukic L., Discovering Requirements, John Wiley, 2009

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

Dr inż. Konrad Jackowski, konrad.jackowski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Telemedicine WEB and mobile system developement

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION

Applied Computer Engineering in Medicine

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	S1IMT_W06 S1IMT_K01	C1	Lec 1	N1,N2
PEK_W02	S1IMT_W06	C4	Lec 2,Lec 3,Lec 4,Lec 5,Lec 6,Lec 7	N1,N2
PEK_W02	S1IMT_W06	C4	Lec 4, Lec 7	N1,N2
PEK_U01	S1IMT_U11	C4	Proj 1,Proj 2, Proj 7	N3,N4,N5
PEK_U02	S1IMT_U11	C2,C3,C4	Proj 3,Proj 4	N3,N4,N5
PEK_U03	S1IMT_U11	C4	Proj 5,Proj 6	N3,N4,N5
PEK_U04	S1IMT_U11	C5	Proj 7	N3,N4,N5
PEK_K01	S1IMT_U11	C5	Proj 1-Proj 7	N5

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FACULTY ELECTRONICS

SUBJECT CARD

Name in Polish: Projektowanie oprogramowania
Name in English Software development
Main field of study (if applicable): Informatics
Specialization: Information systems engineering (INS)
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: INES201
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)				30	
Number of hours of total student workload (CNPS)				90	
Form of crediting				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				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. K1INF_W09, K1INF_U07, K1INF_U08
2. K1INF_W9, K1INF_U33
3. K1INF_W28, K1INF_U31, K1INF_U32

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SUBJECT OBJECTIVES

C1. Gain the skill of work in a group of people using an agile software development method by practising in a project from the field of information systems.
C2. Learn the practical aspects of using the UML language in software projects.
C3. Master the rules and tools from the field of software testing.
C4. Master techniques and tools related to managing software projects: task management, source code versioning, continuous integration and preparing documentation (requirements, design, test scenarios…)

SUBJECT EDUCATIONAL EFFECTS

relating to skills:

PEK_U01 – can work in project team and understand the meaning of tasks and roles assigned to him/her.

PEK_U02 – uses agile software engineering methodology – Scrum.

PEK_U03 – can apply the project execution support software tools.

relating to social competences:

PEK_K01 – understands the impact of created code quality on further software development by other developers.

PEK_K02 – understands his/her responsibility for his/her tasks in context of entire software development process.

PROGRAMME CONTENT

Form of classes - project		Number of hours
Proj 1	Introduction, presentation of the project topic, toolset and schedule.	4
Proj 2	Planning (Sprint Planning Meetings according to the Scrum method).	3
Proj 3	Project designing and implementation during Sprints.	20
Proj 4	Presentation and discussion of results (Sprint Review and Retrospective Meetings according to the Scrum method)	3
	Total hours	30

TEACHING TOOLS USED

N1. Principles of agile software development.
N2. Consultations and reporting of the progress of work.
N3. Literature studies in the scope of project topic and 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 - PEK_U03 PEK_K01 - PEK_K02	Assessment of the project (assessment of the quality of the created product, source code, documentation, and the pace of project implementation)
P = F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] M. Fowler, UML w kropelce, Wersja 2.0, LTP, 2005.
[2] S. Wrycza, Język UML 2.0 w modelowaniu systemów informatycznych, Helion, 2005.
[3] J. Górski, Inżynieria oprogramowania w projekcie informatycznym, Mikom, 1999.
[4] K . Schwaber, Agile project management with Scrum, Microsoft Press, 2004.
[5] A. Hunt, JUnit: Pragmatyczne testy jednostkowe w javie, Helion 2006.
[6] R. Mugridge, W. Cunningham, Fit for Developing Software: Framework for integrated Tests, Prentice Hall, 2005.
[7] R.C. Martin, Czysty kod, Helion, 2010.

SECONDARY LITERATURE:

[1] M. Śmiałek, Zrozumieć UML 2.0, Metody modelowania obiektowego, Helion, 2005.

[2] K. Beck, C. Andres C., Wydajne programowanie: Extreme programming, Mikom, 2005.
[3] K. Beck, TDD by example, Addison-Wesley 2002.
[4] M. Fowler, Architektura systemów zarządzania przedsiębiorstwem. Wzorce projektowe, Helion, 2005
[5] M. Fowler, K. Beck, J. Brant, W. Opdyke, D. Roberts, Refaktoryzacja, Wydawnictwo Naukowo-Techniczne 2006.

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

Jan Magott, jan.magott@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT **Software development** AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics** AND SPECIALIZATION **Information systems engineering**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)	Subject objectives	Programme content	Teaching tool number
PEK_U01	S1INS_U01	C1, C4	Proj 1 – Proj 4	N1 – N3
PEK_U02	S1INS_U01	C1, C3	Proj 1 – Proj 4	N1 – N3
PEK_U03	S1INS_U01	C2, C3, C4	Proj 1 – Proj 4	N1 – N3
PEK_K01	S1INS_K01	C1 – C4	Proj 1 – Proj 4	N1 – N3
PEK_K02	S1INS_K01	C1	Proj 1 – Proj 4	N1 – N3

Zał. nr 4 do ZW 64/2012

FACULTY OF ELECTRONICS / DEPARTMENT……

SUBJECT CARD

Name in Polish Administrowanie sieciowymi systemami operacyjnymi
Name in English Managing of the network operating systems
Main field of study (if applicable): Computer Science
Specialization (if applicable): Data Processing Systems Engineering (INS)
Level and form of studies: 1st/ ~~2nd~~* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INES202
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)	30		90		
Form of crediting	~~Examination~~ / crediting with grade*		~~Examination~~ / crediting with grade*		
For group of courses mark (X) final course					
Number of ECTS points	1		3		
including number of ECTS points for practical (P) classes			3		
including number of ECTS points for direct teacher-student contact (BK) classes	1		3		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge on computer networks.
2. Basic knowledge on computer operating systems.

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SUBJECT OBJECTIVES

C1 Acquisition of knowledge and skills in structure and working principle of selected network operating systems.
C2. Acquisition of knowledge and skills in installing, configuring and administration of the network operating systems.
C3. Acquisition of knowledge on the structure of the applications supporting the network operating systems managing.
C4. Acquisition and consolidation of the skills in searching information in the scientific literature and using documentation of IT tools.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 - student knows the characteristics of the network operating systems.
PEK_W02 - student knows the roles and responsibilities of the administrator of the network operating systems.
PEK_W03 - student knows the structure and the working principle of selected network operating systems.
PEK_W04 - student is familiar with the installation process and the possibility of configuring and administration of selected network operating systems.

PEK_W05 - student knows the problems that may occur during the managing of the network operating systems.
PEK_W06 - student knows applications supporting the network operating systems managing.

relating to skills:
PEK_U01 - student can install selected network operating systems.
PEK_U02 - student can configure selected network operating systems.
PEK_U03 - student can perform common administrative tasks in selected network operating systems.
PEK_U04 - student can prevent, detect and fix basic problems arising during the administration of the network operating systems.

relating to social competences:
PEK_K01 - student is aware of importance of information searching skills and their critical analysis.
PEK_K02 - student understands the need of self-education and developing the ability to apply his knowledge and skills alone.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Organizational matters - program, requirements, literature. Introduction to the course.	2
Lec 2	Characteristics of the network operating system.	2
Lec 3	Examples of the network operating systems.	2
Lec 4	Characteristics of the basic problems arising in network computer systems and methods of solving them.	2
Lec 5	Network hardware - features, installation, configuration, maintenance.	2
Lec 6	Network Services - characteristics, configuration, maintenance.	2
Lec 7	Network protocols.	2
Lec 8	TCP/IP stack of protocols - characteristics, configuration, modification and development capabilities.	2
Lec 9	Installation and configuration of the network operating system.	2
Lec 10	Multiuser - user accounts.	2
Lec 11	Data protection and security - file system, user permissions, shared resources (files, folders, printers).	2
Lec 12	Supervising the work of users, maintenance of the system. The tasks and responsibilities of the administrator.	2
Lec 13	Applications supporting the security and management of the network operating systems.	2
Lec 14	Examples of network applications - features, operating and configuration.	2
Lec 15	Final test.	2
	Total hours	30

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

Lab 1	Organizational matters - program of the laboratory, requirements, etc. Introduction to the workplace, available software, etc.	2
Lab 2,3	Installation and configuration of the network operating system.	4
Lab 4	Setting up the server (domain controller).	2
Lab 5	Adding a second (backup) server (second controller in a domain).	2
Lab 6	Creating and managing user accounts.	2
Lab 7	Creating roaming user profiles.	2
Lab 8	Sharing of the resources.	2
Lab 9	Managing user permissions to the resources.	2
Lab 10	Supervising the work of users (auditing, effective permissions, taking permissions, etc.).	2
Lab 11	Managing of the data encryption and compression in the network operating systems.	2
Lab 12	Advanced management of the network operating systems (group policy).	2
Lab 13	Remote management of the network operating systems.	2
Lab 14	Management of the network services.	2
Lab 15	Review of applications supporting management of the network operating systems.	2
	Total hours	30

TEACHING TOOLS USED

N1. Traditional lecture with multimedia presentation.
N2. Laboratory exercises.
N3. Consultations.
N4. Self-study – preparation for laboratory.
N5. Self-study – preparation for the final test.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 ÷ PEK_U04 PEK_K01 ÷ PEK_K02	Verbal answers, observation of executing of the exercises, written reports on executed exercises.
F2	PEK_W01 ÷ PEK_W06	Written test
C = 0,7*F1 + 0,3*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] A. Silberschatz, J.L. Peterson, G. Gagne, „Podstawy systemów operacyjnych”, WNT, Warszawa 2005.
[2] W. Stallings, „Systemy operacyjne”, Robomatic, Wrocław 2004.
[3] M. Sportack, „Sieci komputerowe. Księga eksperta”, Helion, 1999.

SECONDARY LITERATURE:

[1] A.S. Tanenbaum, “Modern Operating Systems”, Prentice-Hall Inc., 2001.
[2] G. Nutt, “Operating Systems. A Modern Perspective”, Addison Wesley Longman, Inc., 2002.
[3] K. Krysiak, „Sieci komputerowe. Kompendium”, Helion, 2005.
[4] K.S. Siyan, T. Parker, „TCP/IP. Księga eksperta”, Helion, 2002.

Technical documentation of operating systems (e.g., TechNet knowledge base of Microsoft) and other applications.

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Managing of the network operating systems

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION Data Processing Systems Engineering (INS)

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)	S1INS_W01	C1	Lec2, Lec3	N1, N3, N5
PEK_W02	S1INS_W01	C2	Lec4, Lec12	N1, N3, N5
PEK_W03	S1INS_W01	C1	Lec2, Lec3	N1, N3, N5
PEK_W04	S1INS_W01	C2	Lec2, Lec3, Lec9	N1,N2,N3,N4,N5
PEK_W05	S1INS_W01	C1, C2	Lec4	N1, N3, N5
PEK_W06	S1INS_W01	C3	Lec13, Lec14	N1, N3, N5
PEK_U01 (skills)	S2INS_U02	C1, C2	Lab2, Lab3	N1,N2,N3,N4,N5
PEK_U02	S2INS_U02	C1, C2	Lab2,…,Lab5	N1,N2,N3,N4,N5
PEK_U03	S2INS_U02	C1, C2	Lab6,…,Lab14	N1,N2,N3,N4,N5
PEK_U04	S2INS_U02	C1, C2	Lab2,…,Lab15	N1,N2,N3,N4,N5
PEK_K01 (competences) PEK_K02	K1_K04	C4	Lec1,…,Lec15, Lab1,…,Lab15	N1,N2,N3,N4,N5

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF ELECTRONICS / DEPARTMENT……

SUBJECT CARD

Name in Polish Zarządzanie w systemach i sieciach komputerowych
Name in English Management in computer systems and networks
Main field of study (if applicable): Computer Science
Specialization (if applicable): Data Processing Systems Engineering (INS)
Level and form of studies: 1st/ ~~2nd~~* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INES203
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			60	
Form of crediting	Examination / ~~crediting with grade~~*			~~Examination~~ / crediting with grade*	
For group of courses mark (X) final course					
Number of ECTS points	3			2	
including number of ECTS points for practical (P) classes				2	
including number of ECTS points for direct teacher-student contact (BK) classes	3				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge on mathematical analysis and discrete mathematics.
2. Basic knowledge on computational complexity theory.
3. Basic knowledge and skills in using exact and heuristic algorithmic techniques for solving combinatorial problems.
4. Programming skills in a higher level language.

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SUBJECT OBJECTIVES

C1 Acquisition of knowledge about problems arising in the management of computer systems and networks.
C2. Acquisition of knowledge about methods and techniques used to solve problems arising in the management of computer systems and networks.
C3. Acquisition skills in describing and diagnosing problems arising in the management of computer systems and networks.
C4. Acquisition skills in applying appropriate methods and techniques for solving problems arising in the management of computer systems and networks.
C5. Acquisition and consolidation of the skills in searching information in the scientific literature and using documentation of IT tools

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 - student knows the problems arising in the management of computer systems and networks.

PEK_W02 - student knows algorithms of resource management in computer systems and networks.

PEK_W03 - student knows on-line problems arising in computer systems and networks.

PEK_W04 - student knows algorithms solving the on-line problems.

PEK_W05 - student knows techniques and methods of constructing parallel algorithms.

PEK_W06 - student knows problems of load balancing in computer systems and networks.

PEK_W07 - student knows techniques and methods of load balancing in computer systems and networks.

PEK_W08 - student knows issues concerning the deadlock problem in computer systems and networks.

relating to skills:

PEK_U01 - student is able to classify and characterize the problems of resource management in computer systems and networks.

PEK_U02 - student can construct, implement and apply selected resource management algorithms in computer systems and networks.

PEK_U03 - student is able to identify and describe parallel processing problems arising in computer systems and networks.

PEK_U04 - student can implement and apply selected techniques and methods of parallel computations.

PEK_U05 - student can construct and apply selected techniques and methods of load balancing in computer systems and networks.

PEK_U06 - student is able to describe and diagnose the deadlock problem in computer systems and networks.

PEK_U07 - student can use appropriate methods to prevent, avoid, detect and recover deadlock in computer systems and networks.

relating to social competences:

PEK_K01 - student is aware of importance of information searching skills and their critical analysis.

PEK_K02 - student understands the need of self-education and developing the ability to apply his knowledge and skills alone.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Organizational matters - program, requirements, literature. Introduction to the course.	2
Lec 2	Classification and characteristics of the problems arising in the resource management of computer systems and networks.	2
Lec 3,4	Detailed description of selected resource allocation problems arising in computer systems and networks.	4
Lec 5,6	On-line algorithms in computer systems and networks.	4
Lec 7	Parallel processing in computer systems and networks.	2
Lec 8	Techniques and methods of constructing parallel algorithms.	2

Lec 9	Methods of analysis of parallel algorithms.	2
Lec 10	Load balancing in computer systems and networks.	2
Lec 11	Techniques and methods of load balancing.	2
Lec 12	Deadlock in computer systems and networks.	2
Lec 13	Methods of preventing, avoiding, detection and recovering deadlocks in computer systems and networks.	2
Lec 14	QoS services and other phenomena occurring in computer systems and networks.	2
Lec 15	Summary of the presented material.	2
	Total hours	30

Form of classes - project		**Number of hours**
Proj 1	Organizational matters - program, requirements, etc.	2
Proj 2	Detailed description of project tasks.	2
Proj 3,4	Utilization of combinatorial optimization problems to model IT processes.	4
Proj 5,6	Implementation and analysis of the effectiveness of selected on-line algorithms.	4
Proj 7,8	Implementation and analysis of the effectiveness of load balancing algorithms.	4
Proj 9,10	Implementation and analysis of effectiveness of deadlock detection algorithms in computer systems.	4
Proj 11,12	Implementation and analysis of effectiveness of deadlock detection algorithms in computer networks.	4
Proj 13,14	Implementation and analysis of effectiveness of buffer management algorithms in QoS switches.	4
Proj 15	Summary and credit.	2
	Total hours	30

TEACHING TOOLS USED
N1. Traditional lecture with multimedia presentation. N2. Consultations. N3. Self-study – independent execution of project tasks. N4. Self-study – preparation for the final test.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 ÷ PEK_U07 PEK_K01 ÷ PEK_K02	Verbal answers, consultations, written reports on executed project tasks.
F2	PEK_W01 ÷ PEK_W07	Written exam
C = 0,6*F1 + 0,4*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J. Błażewicz, „Problemy optymalizacji kombinatorycznej”, PWN, Warszawa 1996.
[2] A. Janiak (Ed.), „Scheduling in computer and manufacturing systems”, WKŁ, Warszawa 2006.
[3] A. Janiak, „Wybrane problemy i algorytmy szeregowania zadań i rozdziału zasobów”, Akademicka Oficyna Wydawnicza PLJ, Warszawa 1999.
[4] A. Borodin, R. El-Yaniv, “Online Computation and Competitive Analysis”, Cambridge University Press, 1998.
[5] A. Karbowski, E. Niewiadomska-Szynkiewicz (Red.), „Programowanie równoległe i rozproszone”, Oficyna Wydawnicza Politechniki Warszawskiej, 2009.
[6] Z. Czech, „Wprowadzenie do obliczeń równoległych”, Wyd. Naukowe PWN, 2010.
[7] A. Silberschatz, J.L. Peterson, G. Gagne, „Podstawy systemów operacyjnych”, WNT, Warszawa 2005.
[8] W. Stallings, „Systemy operacyjne”, Robomatic, Wrocław 2004.
[9] A.S. Tanenbaum, “Modern Operating Systems”, Prentice-Hall Inc., 2001.

SECONDARY LITERATURE:

[1] C. Jiang, „Stream Data Processing: A Quality of Service Perspective”, Springer 2009.
[2] R. Wyrzykowski, „Klastry komputerów PC i architektury wielordzeniowe: budowa i wykorzystanie”, Akademicka Oficyna Wydawnicza EXIT, 2006.
[3] G. Nutt, “Operating Systems. A Modern Perspective”, Addison Wesley Longman, Inc., 2002.

Journals: European Journal of Operational Research, Annals of Operations Research, IEEE Trans. Systems, Man and Cybernetics, Part A, etc.

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Management in computer systems and networks

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION Data Processing Systems Engineering (INS)

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	S1INS_W02	C1, C2	Lec2,…, Lec4	N1,N2,N4
PEK_W03, PEK_W04	S1INS_W02	C1, C2	Lec5, Lec6	N1,N2,N3,N4
PEK_W05	S1INS_W02	C1, C2	Lec7,…, Lec9	N1,N2,N4
PEK_W06, PEK_W07	S1INS_W02	C1, C2	Lec10, Lec11	N1,N2,N3,N4
PEK_W08	S1INS_W02	C1, C2	Lec12, Lec13	N1,N2,N3,N4
PEK_U01 (skills)	S1INS_U03	C3	Pr2,…,Pr14	N1,N2,N3,N4
PEK_U02	S1INS_U03	C3, C4	Pr3, Pr4	N1,N2,N3,N4
PEK_U03, PEK_U04	S1INS_U03	C3, C4	Pr3, Pr4	N1,N2,N3,N4
PEK_U05	S1INS_U03	C3, C4	Pr3, Pr4, Pr7, Pr8	N1,N2,N3,N4
PEK_U06, PEK_U07	S1INS_U03	C3, C4	Pr9,…, Pr12	N1,N2,N3,N4
PEK_K01 (competences) PEK_K02	K1_K04	C5	Lec1,…,Lec15, Pr1,…,Pr15	N1,N2,N3,N4

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

*** - from table above

FACULTY OF ELECTRONICS / DEPARTMENT……

SUBJECT CARD

Name in Polish Bezpieczeństwo usług i systemów informatycznych 1
Name in English Security of the informatics systems and services (1)
Main field of study (if applicable): Computer Science
Specialization (if applicable): Data Processing Systems Engineering (INS)
Level and form of studies: 1st/ ~~2nd~~* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INES204
Group of courses ~~YES~~ / NO*

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge on computer networks.
2. Basic knowledge on computer operating systems.

\

SUBJECT OBJECTIVES

C1 Acquisition of the basic knowledge on security in the computer systems and networks and on cryptography.
C2. Acquisition and consolidation of the skills in searching information in the scientific literature and using documentation of IT tools.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 - student knows sources of computer attacks.
PEK_W02 - student knows protection methods of operating systems and networks from computer attacks.
PEK_W03 - student knows the basics of cryptography.

relating to social competences:
PEK_K01 - student is aware of the importance of legal protection of data stored in computer systems.
PEK_K02 - student understands the need for legal protection of stored data and know the consequences of inadequate performance of this obligation.
PEK_K03 - student is aware of importance of information searching skills and their critical

analysis.
PEK_K04 - student understands the need of self-education and developing the ability to apply his knowledge and skills alone.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Organizational matters - program, requirements, literature. Introduction to the course.	2
Lec 2	Source of attacks against computer systems.	2
Lec 3	Viruses, Trojan horses, worms, etc.	2
Lec 4	Safe programming.	2
Lec 5	User accounts, groups, access rights.	2
Lec 6	Memory and file protection.	2
Lec 7	Tasks and responsibilities of the system administrator.	2
Lec 8	Firewall systems.	2
Lec 9	Port scanning and active methods of examination of the network.	2
Lec 10	Security of wireless networks.	2
Lec 11	Basics of cryptography.	2
Lec 12	Encrypted data transmission (SSL protocol).	2
Lec 13	Security of e-mail and WWW.	2
Lec 14	Updating of operating systems and applications.	1
Lec 14	Legal aspects of security of the IT systems and services.	1
Lec 15	Final test.	2
	Total hours	30

TEACHING TOOLS USED

N1. Traditional lecture with multimedia presentation.
N2. Consultations.
N3. Self-study – preparation for the final test.

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_K01 ÷ PEK_K04	Verbal answers, consultations.
F2	PEK_W01 ÷ PEK_W03	Written test

C = F2

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J. Stokłosa, T. Bilski, T. Pankowski, „Bezpieczeństwo danych w systemach informatycznych”, PWN, 2001.
[2] S. Garfinkel, G. Spafford, „Bezpieczeństwo w Unixie i Internecie”, Wyd. RM, 1997.
[3] W.R. Cheswick, „Firewalle i bezpieczeństwo w sieci”, Helion, 2003.
[4] N. Ferguson, B. Schneier, „Kryptografia w praktyce”, Helion, 2004.
[5] A. Silberschatz, J.L. Peterson, G. Gagne, „Podstawy systemów operacyjnych”, WNT, Warszawa 2005.
[6] W. Stallings, „Systemy operacyjne”, Robomatic, Wrocław 2004.
[7] M. Sportack, „Sieci komputerowe. Księga eksperta”, Helion, 1999.

SECONDARY LITERATURE:

[1] S. Garfinkel, G. Spafford, „WWW. Bezpieczeństwo i handel”, Helion, 1999.
[2] A.S. Tanenbaum, “Modern Operating Systems”, Prentice-Hall Inc., 2001.
[3] G. Nutt, “Operating Systems. A Modern Perspective”, Addison Wesley Longman, Inc., 2002.
[4] K. Krysiak, „Sieci komputerowe. Kompendium”, Helion, 2005.
[5] K.S. Siyan, T. Parker, „TCP/IP. Księga eksperta”, Helion, 2002.

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Security of the informatics systems and services (1)

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION Data Processing Systems Engineering (INS)

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)	S1INS_W03	C1	Lec2,…, Lec4, Lec10	N1, N2, N3
PEK_W02	S1INS_W03	C1	Lec4,…, Lec6, Lec8,…,Lec10, Lec12,….,Lec14	N1, N2, N3
PEK_W03	S1INS_W03	C1	Lec11	N1, N2, N3
PEK_K01 (competences) PEK_K02	K1_K04	C1	Lec7,Lec14	N1, N2, N3
PEK_K03, PEK_K04	K1_K04	C2	Lec1,…,Lec15	N1, N2, N3

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

*** - from table above

FACULTY OF ELECTRONICS / DEPARTMENT……

SUBJECT CARD

Name in Polish Bezpieczeństwo usług i systemów informatycznych 2
Name in English Security of the informatics systems and services (2)
Main field of study (if applicable): Computer Science
Specialization (if applicable): Data Processing Systems Engineering (INS)
Level and form of studies: 1st/ ~~2nd~~* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INES205
Group of courses ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)			30		
Number of hours of total student workload (CNPS)			60		
Form of crediting			~~Examination~~ / crediting with grade*		
For group of courses mark (X) final course					
Number of ECTS points			2		
including number of ECTS points for practical (P) classes			0		
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. Basic knowledge on computer networks.
2. Basic knowledge on computer operating systems.
3. Knowledge on the theoretical aspects of security of the informatics systems and services.

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SUBJECT OBJECTIVES

C1 Acquisition of practical skills on security in the computer systems and networks and on the cryptography.
C2. Acquisition and consolidation of the skills in searching information in the scientific literature and using documentation of IT tools.

SUBJECT EDUCATIONAL EFFECTS

relating to skills:
PEK_U01 - student is able to identify incidents of computer attacks.
PEK_W02 - student is able to secure operating systems and networks from computer attacks.
PEK_W03 - student can use elements of cryptography to protect computer systems and networks.

relating to social competences:
PEK_K01 - student is aware of the importance of legal protection of data stored in computer systems.
PEK_K02 - student understands the need for legal protection of stored data and know the consequences of inadequate performance of this obligation.
PEK_K03 - student is aware of importance of information searching skills and their critical

analysis.
PEK_K04 - student understands the need of self-education and developing the ability to apply his knowledge and skills alone.

PROGRAMME CONTENT

Form of classes - laboratory		**Number of hours**
Lab 1	Organizational matters - program, requirements, etc. Introduction to the workplace, available software, etc.	3
Lab 2	Protection of the resources (files, folders, printers, etc.) in the operating systems - permissions to the resources.	3
Lab 3	Data protection in IT systems - encryption.	3
Lab 4	Security of computer networks and operating systems - firewalls.	3
Lab 5	Security of network services - FTP, WWW.	3
Lab 6	Security of network services - e-mail.	3
Lab 7	Testing of the selected attacks (e.g., SQL Injection) on the web services and databases.	3
Lab 8	Testing the safety level of different types of passwords.	3
Lab 9, Lab10	Port scanning and active examination of the network.	6
	Total hours	30

TEACHING TOOLS USED

N1. Laboratory exercises.
N2. Consultations.
N3. Self-study – preparation for laboratory.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_K01 ÷ PEK_K04	Verbal answers, consultations, observation of executing of the exercises.
F2	PEK_U01 ÷ PEK_U03	Evaluation of executed exercises.
C = F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J. Stokłosa, T. Bilski, T. Pankowski, „Bezpieczeństwo danych w systemach informatycznych”, PWN, 2001.
[2] S. Garfinkel, G. Spafford, „Bezpieczeństwo w Unixie i Internecie”, Wyd. RM, 1997.
[3] W.R. Cheswick, „Firewalle i bezpieczeństwo w sieci”, Helion, 2003.
[4] N. Ferguson, B. Schneier, „Kryptografia w praktyce”, Helion, 2004.
[5] A. Silberschatz, J.L. Peterson, G. Gagne, „Podstawy systemów operacyjnych”, WNT, Warszawa 2005.
[6] W. Stallings, „Systemy operacyjne”, Robomatic, Wrocław 2004.
[7] M. Sportack, „Sieci komputerowe. Księga eksperta”, Helion, 1999.

SECONDARY LITERATURE:

[1] S. Garfinkel, G. Spafford, „WWW. Bezpieczeństwo i handel”, Helion, 1999.
[2] A.S. Tanenbaum, “Modern Operating Systems”, Prentice-Hall Inc., 2001.
[3] G. Nutt, “Operating Systems. A Modern Perspective”, Addison Wesley Longman, Inc., 2002.
[4] K. Krysiak, „Sieci komputerowe. Kompendium”, Helion, 2005.
[5] K.S. Siyan, T. Parker, „TCP/IP. Księga eksperta”, Helion, 2002.

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Adam Janiak, 71 320 29 06; adam.janiak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Security of the informatics systems and services (2)

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION Data Processing Systems Engineering (INS)

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01 (skills)	S1INS_U04	C1	Lab2,…, Lab10	N1, N2, N3
PEK_U02	S1INS_U04	C1	Lab2,…, Lab10	N1, N2, N3
PEK_U03	S1INS_U04	C1	Lab3,Lab8	N1, N2, N3
PEK_K01 (competences) PEK_K02	K1_K04	C1	Lab1,…,Lab10	N1, N2, N3
PEK_K03, PEK_K04	K1_K04	C2	Lab1,…,Lab10	N1, N2, N3

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY …… / DEPARTMENT……

SUBJECT CARD

Name in Polish: Programowanie w języku Java
Name in English: Programming in Java
Main field of study (if applicable): Informatics
Specialization (if applicable): Data Processing Systems Engineering
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: INES207
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)	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	4				
including number of ECTS points for practical (P) classes	-		3		
including number of ECTS points for direct teacher-student contact (BK) classes	1		2		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W28, K1INF_U31, K1INF_U32
2. S1INS_U01
3. K1INF_W18, K1INF_U16

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SUBJECT OBJECTIVES

C1. Acquisition of knowledge and skills in the use of advanced programming techniques on Java SE platform.
C2. Familiarization with Java platform features allowing multi-layer architectures design and implementation.
C3. Enriching skills in Java applications deployment.
C4. Mastering the ability to create distributed applications in Java.
C5. Practicing GUI implementation in Java technology.
C6. Mastering the techniques for creating hybrid solutions (combining scripting with use of Java bytecode).

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W02 - knows the rules of memory and byte code management.
PEK_W03 - knows on how to implement distributed applications using Java SE classes.
PEK_W04 - knows Java security policy.
PEK_W05 - knows the design patterns of Java beans.
PEK_W06 - knows how to integrate scripts, byte code and native code.
PEK_W07 - knows deployment practices for Java applications.

relating to skills:
PEK_U01 - can design and implement an application with a rich GUI.
PEK_U02 - can create multithreaded applications running in a distributed environment.
PEK_U03 - can take advantage of scripting and external libraries.
PEK_U04 - can utilize dynamic loading of classes in custom application
PEK_U05 - can write customizable Java Beans.
PEK_U06 - can build applications that utilize databases.

relating to social competences:
PEK_K01 – is aware of the impact of the quality of the code created on the possibility of its further development by other developers.
PEK_K02 – understands the need for self-education, especially in the face of constantly evolving technologies and changes in the vocabularies used in the communication between professionals.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction, overview of the basics of programming in Java.	2
Lec 2	Internationalization and advanced techniques for creating graphical user interface (AWT, Swing, SWT).	2
Lec 3	Concurrent programming in Java, memory management.	2
Lec 4	Reflection and class loaders.	2
Lec 5	Introspection and implementation of Java beans.	2
Lec 6	Distributed applications programming: serialization and RMI.	2
Lec 7	Access to data sources (JDBC).	2
Lec 8	Web application design and programming (RESTful, SOAP, KVP).	2
Lec 9	Security issues.	2
Lec 10	Deployment techniques (javaws, JNLP).	2
Lec 11	The use of native code (JNI).	2
Lec 12	Integration with scripting engines, Java2script.	2
Lec 13	Introduction to JavaFX.	2
Lec 14	Applications management and monitoring (JMX).	2
Lec 15	Repetition and summary.	2
	Total hours	**30**

Form of classes - laboratory		Number of hours
Lab 1	Workplace training in health and safety. Organizational matters. Running IDE and building the first sample program.	2
Lab 2	Creation of a windowed application that allows changing the localization settings.	2
Lab 3	The use of weak references in a multithreaded application.	2
Lab 4	The implementation of an extensible application with its own class loader.	2
Lab 5	Implementation of Java beans, their distribution and use in a custom application.	2

Lab 6	Application design given remote interface definition and specification of required functions.	2
Lab 7	Programming with the use of databases for large data sets processing.	2
Lab 8	Implementation of a simple Web application and services.	2
Lab 9	The use of encryption and security policies when loading classes.	2
Lab 10	Deploying application with javaws technology.	2
Lab 11	Development of a Java application with native code utilization.	2
Lab 12	Design of application for testing artificial intelligence algorithms through scripting.	2
Lab 13	Building and running JavaFX based applications.	2
Lab 14	Monitoring and adjusting application behavior during runtime.	2
Lab 15	Summary of the work performed and additional tasks.	2
	Total hours	30

TEACHING TOOLS USED

N1. Traditional lectures using video projector
N2. Classes in the computer laboratory
N3. Consultation
N4. Self-study – preparation for laboratory assignments
N5. Self-study – preparation for the test

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 - PEK_U06 PEK_K01 - PEK_K02	Evaluation of the laboratory assignments outcomes (taking into account the quality of the generated code and the scope of functions implemented - partially in the classroom and partially on completion) assessment of the level of skills (based on the answers to questions on the tasks completed)
F2	PEK_W01 - PEK_W07	Written test
C = 0,5 * F1 + 0,5 * F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Bruce Eckel: Thinking in Java. Wydanie IV. Edycja polska, Helion.
[2] Cay Horstmann, Gary Cornell: Java 2. Podstawy, Helion.
[3] Cay Horstmann, Gary Cornell: Java 2. Techniki zaawansowane, Wydanie II, Helion.

SECONDARY LITERATURE:

[1] Hartley S.J : Concurrent Programming. The Java Programming Language, Oxford University Press'98.
[2] Weiss Z, Gruźlewski T. : Programowanie współbieżne i rozproszone, WNT'93.
[3] Ben-Ari M. : Podstawy programownia współbieżnego i rozproszonego, WNT'92.
[4] Ben-Ari M. : Podstawy programowania współbieżnego, WNT'89.

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Programowanie w języku Java

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Informatics

AND SPECIALIZATION

Data Processing Systems 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	S1INS_W04	C1, C3	Lec 1, Lec 2, Lec 15	N1, N3, N5
PEK_W02	S1INS_W04	C1, C3	Lec 3, Lec 4, Lec 15	N1, N3, N5
PEK_W03	S1INS_W04	C1, C3	Lec 6, Lec 7, Lec 8, Lec 10, Lec 15	N1, N3, N5
PEK_W04	S1INS_W04	C1, C3	Lec 4, Lec 5, Lec 11, Lec 15	N1, N3, N5
PEK_W05	S1INS_W04	C1, C3	Lec 4, Lec 5, Lec 14, Lec 15	N1, N3, N5
PEK_W06	S1INS_W04	C1, C3	Lec 12, Lec 13, Lec 15	N1, N3, N5
PEK_W07	S1INS_W04	C1, C3	Lec 7, Lec 9, Lec 15	N1, N3, N5
PEK_U01	S1INS_U05	C1, C5	Lab 1, Lab 2	N2, N4
PEK_U02	S1INS_U05	C1 – C6	Lab 3, Lab 6, Lab 7, Lab 10, Lab 14	N2, N4
PEK_U03	S1INS_U05	C1, C3, C6	Lab 11 – Lab 13	N2, N4
PEK_U04	S1INS_U05	C1 – C4, C6	Lab 4, Lab 5, Lab 9, Lab 14	N2, N4
PEK_U05	S1INS_U05	C1, C2	Lab 7, Lab 8	N2, N4
PEK_K01	K1INF_K02	C1 – C6	Lab 1 – Lab 15	N1 – N5
PEK_K02	K1INF_K02	C1 – C6	Lec 1 – Lec 15	N1 – N5

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

*** - from table above

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FACULTY …… / DEPARTMENT……

SUBJECT CARD

Name in Polish: Internetowe Bazy Danych
Name in English: Internet database systems
Main field of study (if applicable): Informatics
Specialization (if applicable): Data Processing Systems Engineering
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code: INES208
Group of courses: YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		15		
Number of hours of total student workload (CNPS)	60		60		
Form of crediting	crediting with grade		crediting with grade		
For group of courses mark (X) final course	X				
Number of ECTS points	**4**				
including number of ECTS points for practical (P) classes	-		2		
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. K1INF_W25, K1INF_U25
2. K1INF_W18, K1INF_U16

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SUBJECT OBJECTIVES

C1. Knowledge acquisition of web technologies and applications with database access
C2 Gain skills of properly modelling of internet relational databases and technical documentation fullfilling
C3 Gain skills of user interface implementation as internet site with database access

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 – he knows classification and architectures of internet database systems
PEK_W02 – he knows techiques and internet application tools which allow to access databases
PEK_W03 – has a knowledge of modelling internet database sytems
PEK_W04 – has a knowledge how to create specification and documentetion od a project
relating to skills:
PEK_U01 – can design internet site with database access
PEK_U02 – can properly create datbase tables and relations
PEK_U03 – can use SQL and MySQL with PHP to manage internet databases
relating to social competences:
PEK_K01 – is aware of ability of information searching and its critical analisys,
PEK_K02 – understand a need of selfeducation and developing abilities of using possessed knowledge and skills
PEK_K03 – is aware responsibility of selfworking and is ready for team work principles fullfilling and is responseble for common realization

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Architecture of an internet database systems. Distributed and heterogenious systems.	2
Lec 2	Database modelling using MySQL tools, normalization process, entity – relational diagrams, data-flow diagrams, administrator tools and tasks.	4
Lec 3	Advanced featurs and functions of SQL, nested queries in script languages.	2
Lec 4	Using PHP language in internet database projects, overview of some web database technologies	6
Lec 5	Preparing of technical documentation for internet database system project	1
	Total hours	**15**

Form of classes - laboratory		**Number of hours**
Lab 1	Overview and recognition of some web DBMS environments, installation of choosen system.	2
Lab 2	Design of a database schema, normalization to 3NF	3
Lab 3	Database schema generation using dedicated tools	3
Lab 4	User interface design, web site map presentation	3
Lab 5	Functional system model implementation with database, entering testing dataset	3
Lab 6	Testing of modules with web database access, documentation of implemented and tested modules, according class- and homework	1
	Total hours	**15**

TEACHING TOOLS USED
N1. Traditional lectures using video projector and table N2. Classes in the computer laboratory N3. Consultation N4. Self-study – short home projects N5. Self-study – knowledge aquisition based on literature

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01-W04	Written test
F2	PEK_U01-U03 PEK_K01-K03	Observation of a workflow Project documentation
C = 0,5 * F1 + 0,5 * F2		

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE:
[1] Julie C. Meloni, PHP, MySQL i Apache dla każdego. Wydanie III, Helion, luty 2007 [2] T. Connolly, C.Begg, Systemy baz danych. Praktyczne metody projektowania, implementacji i zarządzania. Tom 2, RM, 2004 [3] Łukasz Sosna, 101 porad. PHP i MySQL, Mikom, 2005
SECONDARY LITERATURE:
[1] Marcin Lis, PHP. 101 praktycznych skryptów. Wydanie II, Helion, 2007 [2] Laura Thomson, PHP i MySQL. Tworzenie stron WWW. Vademecum profesjonalisty, Helion, 2005 [3] Jacek Matulewski, Sławomir Orłowski, Technologie ASP.NET i ADO.NET w Visual Web Developer, Helion, 2007
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Prof. dr hab. inż. Jan Magott, jan.magott@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Internet Database Systems

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics** AND SPECIALIZATION

Data Processing Systems 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	S1INS_W05	C1	Lec1	N1,N3,N5
PEK_W02	S1INS_W05	C1	Lec3,Lec4	N1,N3,N5
PEK_W03	S1INS_W05	C1	Lec2,Lec3	N1,N3,N5
PEK_W04	S1INS_W05	C1	Lec5,Lec6	N1,N3,N5
PEK_U01	S1INS_U06	C3	La3,La5	N1,N2,N3,N5
PEK_U02	S1INS_U06	C2	La2,La3	N1,N2,N3,N5
PEK_U03	S1INS_U06	C1,C3	La1,La3	N1,N2,N3,N5
PEK_K01	K1INF_K01	C1	Lec1-Lec5	N5
PEK_K02	S1INS_K02	C1,C2,C3	La1-La6	N5
PEK_K03	S1INS_K01	C2,C3	La1-La6	N2,N5

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF ELECTRONICS

SUBJECT CARD

Name in Polish: Seminarium dyplomowe
Name in English Seminar
Main field of study (if applicable): Computer science
Specialization (if applicable): Computer systems engineering
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code INES209
Group of courses NO

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

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SUBJECT OBJECTIVES

C1. The acquisition of knowledge in the principles of engineering documentation, documentation of experimental results, refer to the literature and its proper citation, the presentation of results and subject them to a public discussion
C2. The acquisition and consolidation of skills to find information in the scientific literature and the use of documentation tools.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 - can create documentation of engineering project, documentation of experimental results, refer to the literature and its proper citation, the presentation of results and subject them to a public discussion

relating to social competences:
PEK_K01 - recognizes the importance of information retrieval skills and their critical analysis,
PEK_K02 - understands the need for self-education and to develop the ability to independently apply their knowledge and skills,

PROGRAMME CONTENT

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

Se 1	Introduction. The requirements. Discussion of the scope of the final exam.	2
Se 2	Methods of engineering project documentation, documentation of results, refer to the literature and other materials.	2
Se 3	Methods for creating multimedia presentations on engineering projects	2
Se4-15	Presentation of the results of an engineering project by students. Discussion of individual projects.	24
	Total hours	30

TEACHING TOOLS USED

1 Student presentations using a video projector
2 Consultation
3 Own work - preparing to give a seminar

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK W01, PEK_K01, PEK_K02	Assessment of delivered seminar presentation and participation in the discussion
P = F1		

PRIMARY AND SECONDARY LITERATURE

Literature related to the engineering project

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
3D graphics and multimedia systems 2
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science

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	S1INS_W06	C1,C2	Se1-Se15	1,2,3

PEK_K01, PEK_K02	K1_K04	C2	Se1-Se15	1,2,3

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

FACULTY OF ELECTRONICS / Institute of Computer Engineering, Control and Robotics

SUBJECT CARD

Name in Polish: **Programowanie współbieżne**
Name in English: **Concurrent Programming**
Main field of study (if applicable): **Computer Science**
Specialization (if applicable): **Internet Engineering**
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code: **INES302**
Group of courses: **YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		30		
Number of hours of total student workload (CNPS)	40		80		
Form of crediting	Examination		crediting with grade*		
For group of courses mark (X) final course	X				
Number of ECTS points	4				
including number of ECTS points for practical (P) classes	-		3		
including number of ECTS points for direct teacher-student contact (BK) classes	1		2		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W09, K1INF_U07, K1INF_U08
2. K1INF_W21, K1INF_U19, K1INF_U20
3. K1INF_32

SUBJECT OBJECTIVES

C1 Getting the knowledge about phenomena in systems consist of communicating concurrent procesees.
C2 Getting the knowledge about process creation methods, process attributes getting and testing.
C3 Getting the knowledge about file access methods, files attributes, interprocess communication by Files.
C4 Getting the knowledge about interprocess communication by unnamed pipes, FIFO queues, message queues.
C5 Getting the knowledge about processes mutual exclusion and critical section protection.
C6 Getting the knowledge about interprocess communication by shared memory, processes synchronisation by Posix semaphores.
C7 Getting the knowledge about methods of creation distributed applications consist of processes communicating by sockets (UDP messages, TCP connection communication)
C8 Getting the knowledge about methods of creation multithread applications, threads synchronisation by mutexes, conditional variables, readers writers locks. Getting knowledge about effective multiprocessors applications.
C9 Familiarize with Petri nets as tool for modelling concurrent systems. Testing of Petri nets qualities such as reachability, liveness, safety, deadlocks.
C8 Getting skills in creation of applications which consist of a set of communicating processes. Such applications are executed in uni or multiprocessor computer or cluster (which consist of number of computers)

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Understand of phenomenas in concurrent systems

PEK_W02 Understand funcion of process, knows structure of application consist of commucating processes

PEK_W03 Understand of file abstraction, file acess methods, file attributes, file locking

PEK_W04 Knows methods of local interprocess communication such as unnamed and named pipes, message queues

PEK_W05 Understand notion of mutual exclusion and critical section protection

PEK_W06 Knows process synchronisation methods such as semaphores and monitors

PEK_W07 Knows communication methods in networks, network socket application interface, UDP conectionless communication and TCP conection communication in networks.

PEK_W08 Understand creation rules of multithread applications, knows threads synchronisation methods, mutexes, conditional variables, bariers.

PEK_W09 Knows application of Petri nets for concurrent systems modelling.

PEK_W010 Knows methodology of distributed applications. Such application consist of a set of communicating processes which are executed in uni or multiprocessor computer or cluster

relating to skills:

PEK_U01 Is able to create concurrent and parallel processes and knows how to apply of their attributes.

PEK_U02 Is able to create an application consist of a lot of processes communicating by common files.

PEK_U03 Is able to create an application consist of a lot of concurrent processes communicating by unnamed pipes, named pipes and message queues.

PEK_U04 Is able to create concurrent application where processes communicates by shared memory and synchronises by semaphores.

PEK_U05 Is able to create distributed application where processes communicates by network sockets API. Knows how to create client – server application and concurrent network server.

PEK_U06 Knows how to create multithread applications and exploit computer processors (in multiprocesor systems)

relating to social competences:

PEK_K01 Knows that cooperating in team persons needs to communicate each other and synchronise individual activities.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Fundamentals of concurrency, sequential and concurrent processes, safety, liveness, deadlock, starvation. Canonical states of processes.	1
Lec 1, 2	Proces creation, attributes, termination, synchronisation of proces termination	2
Lec 3	Interprocess communication by unnamed and named pipes, select function	1
Lec 3	POSIX message queues	1
Lec 4	Mutual exclusion, critical section, methods of critical section protection	1
Lec 4	Interprocess communication by shared memory	1
Lec 5	Process synchronisation, producer-consumer problem, Posix semaphores, monitors	1
Lec 5	Network communication by sockets, network adresses, UDP connectionless communication	1
Lec 6	TCP connection communication, concurrent server, network superserver	1
Lec 6,7	Threads – creation, termination, mutexes, conditional variables, barriers, readers writers locks, threads in multiprocessor enviroment	2
Lec 7	Application of Petri networks in modelling of concurrent systems. Basic definitions: active transitions, reachability, boundedness, liveness, safety, conservativeness, reversivilibity.	1
Lec 8	Analysis of Petri networks: reachabilitygraph, coverability tree, incidence matrix, places and transitions invariants.	1
	Total hours	15

Form of classes - laboratory		Number of hours
Lab 1	Introduction.	1
Lab 1	Fundamentals of using Linux operating system for program development, editor, compiler, debugger. Integrated development enviroment.	3
Lab 2	Process creation, termination, process attributes, transformation one proces into enother.	4
Lab 3	Interprocess communication by common files, master – slave architecture.	2
Lab 4	Interprocess communication by unnamed pipes and FIFO files, master – slave architecture.	2
Lab 5	Interprocess communication by Posix message queues, producer – consumer problem.	2
Lab 6	Application of shared memory for interprocess communication. Process synchronisation by Posix semaphores, producer – consumer problem.	4
Lab 7	Distributed applications, socket application interface, UDP connectionless communication	4
Lab 8	Distributed applications, socket application interface, TCP connection communication	4
	Total hours	30

TEACHING TOOLS USED

N1. Traditional lecture with multimedia projector
N2. Practical exercises in computer laboratory
N3. Consultations
N4. Homework – preparation for laboratory
N5. Homework – preparation for examination

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 ÷ PEK_U06	Evaluation of exercises results
F2	PEK_W01 ÷ PEK_W10	Presence during lectures, activity
F3	PEK_W01 ÷ PEK_W10	Examination
P = 0,3*F1 + 0,1*F2 + 0,6*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Keith Haviland, Dina Gray, Ben Salama, UNIX System Programming, second edition, Adison Wesley 1999
[2] M. Ben-Ari, Princliples of Concurrent and Distributed Programming, Second Edition , Adison Wesley 2006
[3] Jędrzej Ułasiewicz, Real Time Systems, QNX6 Neutrino, wyd. BTC 2008
[4]

SECONDARY LITERATURE:

[1] Mark Mitchell, Jefrey Oldham, Alex Samuel, Advanced Linux Programming, New Riders Publ. 2001
[2] Zbigniew Czech, Introduction to Parallel Computing, Wyd. nauk. PWN, Warszawa 2010
[3]

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Concurrent Programming

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION

Internet 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	S1INT_W02	C1	Lec1	N1, N3, N5
PEK_W02	S1INT_W02	C2	Lec2	N1, N3, N5
PEK_W03	S1INT_W02	C3	Lec2	N1, N3, N5
PEK_W04	S1INT_W02	C4	Lec3	N1, N3, N5
PEK_W05	S1INT_W02	C5	Lec4	N1, N3, N5
PEK_W06	S1INT_W02	C6	Lec4,Lec5	N1, N3, N5
PEK_W07	S1INT_W02	C7	Lec5,Lec6	N1, N3, N5
PEK_W08	S1INT_W02	C8	Lec6,Lec7	N1, N3, N5
PEK_W09	S1INT_W02	C9	Lec7,Lec8	N1, N3, N5
PEK_W010	S1INT_W02	C10	Lec1,Lec2,Lec3,Lec4,Lec5,Lec6,Lec7,Lec8	N1, N3, N5
PEK_W06	S1INT_W02	C6	Lec4,Lec5	N1, N3, N5
PEK_U01	S1INT_U02	C2	Lab2	N1,N2,N4
PEK_U02	S1INT_U02	C3	Lab3	N1,N2,N4
PEK_U03	S1INT_U02	C4	Lab4	N1,N2,N4
PEK_U04	S1INT_U02	C5,C6	Lab4,Lab5	N1,N2,N4
PEK_U05	S1INT_U02	C7	Lab6,Lab7	N1,N2,N4
PEK_U06	S1INT_U02	C8	Lab8	N1,N2,N4
PEK_K01	S1INT_K01	C10	Lec 8	N1,N2,N3,N4,N5

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF ELECTRONCIS

SUBJECT CARD

Name in Polish Inżynieria e-systemów - technologia JAVA
Name in English E-system engineering – Java technology JAVA
Main field of study (if applicable): Computer Science
Specialization (if applicable): Internet Engineering
Level and form of studies: 1-st level, full-time
Kind of subject: obligatory
Subject code INES303
Group of courses YES

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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SUBJECT OBJECTIVES

C1. To learn how to develop modern distributed applications in Java EE technology
C2. To learn how to develop web applications in Java EE technology
C3. To get familiar with Java EE frameworks
C4. To master the ability to design and develop web applications in Java EE technology
C5. To master the ability to develop project documentation
C6. To master the social competences in group cooperation in effective problem solving

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 – knows Servlets and JSP
PEK_W02 – knows EJB
PEK_W03 – knows JPA technology
PEK_W04 – knows selected Java EE frameworks

relating to skills:

PEK_U01– is able to design an application in Java EE technology
PEK_U02 – is able to develop a web application in Java EE technology
PEK_U03 – can develop a presentation presenting selected aspects of Java EE technology

relating to other competences:

PEK_K01 – has an awareness of importance of knowledge searching skills and its critical analysis

PEK_K02 – understands the kneed of self-learning and improving of knowledge application skills

PEK_K03 – improves the competences in group cooperation in effective problem solving

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to JavaEE	1
Lec 2	Servlety, JSP	2
Lec 3	JSTL oraz Expression Language	2
Lec 4	Java Server Faces	2
Lec 5	Enterprise Java Beans	2
Lec 6	Database aces sin Java EE	2
Lec 7	Java EE Frameworks	2
Lec 8	Final test	2
	Total hours	15

Form of classes - project		Number of hours
Proj 1	Organizational matters, introduction, providing project topics	2
Proj 2	Developing a time schedule, listing of millstones	2
Proj 3	Project of web system	2
Proj 4	Coding and testing of web system	20
Proj 5	Documentation development	2
Proj 6	Project presentation, project assessment	2
	Total hours	30

TEACHING TOOLS USED

N1. Lectures with slides
N2. Project – web system development – work in groups
N3. Consultation
N4. Developing of the presentation
N5. Self-study, study for final test

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01,PEK_U02, PEK_K03	Replies, presentation of the developed applications, project documentation
F2	PEK_U03, PEK_K01,PEK_K02	Delivering of presentation
F3	PEK_W01-PEK_W04	Final test
P = 0,5*F1 + 0,2*F2+0,3*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] A. Goncalves, Beginning Java EE 6 with GlassFish 3, Apress
[2] B. Burke, R. Monson-Haefel, Enterprise JavaBeans 3.0
[4] Web page http://docs.oracle.com/javaee/

SECONDARY LITERATURE:

[1] D. Heffelfinger, *Java EE 6 Development with NetBeans 7*, Packt Publishing

[2] A. Goncalves, *Beginning Java EE 6 with GlassFish 3*, Apres

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Application Programming - Java and XML Technologies
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Internet 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	S1INT_W03	C1,C2	Lec1-Lec3	N1, N3, N5
PEK_W02	S1INT_W03	C1,C2	Lec5	N1, N3, N5
PEK_W03	S1INT_W03	C1,C2	Lec6	N1, N3, N5
PEK_W04	S1INT_W03	C3	Lec4,Lec7	N1, N3, N4, N5
PEK_U01	S1INT_U03	C4,C5	Proj2-Proj3	N2, N3, N5
PEK_U02	S1INT_U03	C4,C5	Proj4-Proj5	N2, N3, N5
PEK_U03	S1INT_U03	C3	Proj4-Proj5	N4, N5
PEK_K01 **PEK_K02**	K1INF_K04	C6	Lec1-Lec8 Proj1-Proj6	N1, N2, N3, N4, N5
PEK_K03	S1INT_K01	C6	Proj1-Proj6	N2

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

Zał. nr 4 do ZW 64/2012

FACULTY OF ELECTRONIC ENGINEERING / DEPARTMENT……

SUBJECT CARD

Name in Polish: Aplikacje internetowe i rozproszone
Name in English: Web and distributed applications development
Main field of study (if applicable): Computer Engineering
Specialization (if applicable): INT
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code INES304
Group of courses YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload (CNPS)	30			90	
Form of crediting	Crediting with grade		Crediting with grade		
For group of courses mark (X) final course	X				
Number of ECTS points	4				
including number of ECTS points for practical (P) classes				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. 1. K1INF_13, K1INF_U12
2. K1INF_W28, K1INF_U31, K1INF_U32
3. K1INF_W24, K1INF_U22, K1INF_U23

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SUBJECT OBJECTIVES

The student who has completed the course should:
C1 Know design principles of distributed systems, including communication and synchronization mechanisms.
C2 Be able to design and implement parallel programs in the Message Passing Interface environment.
C3 Know the multi tier architecture of Web applications.
C4 Know the most prominent technologies for the server side and for the client side in Web application development.
C5 Be able to design and implement a simple Web application using a selected Web development framework (such as the Django / Python environment).
C6 Be able to design and implement the client side logic using a selected scripting language (JavaScript, jQuery library).
C7 Be able to prepare documentation of the distributed Web application developed.
C8 Be able to co-operate in a team of programmers developing an IT system (social competence).

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Knows the principles of parallel processing, including the process farm model, Amdahl and Gustafson rules, and applicability of these models.

PEK_W02 Knows the MPI architecture / models of communication.

PEK_W03 Knows the HTTP protocol (including extensions/headers designed to support effective Web applications, i.e. persistent connections, session support, virtual server support etc.).

PEK_W04 Knows the architecture of Web applications (multi-tier, MVC), as well as most prominent technologies for the server-side programming.

PEK_W05 Knows the principles of procedural, functional and object-oriented programming in the Python language.

PEK_W06 Knows the architecture and principles of the selected Web development framework (Django).

PEK_W07 Knows a selected development environment for the client side logic (JavaScript library jQuery).

PEK_W08 Knows the mechnisms of asynchronous communication between the client and server side of the Web application (client side asynchronous communication – AJAX, server side asynchronous communication – .e.g Comet).

relating to skills:

PEK_U01 Is able to design and implement a computationally intensive task in the MPI environment.

PEK_U02 Is able to design and implement a simple mutli-tier Web application using a selected framework (Django / Python).

PEK_U03 Is able to implement the client-side logic using JavaScript / jQuery.

PEK_U04 Is able to implement asynchronous client – server communication using AJAX model.

PEK_U05 Is able to prepare documentation of the designed Web application.

relating to social competences:

PEK_K01 Is able to co-operate in a team of programmers realizing a software development project.

PEK_K02 Is able to continue self-managed learning regarding new technologies in Web application development.

PROGRAMME CONTENT

Form of classes – lecture		**Number of hours**
Lec 1	Mechanisms and models of distributed processing, scalability, Amdahl and Gustafson laws.	2
Lec 2,3	MPI standard, process model, models of communication, data structures, process farm in MPI.	3
Lec 3	HTTP protocol, methods, most prominent headers for Web application development, session support etc.	1
Lec 4,5	Python – procedural, functional, object-oriented programming; modules.	3
Lec 5,6,7	Python for Web development. Django framework, architecture, MTV, ORM, views, template language.	4
Lec 7,8	Client-side programming, DOM, manipulating DOM elements in JavaScript and jQuery; asynchronous communication (AJAX, Comet). .	3
	Total hours	15

Form of classes - project		Number of hours
Proj 1	Introduction: presentation of the ideas for the Web applications to be designed, organization of the project teams, configuration of the project management tools (Redmine, Assembla, etc.)	2
Proj 2	Selection of the project assignment by individual project teams, analysis of requirements for the intended Web applications.	2
Proj 3-4	Design of the architecture of the Web applications (application server logic, database layer, computational engine (back end), user interface, communication mechanisms).	4
Proj 5-6	Technical design of the application.	4
Proj 7-9	Implementation of the basic functionality of the Web application (iteration „0").	6
Proj 10	Presentation of the iteration „0" application, verification of the requirements, final specification of the application.	2
Proj 11-13	Implementation of the final version of the application.	6
Proj 14	Preparation of the technical documentation of the system.	2
Proj 15	Presentation of the final version of the application.	2
	Total hours	30

TEACHING TOOLS USED

N1. Lecture, power point presentations, handouts
N2. Project assignment
N3. Consultations
N4. Self-study – preparation for the subtasks realized in the project
N5. Self-study – preparation for the final test

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 – PEK_U05 PEK_K01 – PEK_K02	Evaluation of the project results; evaluation of the project presentation /documentation; discussion of the subsequent development stages in the course of the project realization.
F2	PEK_W01 – PEK_W08	Final test (written)
P = 0.6*F1+0.4*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] M. Ben-Ari, Pronciples of concurrent and distribution programming.
[2] J. Forcier, Python Web development with Django
[3] MPI Standard specification http://www.mcs.anl.gov/research/projects/mpi
[4] Django specification http://www.djangoproject.com

SECONDARY LITERATURE:

[1] C. Lin, L. Snyder.: *Principles of parallel programming*, Addison Wesley 2009
[2] A.D. Kshemkalyani, M.Singhal, *Distributed computing: principles, algorithms and systems*, Cambridge Univ. Press 2011

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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 - PEK_W08	S1INT_W04	C1 –C4	Lec1 – Lec8	N1,N3,N5
PEK_U01 – PEK_U05	S1INT_U04	C5 –C8	Proj1 – Proj15	N2,N4
PEK_K01, PEK_K02	S1INT_K01	C8	Proj1 – Proj15	N2,N4

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY …… / DEPARTMENT……

SUBJECT CARD

Name in Polish ……Projekt Zespołowy…….
Name in English ……Team Project…….
Main field of study (if applicable): ……Computer Sciences…….
Specialization (if applicable): ……..
Level and form of studies: 1st/ ~~2nd*~~ level, full-time / ~~part-time*~~
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code …INES305…….
Group of courses ~~YES~~ / NO*

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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SUBJECT OBJECTIVES

C1 Mastering of basic skills, with application aspects, of the task of building of software-hardware computer system
C2 Mastering of of skills of realization of tasks comprising whole project: design of an application, programming with libraries, deployment and testing of an application, software integration, design of embedded systems, deployment and testing of applications in computer systems, deployment and testing of distributed applications in various configurations (PC/embedded system) with various network protocols (e.g. TCP/IP, RS232, USB, Bluetooth, ZigBee, Dash-7).
C3 Mastering of skills of proceeding of IT project with utilization of various software tools for planning and management of workflons and acquiring and management of project results (descriptions, reports, documentation, archivization of results and application code).
C4 Mastering and strnghtening of social competences covering emotional intelligence consisting of collaboration in a team of students targeting in effective problem solving. Development of responsability, honesty and fairness of behavior; observation of rules of academic community and public.

SUBJECT EDUCATIONAL EFFECTS

relating to skills:

PEK_U01 – can collect the requirements needed to solve the task, define the goal of the project, results and measurement criteria of results; define functionalities ,,must have" and ,,nice to have".

PEK_U02 – can acquire and arrange the information on technologies available for solving the tasks,

PEK_U03 – can partition the project on tasks, formulate necessary prerequisites, eqxpected results of each task, estimate the time needed to achieve each stage of the task, designate resources needed for realization of the stage and point out the risks of the project,

PEK_U04 – can qualify the abilities of each of the members of the project team, assign tasks to team members and elaborate project schedule,

PEK_U05 – can use software tools for group project management, version control systems, issue and problem management systems, documentation and schedule management tools.

PEK_U06 – can prepare completion of the elements of the system with selection and cost estimation of the components.

PEK_U07 – can modify of tasks and schedule in case of problems arising during the project.

PEK_U08 – can apply task scheduling methodology in planning of project tasks accounting of synergies and limitations resulting from realizaction of other subjects of the studies.

PEK_U09 – can prepare partial documentation from the realization of tasks in the form of reports and use it for elaboration of the documentation of complete project.

PEK_U10 – can use the results of the works of other project teams (or other subjects of the studies) and use the results of the works of the project in the realization of final bachelor project.

PEK_U11 – can edit and disseminate the results of the project in the form of conference poster, presentation or film.

relating to social competences:

PEK_K01 – searching for information and tools and their analysis,

PEK_K02 – team collaboration in the field of improval of the methods of selection of the strategy of optimal problem solving,

PEK_K03 – understanding of the neccessity of self-teaching, correction of ability of concantration of attention and focusing on essential problems and development of abilities of application of possessed knowledge and skills,

PEK_K04 – evolution of abilities of self-esteem and self-control and responsibility for taken tasks,

PEK_K05 – observation of customs and rules held in academic community and project team.

PEK_K06 – independent and creative thinking, problem solving.

PEK_K07 – objective evaluation of the arguments, rational explanation and justification of own point of view with the application of knowledge in the field of the subject.

PROGRAMME CONTENT

Proj 1	Organizational matters, introduction, description of the subject, presentation of the tasks	2
Proj 2	Detailed explanation of the tasks, partitioning of the project on the subtasks, partitioning of the teams	4

	project on the subtasks, partitioning of the teams, elaboration of the schedules	
Proj 3	Presentation, deployment and configuration of software tools for project management	4
Proj 4	Completion of the system, specification of the components and bills of materials	4
Proj 5 – Proj 12	Realization of the project tasks	36
Proj 13	Deployment of the finished system	2
Proj 14	Specification of the disrepancies between the project goal and the actual project, summarisation of the results	4
Proj 15	Evaluation of the documentation, presentation of the results, preparation of the publications.	4
	Total hours	60

TEACHING TOOLS USED

N1. Short lectures with slides, discussion
N2. Workshops
N3. Consultations and meetings
N4. Own work – literature studies,
N5. Own work – development of the reports, final documentation, software code

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 - PEK_U10 PEK_K01 - PEK_K07	Oral answers, discussions, evaluation of the reports, evaluation of the degree of achievement of project goals
P - F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] F. Brooks, The Mythical Man-Month: Essays on Software Engineering, Addison-WEsley, 1975, 1995

[2] Documentation of team work management systems: Trac, Redmine, FlySpray, ProjectOpen, MS Project

SECONDARY LITERATURE:

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

……Team Project……

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

……Computer Sciences……..

AND SPECIALIZATION ……Internet Engineering……..

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01-PEK_U03,	S1INT_U05	C1, C2	Pr1-Pr2, Pr4-Pr15	N1-N5
PEK_U04	S1INT_U05	C1, C2, C3	Pr1-Pr15	N1, N2, N4, N5
PEK_U05-PEK_U10	S1INT_U05	C1, C2	Pr1-Pr2, Pr4-Pr15	N1-N5
PEK_K01-PEK_K07	S1INT_K01	C4	Pr1-Pr2, Pr4-Pr15	N1, N2, N3

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

*** - from table above

FACULTY …… / DEPARTMENT……

SUBJECT CARD

Name in Polish …Sieciowe Systemy Operacyjne.
Name in English …Secure Systems and Networks
Main field of study (if applicable): Computer Science
Specialization (if applicable): Computer Engineering
Level and form of studies: 1st level, full-time
Kind of subject: obligatory
Subject code INES306
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)	40		80		
Form of crediting	crediting with grade*		crediting with grade*		
For group of courses mark (X) final course	X				
Number of ECTS points	4				
including number of ECTS points for practical (P) classes			3		
including number of ECTS points for direct teacher-student contact (BK) classes	1		3		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W09, K1INF_U07, K1INF_U08
2. K1INF_W18, K1INF_U16
3. K1INF_U36

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SUBJECT OBJECTIVES

C1 acquisition of practical knowledge of programming in the UNIX environment
C2 Acquisition of knowledge of interprocess communication and concurrent programming
C3 Acquisition of knowledge and practical skills relating to the process synchronization mechanisms
C4 Acquisition of knowledge of the OSI model and protocols in TCP/IP networks
C5 Acquisition of knowledge and practical skills of BSD sockets programming and network communication in client-server and peer-to-peer modes
C6 Acquiring the ability to search and use technical documentation

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 - knows how the unix streams work (named and unnamed)
PEK_W02 - knows how the IPC mechanisms (message queues, shared memory)
PEK_W03 - known methods of process synchronization using buffers and semaphores
PEK_W04 - knows the organization of memory in the operating system, the operation of the stack, segmentation and paging, virtual memory
PEK_W05 - knows the difference between processes and threads, knows how to write multithreaded applications
PEK_W06 - knows and is able to describe methods of thread synchronization using semaphores, monitors, and condition variables
PEK_W07 - know the OSI model, is able to identify OSI layers and relate them to particular parts of the system software and user programs.
PEK_W08 - knows and is able to describe methods of thread synchronization using monitors and condition variables

PEK_W09 - knows and associates core TCP/IP protocols, can describe characteristic features of TCP and UDP.
PEK_W10 - knows system calls for BSD sockets and network programming
PEK_W11 - knows the client-server and peer-to-peer communication models
PEK_W12 - knows the remote function calls (RPC) and XDR data exchange mechanisms.

relating to skills:
PEK_U01 - can write a C program and run it under Unix operating system.
PEK_U02 - can use a text editor (vi, vim), compiler (gcc, g+ +), and the "make" program.
PEK_U03 - can use system calls to create new processes and establish communication between them (streams, queues, shared memory)
PEK_U04 - can write multithreaded application
PEK_U05 - is able to ensure proper synchronization of processes or threads with suitable mechanisms (semaphores and monitors).
PEK_U06 - can write a client-server network application using TCP sockets
PEK_U07 - can write a peer-to-peer and client-server applications using UDP

relating to social competences:
PEK_K01 - is aware of the importance of writing programs using error checking and deterministic behavior of the application.
PEK_K02 - understands the need for self-education, extending the knowledge and applying it to find practical solutions

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Introduction to the course, course requirements	1
Lec 2	File system access, blocking system calls, system libraries, scripts, commands.	3
Lec 3	Processes, process control	2

Lec 4	Inter-process communication using pipes	2
Lec 5	Message queues.	2
Lec 6	Process synchronization - semaphores and basic problems of concurrent programs	2
Lec 7	Multithreaded applications, monitors and condition variables	2
Lec 8	Communication between processes - shared memory, virtual memory.	2
Lec 9	Network Communications - internet addressing, ISO/OSI layers.	2
Lec 10	BSD sockets, overview of the network protocols	2
Lec 11	TCP protocol, basic properties, typical programs	2
Lec 12	UDP protocol - properties, program examples	2
Lec 13	Advanced Network issues - multiple input, special functions.	2
Lec 14	RPC communications, XDR standard - typical applications. Domain name resolution (DNS), network protocols.	2
Lec 15	Topics review, course assessment	2
	Total hours	30

Form of classes - laboratory		**Number of hours**
Lab 1	Introductory Classes - definition of topics, creation of system accountss, basic Unix commands, basic system operation	3
Lab 2	Text and program editing, compiling and linking sample	3

	programs	
Lab 3	Compiling programs using make, running test programs for process control (fork, exec functions)	3
Lab 4	Interprocess communication with unnamed pipes and FIFOs	3
Lab 5	Interprocess communication using shared memory and semaphores	3
Lab 6-7	Understanding the mechanisms of synchronization in multi-threaded programs - lPthreads library, semaphores, monitors, conditional variables	3
Lab 7-8	Network communications using TCP	3
Lab 9-10	Network communications using UDP	3
	Total hours	30

TEACHING TOOLS USED
N1.Traditional Lecture N2. Consultation N3. Laboratory work guidance N4. Individual work during classes N5. Individual work - preparation for classes

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	PEK_U01-PEK_U07 PEK_K01-PEK_K02	Lab assessment
F2	PEK_U01-PEK_U07 PEK_K01-PEK_K02	Networking project assessment
F3	PEK_W01-PEK_W12	Lecture written test
P=(0.6*F1+0.4*F2)*0.4+F3*0.6		

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [1] SILBERSCHATS, ABRAHAM : Operating system concepts [2] STEVENS : Unix Network Programming **SECONDARY LITERATURE:** [1] Bach, Maurice J. -- The Design of the UNIX Operating System [2] Ben-Ari, M. – Concurrent Programming
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
Tomasz Surmacz, tomasz.surmacz@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
INES306
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*****	
PEK_W01 (wiedza)	S1INT_W05	C1, C2, C3	

PEK_W02	S1INT_W05	C1, C2, C3	
PEK_W03	S1INT_W05	C1, C2, C3	
PEK_W04	S1INT_W05	C1, C2, C3	
PEK_W05	S1INT_W05	C1, C2, C3	
PEK_W06	S1INT_W05	C1, C2, C3	

PEK_W07	S1INT_W05	C1, C2, C3	
PEK_W08	S1INT_W05	C1, C2, C3	
PEK_W09	S1INT_W05	C1, C4, C5	
PEK_W10	S1INT_W05	C1, C4, C5	
PEK_W11	S1INT_W05	C1, C4, C5	

PEK_W12	S1INT_W05	C1, C4, C5	

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

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FACULTY …… / DEPARTMENT……

SUBJECT CARD

Name in Polish **Zastosowania systemów wbudowanych**
Name in English **Embedded systems applications**
Main field of study (if applicable): **Informatics**
Specialization (if applicable): **Internet Engineering**
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code **INES307**
Group of courses **YES**

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W13, K1INF_U12
2. K1INF_W21, K1INF_U19, K1INF_U20
3. K1INF_W31, K1INF_U35

SUBJECT OBJECTIVES

C1. Knowledge of architecture of embedded systems.

C2. Knowledge how to write software for embedded systems.

C3. Knowledge how to work on big programs (more then1000 lines of code).

C4. Knowledge how to make usage of documentation from internet and libraries.

SUBJECT EDUCATIONAL EFFECTS

relating to skills:

PEK_U01 – student is able to write software for selected embedded system

PEK_U02 – student is able to propose (redesign) hardware for selected embedded system

relating to social competences:

PEK_K01 – student understands how to find information, how analyze and use of this information

PEK_K02 – student understands haw important is self studying in solving technical problems

PROGRAMME CONTENT

Form of classes - project		**Number of hours**
Proj 1	Information about safety of work in laboratory. Organize of work on project. Subject of student's projects delivery.	3
Proj 2	More details student's project. Tools, software and internet documents presentation.	3
Proj 3	Working on project. Presentation of partial results. Consultations with teacher.	3
Proj 4	Working on project. Presentation of partial results. Consultations with teacher.	3
Proj 5	Working on project. Presentation of partial results. Consultations with teacher.	3
Proj 6	Working on project. Presentation of partial results. Consultations with teacher.	3
Proj 7	Working on project. Presentation of partial results. Consultations with teacher.	3
Proj 8	Working on project. Presentation of partial results. Consultations with teacher.	3
Proj 9	Working on project. Presentation of partial results. Consultations with teacher.	3
Proj 10	Presentation of students projects. Dyscusions of resuls. Evaluation of projects	3
	Total hours	30

TEACHING TOOLS USED

N1. Project presentation
N2. Presentation of project tools
N3. Consulting
N4. Self working – introduction to project
N5. Self working – working on project
N6. Self working – project documentation
N7. Project presentation

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_K01,PEK_K02	Evaluation of project documentation

		documentation
F2	PEK_U01,PEK_U02	Evaluation of project working
P = 0,2*F1 + 0,8*F2		Final evaluation
C		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Marcin Nowakowski, PicoBlaze. Mikroprocesor w FPGA,Wydawnictwo BTC, 2009
[2] Jacek Majewski, Piotr Zbysiński, Układy FPGA w przykładach, Wydawnictwo BTC,2007
[3] Q2687 Wireless CPU® , Product Technical Specification Reference:, WAVECOM S.A., 2008
[4] AT COMMANDS INTERFACE GUIDE, WAVECOM S.A.,2009

SECONDARY LITERATURE:

http://www.xilinx.com/
http://www.xilinx.com/products/intellectual-property/picoblaze.htm
https://docs.google.com/viewer?url=http://www.xilinx.com/support/documentation/ip_documentation/ug129.pdf
http://www.sierrawireless.com/
http://www.acte.pl/
http://www.eclipse.org/

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Embedded systems applications
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION **Internet Engineering**

Subject educational effect	**Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)****	**Subject objectives*****	**Programme content*****	**Teaching tool number*****
PEK_U01,PEK_U02	S1INT_U07	C2	Pr2,Pr3-Pr9	N2, N3
PEK_U01,PEK_U02	S1INT_U07	C3	Pr3-Pr9	N4, N5, N6
PEK_U01,PEK_U02	S1INT_U07	C4	Pr2	N2, N6
PEK_K01,PEK_K02	K1INF_K02	C4	Pr10	N6, N7

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

FACULTY OF **ELECTRONICS**

SUBJECT CARD

Name in Polish: **Rekonfigurowalność e-systemów**
Name in English: **E-systems reconfiguration**
Main field of study: **Computer Science**
Specialization: **Internet Engineering**
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code: **INES308**
Group of courses: **YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			15	
Number of hours of total student workload (CNPS)	30			90	
Form of crediting	crediting with grade			crediting with grade	
For group of courses mark (X) final course	X				
Number of ECTS points	**4**				
including number of ECTS points for practical (P) classes	-			3	
including number of ECTS points for direct teacher-student contact (BK) classes	1			1	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. INEW002 K1INF_W13, K1INF_U12
2. INEK011 K1INF_W29, K1INF_U33

SUBJECT OBJECTIVES

C1 Learning the requirements of service oriented systems configuration and assessing their throughput/dependability.
C2 Learning techniques of reconfigurable systems design.
C3 Acquiring the skills in organizing load and dependability tests of e-systems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 knows the methods of web systems configuration and their assessment techniques
PEK_W02 knows the techniques and tools of service throughput evaluation
PEK_W03 knows the procedures used to react to security threats (based on reconfiguration)

relating to skills:

PEK_U01 is able to plan and conduct throughput and dependability assessments of web services
PEK_U02 can analyze the results of stress tests and propose configuration modifications to improve the availability of the system

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Network services configuration, server configuration, service deployment	6
Lec 2	Assessment of e-systems functionality: operation monitoring and stress testing	3
Lec 3	Dependability events driven reconfiguration	3
Lec 4	Service profiling	3
	Total hours	15

Form of classes - project		Number of hours
Proj 1	Introduction to project and individual assignments	3
Proj 2	Design of the stress and dependability tests for a given information system	3
Proj 3	Stress tests performance and presentation of the results	6
Proj 4	System reconfiguration and assessment of the effects	3
	Total hours	15

TEACHING TOOLS USED

N1. Traditional lecture using video projector
N2. Presentation of the assignment requirements and experimental reusults
N3. Consultations
N4. Individual work – conducting the testing

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	Written test
F2	PEK_U01, PEK_U02	Individual presentations of the assignment requirements and results of experiments
P = 0,3*F1+0,7*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J.D. Meier, C. Farre, P. Bansode, S. Barber, D. Rea, Performance Testing Guidance for Web Applications, Microsoft Patterns and Practices.

SECONDARY LITERATURE:

[1] Tomcat manuals
[2] ApacheJMeter manuals
[3] Funkload documentation
[4] Nagios documentation

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
E-systems reconfiguration
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science

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	S1INT_W06	C1	Wy1	N1, N3
PEK_W02	S1INT_W06	C1	Wy2,Wy4	N1, N3
PEK_W03	S1INT_W06	C1	Wy3	N1, N3
PEK_U01	S1INT_U08	C1, C3	Pr1÷Pr3	N2, N4
PEK_U02	S1INT_U08	C2, C3	Pr4	N2, N4

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FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Zarządzanie projektem informatycznym**
Name in English	**Project management**
Main field of study (if applicable):	**Computer Science**
Specialization (if applicable):	**Computer Systems and Networks**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES404**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				30
Number of hours of total student workload (CNPS)	45				105
Form of crediting	Examination				crediting with grade
For group of courses mark (X) final course	X				
Number of ECTS points					
including number of ECTS points for practical (P) classes	5				3
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

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SUBJECT OBJECTIVES

C1 Knowledge and understanding of the principles of effective IT project management in planning and organization area, evaluation and monitoring of risk, budgeting
C2 Learning how implementation of complex IT projects is going on,
C3 Gain experience in teamwork, the ability to be creative, open to innovative approaches to achieving the aim

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 has knowledge of the project life cycle and methods of implementation of projects
PEK_W02 has knowledge of the processes necessary for the effective management of projects, with particular emphasis on the organizational side of the project, taking into account the context of the project.
PEK_W03 has knowledge of quality management in the project
PEK_W04 has knowledge of risk management in the project
relating to skills:
PEK_U01 knows how to perform the assigned tasks on schedule
PEK_U02 knows how to develop and present the strategy adopted to tasks realization in the project
relating to social competences:
PEK_K01 can work with the team, has a consciousness of their role in the project and attention

to the timely execution of the tasks assigned to him

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Introduction to Project Management	1
Lec 2	The life cycle of the project, the comparison of projects and operational activities	1
Lec 3	Project management methodologies, project management processes	2
Lec 4	Human resource management in the project, the roles in the team	1
Lec 5	Communication management in the project	2
Lec 6	Managing the scope of the project: requirements analysis	2
Lec 7	Quality Management	2
Lec 8	Risk management: risk analysis, risk response planning	2
Lec 9	Cost management in the project	1
Lec 10	The processes of project closure	1
	Total hours	**15**

Form of classes - seminar		**Number of hours**
Sem 1	Presentation of the project team, the established roles in the team, objective of the project, project management method chosen	2
Sem 2	Presentation of the communication plan, feasibility study, requirements analysis, discuss problems	4
Sem 3	Presentation of time-sharing in the project: defining actions, the allocation of resources for the implementation of activities, estimating the duration of action, developed schedules	4
Sem 4	Presentation of the risks identified in the project, qualitative and quantitative analysis of risks, risk response planning, monitoring and controlling risk, discuss problems	4
Sem 5	Presentation selected by teams quality management methods, methods of carrying out quality assurance and quality control, discuss problems	4
Sem 6	Presentation of the cost management plan in the project: estimating costs, determine budget, control costs, discuss problems	4
Sem 7	Presentation of the management plan for the procurement in the project, discuss problems	4
Sem 8	Closure of the project, discuss problems: the evaluation of all the presentations by students. Discuss the advantages and disadvantages of each presentation, Justification ratings by the teacher. Formulation suggestions of future - improving the form and content of the presentation	4
	Total hours	**30**

TEACHING TOOLS USED

N1. Traditional lectures using multimedia presentations
N2. multimedia presentation
N3. Discuss problem
N4. Consultation
N5. Own work

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01,PEK_W02, PEK_W03, PEK_W04	Activity during lectures, assessment of written test examination
F2	PEK_U01, PEK_U02, PEK_K01	Activity during seminar classes, assess the quality of the presentation on seminar
P=0.6*F1+0.4*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Praca zbiorowa, A Guide to the Project Management Body of Knowledge (PMBOK Guide), 2009
[2] Robertson J., Robertson S., (1999), Pełna analiza systemowa, WNT Warszawa, 2003
[3] Dennis A., Wixam B.H., System Analysis, Design, John Wiley & Sons, 2003

SECONDARY LITERATURE:

[1] Yourdon E., Modern Structured Analysis. Prentice Hall.
[2] Wrycza S., Projektowanie systemów informatycznych, Wydawnictwo Uniwersytetu Gdańskiego, 1997 (in polish)

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Project management
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
COMPUTER SCIENCE
AND SPECIALIZATION **Computer Systems and Networks**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization	Subject objectives	Programme content	Teaching tool number
PEK_W01	S1ISK_W03	C1	Lec1, Lec2, Lec3	N1, N4, N5
PEK_W02	S1ISK_W03	C1	Lec3, Lec4, Lec5, Lec6, Lec9, Lec10,	N1, N4, N5
PEK_W03	S1ISK_W03	C1	Lec7	N1, N4, N5
PEK_W04	S1ISK_W03	C1	Lec8	N1, N4, N5
PEK_U01	S1ISK_U04	C2	Sem1-Sem8	N2, N3, N5
PEK_U02	S1ISK_U04	C2	Sem1-Sem8	N2, N3, N5
PEK_K01	S1ISK_K01	C3	Sem1-Sem8	N3, N5,

FACULTY OF ELECTRONICS

SUBJECT CARD

Name in Polish: **Projektowanie systemów internetowych i mobilnych**
Name in Polish: **WEB and mobile system development**
Main field of study (if applicable): **Computer Science**
Specialization (if applicable): **Computer Systems and Networks**
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code: **INES405**
Group of courses **YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload (CNPS)	30			90	
Form of crediting	Examination			crediting with grade	
For group of courses mark (X) final course	X				
Number of ECTS points	**4**				
including number of ECTS points for practical (P) classes	-			2	
including number of ECTS points for direct teacher-student contact (BK) classes	1			1	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W25, K1INF_U25
2. K1INF_U26, K1INF_U27
3. K1INF_W09, K1INF_U07, K1INF_U08

SUBJECT OBJECTIVES

C1 Knowledge acquisition on selected issues on IT project management
C2 Knowledge acquisition on methods of user requirement acquisition and working out respective documentation
C3 Knowledge acquisition on selected techniques of application development with access to data on mobile devices such as smartphone, laptop
C4 Knowledge acquisition on selected techniques of Internet application development
C5 Gathering practical skills in development of integrated information systems
C6 Gathering practical skills in cooperation in project teams
C7 Gathering practical skills in presentation of work progress and final product of work

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student has knowledge on peculiarities of IT projects problems of IT project realization
PEK_W02 Student has knowledge on rules of IT project management
PEK_W03 Student has knowledge on rules of working out user requirements documentation for IT project
PEK_W04 Student has knowledge on selected techniques of Internet or mobile application development

relating to skills:

PEK_U01 Student can work out project documentation
PEK_U02 Student can estimate work for the project realization, define work schedule, and recognize risks
PEK_U03 Student can work out user requirements documentation
PEK_U04 Student can develop mobile or Internet application with access to database
PEK_U05 Student can cooperate in integration of compound system
PEK_U06 Student can report work progress

relating to social competences:

PEK_K01 Student can cooperate in project team

PROGRAMME CONTENT

Form of classes – lecture		**Number of hours**
Lec 1	Peculiarities of mobile applications and problems of IT Project realization.	1
Lec 2	Rules of working out user requirements documentation	1
Lec 3	Rules of working out project documentation	1
Lec 4	Designing application forms and using server controls in Internet application with HTML, C# using ASP.NET in Visual Studio 2010	2
Lec 5	Master pages and CSS	2
Lec 6	Database access using C# in ASP.NET in Internet application	2
Lec 7	Architecture and application life cycle of Windows Phone 7 application	2
Lec 8	Designing pages for Windows Phone 7	2
Lec 9	Data management in Windows Phone 7, Access to database	2
	Total hours	**15**

Form of classes - project		**Number of hours**
Proj 1	Selection of prospective project	2
Proj 2	Working out project documentation	2
Proj 3	Working out user requirements	4
Proj 4	Developing software module	15
Proj 5	Presentation of final product	4
Proj 6	Working out final documentation	3
	Total hours	**30**

TEACHING TOOLS USED

N1 Lecture with the multimedia presentation
N2 Lecture devoted to a problem
N3 Consultation
N4 Literatury study

N5 Own work on project

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 PEK_W02 PEK_W03 PEK_W04	Final test
F2	PEK_U01 PEK_U02 PEK_U03 PEK_U04 PEK_U05, PEK_U06	Assessment of work progress, and assessment of project documentation
F3	PEK_K01	Project manager assessment
P = 0,4*F1+0,4*F2+0,1*F3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Bill Evjen, ASP.NET 3.5 z wykorzystaniem C# i VB. Zaawansowane programowanie, Helion 2010

[2] Eugene Chuvyrov, Henry Lee , Windows Phone 7. Tworzenie efektownych aplikacji, Helion 2011

[3] Robert B. Dunaway , Visual Studio. NET, Mikom 2003

SECONDARY LITERATURE:

[1] Alexander I., Beus-Dukic L., Discovering Requirements, John Wiley, 2009

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
WEB and mobile system developement
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION
Computer Systems and Networks

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	S1ISK_W06	C1	Lec1	N1,N2
PEK_W02	S1ISK_W06	C1	Lec2	N1,N2
PEK_W03	S1ISK_W06	C2	Lec3	N1,N2
PEK_W04	S1ISK_W06	C4	Lec4,Lec5,Lec6, Lec7,Lec8,Lec9	N1,N2
PEK_U01	S1ISK_U09	C1,C2	Proj1,Proj2	N3,N4,N5
PEK_U02	S1ISK_U09	C1,C2	Proj2,Proj3	N3,N4,N5
PEK_U03	S1ISK_U09	C2	Proj3	N3,N4,N5
PEK_U04	S1ISK_U09	C3,C4	Proj4	N3,N4,N5
PEK_U05	S1ISK_U09	C3,C4,C5	Proj4,Proj5	N3,N4,N5
PEK_U06	S1ISK_U09	C6	Proj4,Proj5,Proj6	N3,N4,N5
PEK_K01	S1ISK_K01	C6	Proj1-Proj6	N5

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FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Projekt zespołowy**
Name in English	**Team project**
Main field of study	**Computer Science**
Specialization:	**Systems and Computer Networks**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES406**
Group of courses	**NO**

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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SUBJECT OBJECTIVES

C1 Acquiring the ability to carry out their engineering tasks as part of a complex engineering task

C2 Gain experience in teamwork, including the ability to planning and scheduling, intra-team communication, perform the role of a team member or leader, the opportunity to demonstrate their creativity, openness to innovative approaches focused on the team's success

SUBJECT EDUCATIONAL EFFECTS

relating to skills:

PEK_U01 is able to perform tasks in the implementation of complex IT project

PEK_U02 is able to apply the principles of project management for the implementation of complex IT project

PEK_U03 is able to prepare the project's documentation

relating to social competences:

PEK_K01 can work with the team, has a consciousness of their role in the project and attention to the timely execution of the tasks assigned

Form of classes - project	**Number of hours**

Proj 1	Determining the subject and purpose of the project (eg., web information system, a complex system database, a comprehensive project of computerization), the allocation of roles in the project, the initial allocation of tasks to be performed, the choice of team leader	4
Proj 2	Introduction to the problem area of the project. Overview of solutions in the area of the problem - an analysis of the methods and applied information technology.	4
Proj 3	Analysis of user requirements, including an analysis of the economic impact of the project implementation. Development of project assumptions. Determining the initial timetable for action (in the form of Gantt chart) and the principles of intra-team and teacher communication	8
Proj 4	Analysis of risks in the project, establish emergency scenarios and ways to monitor risks. Planning for quality management principles in the project, development of quality control procedures. Establish rules for the results subsequent stages justification of a project and rules for documenting the stages	4
Proj 5	The implementation of individual project tasks according to the schedule of the first stage of the project	12
Proj 6	The implementation team meetings with the teacher - in accordance with the agreed schedule (milestone)	4
Proj 7	The implementation of individual project tasks by scheduling the second stage of the project	12
Proj 8	Presentation of the results of the executed project, discuss problems, the assessment of the completed project by the teacher. Verification of the project. Determination of possible changes	8
Proj 9	Presentation of final project documentation in writing form	4
	Total hours	**60**

TEACHING TOOLS USED
N1. multimedia presentation N2. discussion N3. Consultation N4. Own work

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01 PEK_U02 PEK_K01	Rating presenting subsequent stages of the project and team skills: the timetable, the activity of the team, the ability to apply the principles of project management
F2	PEK_U03	Evaluation of the quality of the executed project and design documentation
P=0.4*F1+0.6*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Collective work, A Guide to the Project Management Body of Knowledge (PMBOK Guide), 2009
[2] Praca zbiorowa, Zarządzanie projektem informatycznym - model najlepszych praktyk, IFC Press, Kraków 2003 (in polish)
[3] J. Robertson, Robertson, S., Full system analysis, WNT Warsaw, 2003
[4] Dennis A., Wixam B.H., System Analysis, Design, John Wiley & Sons, 2003

SECONDARY LITERATURE:

[1] The literature recommended by the teacher

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

Dr inż. Iwona Poźniak-Koszałka, iwona.pozniak-koszalka@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Team project
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION **Systems and Computer Networks**

Subject educational effect	**Correlation between subject educational effect and educational effects defined for main field of study and specialization**	**Subject objectives**	**Programme content**	**Teaching tool number**
PEK_U01	S1ISK_U07	C1	Proj1–Proj8	N1, N2, N3, N4
PEK_U02	S1ISK_U07	C1	Proj1-Proj4	N1, N2, N3
PEK_U03	S1ISK_U07	C1	Proj9	N2, N3, N4
PEK_K01	S1ISK_K01	C2	Proj1-Proj8	N2, N3, N4

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FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish **Techniki światłowodowe**
Name in English **Fiber optic techniques**
Main field of study (if applicable): **Computer Science**
Specialization (if applicable): **Computer Systems and networks**
Level and form of studies: **1st level, full-time**
Kind of subject: **obligatory**
Subject code **INES407**
Group of courses: **YES**

	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 with grade		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	--		3		
including number of ECTS points for direct teacher-student contact (BK) classes	1.5		1		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W02
2. K1INF_W08
3. K1INF_U01

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SUBJECT OBJECTIVES

C1 Knowledge of the basic fiber telecommunication
C2 Ability to construct and measure simple telecommunication set-ups

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Knowledge of basic fiber network structure
PEK_W02 Knowledge of basic fiber operation
PEK_W03 Knowledge of cause of fiber attenuation
PEK_W04 Knowledge of basic dispersion parameters
PEK_W05 Knowledge of network elements
PEK_W06 Knowledge of network constructing method
PEK_W07 Ability to measure of fiber lines with using reflectometer

relating to skills:
PEK_U01 Ability to construct basic fiber systems

PEK_U02 Ability to measure fiber numerical aperture NA
PEK_U03 Ability to measure fiber attenuation
PEK_U04 Ability to connect fiber elements without attenuation
PEK_U05 Ability to measure basic parameters of fiber elements
PEK_U06 Ability to use a reflectometer and carry out measurement with using it

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Organization, application of fiber techniques in transmission systems	2
Lec 2	Fiber operation and basic relations determining single and multimode work	2
Lec 3	Fibers and fiber elements losses	2
Lec 4	Fiber dispersion	2
Lec 5	Basic elements of fiber networks, couplers, sources, detectors and others	2
Lec 6	Transmission limitations in fiber networks, resulting from attenuation and dispersion	2
Lec 7	Reflectometric measurement of fiber lines	2
Lec 8	Written exam	1
	Total hours	15

	Form of classes - laboratory	**Number of hours**
Lab 1	Safety rules in fiber technique (work with optical radiation sources)	1
Lab 2	Measuring fiber numerical aperture	2
Lab 3	Measuring fiber attenuation as wavelength function	2
Lab 4	Stable connection of fiber with using fusion fiber set-up	2
Lab 5	Coupling light sources with fiber	2
Lab 6	Measurement fiber coupler parameters	2
Lab 7	Measurement fiber line by reflectometer method	2
Lab 8	Repeating of chosen exercises, attested credit	2
	Total hours	15

TEACHING TOOLS USED

N1. Traditional lecture
N2. Consultations
N3. Own work-independent study and preparing last written exam

N4. Preparing theoretical material to the exercises
N5. Realization of laboratory exercises
N6. Elaboration of reports from laboratory exercises

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-W07	Written exam
F2	PEK_U01-U02	Reports
P=0.5*F1+0.5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Jerzy Siuzdak"Wstęp do wspólczesnej telekommunikacji światłowodowe", Wydawnictwo Komunikacji I Łączności, Warszawa 1997.
[2] Bernard Ziętek "Optoelektronika" Wydawnictwo Uniwersytetu Mikołaja Kopernika, Toruń 2004.

SECONDARY LITERATURE:

[1] B.E.A. Saleh, M. C. Teich " Fundamentals of Photonics", Second Editions, A.Jon Wiley&Sons. Inc. Publications, 2007

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Fiber optic techniques

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION

Computer Systems and Networks

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)	S11SK_W05	C1	Lec 1	N1, N2, N3
PEK_W02	S11SK_W05	C1	Lec 2	N1, N2, N3
PEK_W03	S11SK_W05	C1	Lec 3	N1, N2, N3
PEK_W04	S11SK_W05	C1	Lec 4	N1, N2, N3
PEK_W05	S11SK_W05	C1	Lec 5	N1, N2, N3
PEK_W06	S11SK_W05	C1	Lec 6	N1, N2, N3
PEK_W07	S11SK_W05	C1	Lec 7	N1, N2, N3
PEK_U01(skills)	S11SK_U08	C2	Lab 2	N4, N5, N6
PEK_U02	S11SK_U08	C2	Lab 3	N4, N5, N6
PEK_U03	S11SK_U08	C2	Lab 4	N4, N5, N6
PEK_U04	S11SK_U08	C2	Lab 5	N4, N5, N6
PEK_W05	S11SK_U08	C2	Lab 6	N4, N5, N6
PEK_W06	S11SK_U08	C2	Lab 7	N4, N5, N6

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

*** - from table above

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FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Seminarium dyplomowe**
Name in English	**Diploma Seminar**
Main field of study (if applicable):	**Computer Science**
Specialization:	**Computer Systems and Networks**
Level and form of studies:	**1nd* level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES409**
Group of courses	**NO***

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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SUBJECT OBJECTIVES

C1 Learn how to search for selective knowledge needed to create their own original solutions.
C2 Learn how to prepare a presentation allowing students in communicative way transfer their original ideas, concepts and solutions
C3 The acquisition of the skill of creative discussion allowing in a factual and substantive way justified and defended own opinions
C4 Gain of the writing skills for presenting student's own achievements, including a presentation of his/her own achievements against the development of the global mean

SUBJECT EDUCATIONAL EFFECTS

relating to skills:
PEK_U01 is able to prepare a presentation that contains own scheme of research based on references
PEK_U02 is able to discuss objectively and justify his/her original ideas and solutions
PEK_U03 is able to critically evaluate the scientific and technical others solutions

PROGRAMME CONTENT

	Form of classes - seminar	**Number of hours**
Sem 1	Discussion of the principles of preparing and writing a thesis, and in particular presentation the principles of editorial side of the final project	2
Sem 2	Individual presentations related to the problem of the diploma thesis, pointed	8

	on the original own contribution in comparison to the achievements known in literature	
Sem 3	Public discussion on the state of literature and established the idea of solving problems posed to compose the diploma thesis	6
Sem 4	Individual presentations summarizing the results obtained in the final projects, in particular showing the selected topics and objectives of the diploma thesis outlining the original approach proposed by their authors	14
	Total hours	**30**

TEACHING TOOLS USED
N1. Multimedia presentation N2. Discussion - talk problematic N3. Own work

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01	rate of the presentation
F2	PEK_U02, PEK_U03	the activity in the discussion
P=0.5 F1+0.5 F2		

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE:
[1] Literature related to the issues of the diploma thesis
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
Prof. dr hab. inż. Andrzej Kasprzak, Andrzej.kasprzak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Diploma Seminar

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION **Computer Systems and Networks**

Subject educational effect	**Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)****	**Subject objectives*****	**Programme content*****	**Teaching tool number*****
PEK_U01	S1ISK_U11	C2	Sem2, Sem4	N1
PEK_U02	S1ISK_U11	C3	Sem3, Sem4	N2, N3
PEK_U03	S1ISK_U11	C1 ,C2, C3, C4	Sem3, Sem4	N2, N3

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

*** - from table above

FACULTY ELECTRONICS

SUBJECT CARD

Name in Polish	**Bezprzewodowe sieci komputerowe**
Name in English	**Wireless Networks**
Main field of study (if applicable):	**Computer Science**
Specialization (if applicable):	**Computer Systems and Networks**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES412**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15		15	15	
Number of hours of total student workload (CNPS)	30		50	40	
Form of crediting	crediting with grade*		crediting with grade*	crediting with grade*	
For group of courses mark (X) final course	X				
Number of ECTS points	**4**				
including number of ECTS points for practical (P) classes	-		2	1	
including number of ECTS points for direct teacher-student contact (BK) classes	1		1	1	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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SUBJECT OBJECTIVES

C1. Knowledge in the field of application, technologies and protocols for the wireless networks.
C2. Abilities of practical design and configuration of wireless networks.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – The course results with a student's ability to explain and describe application of the wireless networks.

PEK_W02 – The course results with a student's ability to explain and describe current standards, protocols and technologies of the wireless networks.

PEK_W03 – The course results with a student's ability to explain and describe information in the field of design and configuration of the wireless networks.

relating to skills:

PEK_U01 – The course results with a student's ability to build and configure the wireless network using network devices, use diagnostic tools.

PEK_U02 – The course results with a student's ability to use catalogs equipment and network

software.

PEK_U03 – The course results with a student's ability to perform logical design, deploy devices for the wireless network taking into account requirements of user.

PEK_U04 – The course results with a student's ability to match suitable wireless technology to the actual requirements of the project.

PROGRAMME CONTENT

	Form of classes - lecture	**Number of hours**
Lec 1	Introduction, classification of wireless networks, properties, applications.	**1**
Lec 2	Wireless communication systems, transmission media.	**2**
Lec 3	Techniques of the transmission in the wireless systems.	**2**
Lec 4	Algorithms and protocols for access to media.	**1**
Lec 5	Networks WLAN- solutions, modes of work.	**2**
Lec 6	Security of the wireless networks.	**2**
Lec 7	Design of WLAN network- implementation, testing.	**2**
Lec 8	WPAN networks- selected technologies.	**1**
Lec 9	Satellite data transmission system.	**1**
Lec 10	Basics of cellphones.	**1**
	Total hours	**15**

Form of classes - laboratory		**Number of hours s**
Lab 1	Introduction.	**1**
Lab 2	Configuration different modes of operation of access points in the networks of standard IEEE 802.11.	**2**
Lab 3	Measurement of performance of wireless networks.	**2**
Lab 4	Security of wireless networks.	**2**
Lab 5	Equipment of wireless networks with alternative firmware	**2**
Lab 6	Design wireless network.	**2**
Lab 7	VoIP service in the wireless networks.	**2**

Lab 8	Configuration and software modems GSM/GPRS/UMTS	**2**
	Total hours	**15**

Form of classes - project		**Number of hours**
Proj 1	Introduction, perform organization of classes, discussion of the example projects.	2
Proj 2	Definition of topic and scope of the project	1
Proj 3	Preliminary stage of preparation- collection of information, analysis of requirements.	2
Proj 4	Stage of the selection and design- selection of technology, network architecture, logical project, selection of equipment, local interview, balance of Internet connection, modeling of propagation, location of transmitters and antennas.	6
Proj 5	Documentation of project, cost estimate	2
Proj 6	Discussion - Presentation of the final report.	2
	Total hours	**15**

TEACHING TOOLS USED

N1. Lecture with multimedia presentations.
N2. Problem-oriented lecture
N3. Practical tasks in laboratory.
N4. Consultation
N5. Discussion
N6. Own work – preparation to lecture, laboratory and project.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educationaleffectnumber	Way of evaluating educational effect achievement
F1	PEK_W01 ÷ PEK_W03	Tests
F2	PEK_U01, PEK_U04	Summation of exercises in laboratory, laboratory reports, oral answers
F3	PEK_U01÷PEK_U04,	Project work, presentation of project, participation in discussion
P = (F1 + F2 + F3)/3		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] P. Gajewski, St. Wszelak, Technologie b*ezprzewodowe sieci teleinformcznych*, wyd. WKŁ. Warszawa 2008
[2] Grey Holden, Sieci domowe i bezprzewodowe, Poznań NAKON 2010
[3] B. Danowski, *Wi-Fi. Domowe sieci bezprzewodowe Ilustrowany przewodnik*; Helion 2010
[4] K. Nowicki, J. Woźniak, *Przewodowe i bezprzewodowe sieci LAN*, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2002
[5] Wesołowski K., *Systemy radiokomunikacji ruchomej*, WKŁ, Warszawa 2003.

SECONDARY LITERATURE:

[1] RFC (ang. Request for Comments) standards www.ietf.org
[2] IEEE (ang. Institute of Electrical and Electronics Engineers) standards www.ieee.org

[3] Networld Journal
[4] Materials of computer network devices and software vendors

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Wireless Networks

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION **Computer Systems and Networks**

Subjecteducationaleffect	**Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)****	**Subjectobjectives*****	**Programmecontent*****	**Teachingtoolnumber*****
PEK_W01	S1ISK_W04	C1	Lec1, Lec8÷Lec10	N1, N2, N4÷N6
PEK_W02	S1ISK_W04	C1	Lec2÷Lec10	N1, N2, N4÷N6
PEK_W03	S1ISK_W04	C1	Lec5÷Lec7	N1, N2, N4÷N6
PEK_U01	S1ISK_U05	C2	Proj1, Lab1÷Lab8	N3÷N6
PEK_U02	S1ISK_U06	C2	Proj3÷ Proj4, Lab6	N3÷N6
PEK_U03	S1ISK_U06	C2	Proj2, Proj4÷Proj5, Lab3, Lab6, Lab8	N3÷N6
PEK_U04	S1ISK_U05; S1ISK_U06	C1, 2	Proj4, Proj6, Lab2, Lab4, Lab6	N3÷N6

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

*** - from table above

FACULTY **ELECTRONICS (W4)**

SUBJECT CARD

Name in Polish	**Bezpieczeństwo sieci komputerowych**
Name in English	**Network security**
Main field of study (if applicable):	**Computer Science**
Specialization (if applicable):	**Computer Systems and Networks**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES414**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		15		
Number of hours of total student workload (CNPS)	50		40		
Form of crediting	crediting with grade		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		1		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

K1INF_W26, K1INF_U28

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SUBJECT OBJECTIVES

C1 To built an extended knowledge regarding threads and vulnerabilities of computer networks and security mechanisms, including cryptographic mechanisms
C2 To develop necessary skills to test computer system security and configure security mechanisms
C3 To become conscious of the idea of standardization in the field of network security, to become conscious of social and legal aspect of information security

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Knows and understands typical threads and vulnerabilities of modern teleinformatic systems
PEK_W02 Has the knowledge in the field of the means and methods for systems security, including cryptographic mechanisms
PEK_W03 Has the knowledge in the field of risk analysis methodologies and auditing methodologies, is able to specify and describe standards normalizing the computer security evaluation
relating to skills:
PEK_U01 Can plan and conduct security test of computer network, can analyze results and

formulate conclusions
PEK_U02 Can use cryptographic tools, encrypt and decrypt, put and verify digital signatures
PEK_U03 Can configure and manage security mechanisms and secured network services

relating to social competences:
PEK_K01 Understands the idea of standardization and certification, knows and understands social and legal aspect of information security

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction, basic terms and principles of network security, security attributes	1
Lec 2	Threads and vulnerabilities of computer networks	3
Lec 3	Symmetric cryptography, basic of cryptoanalysis	4
Lec 4	Asymmetric cryptography	2
Lec 5	Cryptographic algorithms for data integrity. Digital signature.	1
Lec 6	Key distribution, public key certificates, public key infrastructure	2
Lec 7	Authentication protocols	1
Lec 8	Secure network services, virtual private networks	6
Lec 9	Wireless networks security	1
Lec 10	Filtering and inspection of network traffic	4
Lec 11	Reliability of computer networks	1
Lec 12	Security standardization, security policy, legal aspects of network security	2
Lec 13	Risk analysis, audit of network security	2
	Total hours	**30**

Form of classes - laboratory		**Number of hours**
Lab 1	Network threads, vulnerability detection, security of network operating systems	3
Lab 2	Cryptography and cryptoanalysis	2
Lab 3	Secure network services	2
Lab 4	Tunneling, virtual private networks	2
Lab 5	Public key infrastructure	3
Lab 6	Firewalls, traffic filtering, security of network infrastructure	3
	Total hours	**15**

TEACHING TOOLS USED

N1. Lecture with multimedia presentations N2. Practical laboratory exercises N3. Discussion N4. Self-study – preparation for lecture and laboratory N5. Consultations with lecturers

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_K01	Written colloquium, oral answers, quiz
F2	PEK_U01-PEK_U03	Quiz, evaluation of laboratory exercises completion, laboratory report, discussion
P = 0,6 * F1 + 0,4 * F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Stallings W., ‘Kryptografia i bezpieczeństwo sieci komputerowych : matematyka szyfrów i techniki kryptologii’, wyd. Helion, Gliwice, 2012
[2] Cole E., Krutz R., Conley J., ‘Bezpieczeństwo sieci: biblia’, wyd. Helion, Gliwice, 2005
[3] Dostálek L., ‘Bezpieczeństwo protokołu TCP/IP: kompletny przewodnik’, Wydawnictwo Naukowe PWN, Warszawa, 2006.
[4] Krzysztof Liderman, ‘Analiza ryzyka i ochrona informacji w systemach komputerowych’, Wydawnictwo Naukowe PWN: Mikom, Warszawa, 2008
[5] Fry C., Nystrom M., ‘Monitoring i bezpieczeństwo sieci’, wyd. Helion, Gliwice, 2010
[6] Polaczek T., ‘Audyt bezpieczeństwa informacji w praktyce: praktyczny przewodnik po zagadnieniach ochrony informacji’, wyd. Helion, Gliwice, 2006
[7] Serafin, M., ‘Sieci VPN: zdalna praca i bezpieczeństwo danych’, wyd. Helion, Gliwice, 2010
[8] Stallings W., ‘Ochrona danych w sieci i intersieci’, WNT, Warszawa, 1997

SECONDARY LITERATURE:

[1] Lockhart A., ‘125 sposobów na bezpieczeństwo sieci’, Helion, Gliwice, 2007
[2] Lam K., LeBlanc D., Smith B., ‘Ocena bezpieczeństwa sieciowego’, Microsoft, wyd. APN PROMISE, Warszawa, 2005
[3] Web pages of organizations and institutions connected with network security (www.isaca.org, www.cert.pl, www.iso.org)

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

Dr inż. Marcin Markowski, Marcin.Markowski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Network security
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Computer Science**
AND SPECIALIZATION **Computer Systems and Networks**

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	S1ISK_W07	C1	Lec1, Lec2,Lec11	N1, N3-N5
PEK_W02	S1ISK_W07	C1	Lec3-Lec11	N1, N3-N5
PEK_W03	S1ISK_W07	C1	Lec12, Lec13	N1, N3-N5
PEK_U01	S1ISK_U10	C2	Lab1	N2-N5
PEK_U02	S1ISK_U10	C2	Lab2	N2-N5
PEK_U03	S1ISK_U10	C2	Lab3-Lab6	N2-N5
PEK_K01	K1INF_K03, K1INF_K04	C3	Lec1, Lec12	N1, N3

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

Zał. nr 4 do ZW 64/2012

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Sieci TCP/IP**
Name in English	**TCP/IP networks**
Main field of study (if applicable):	**Computer Science**
Specialization (if applicable):	**Computer Systems and Networks**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES415**
Group of courses	**NO**

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

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

K1INF_W26, K1INF_U28

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SUBJECT OBJECTIVES

C1 To develop necessary skills for routing configuration on network devices
C2 To develop necessary skills for designing and configuration of network addressing in complex computer network
C3 To gain experience in cooperation in team while designing, implementing and configuring of complex networks

SUBJECT EDUCATIONAL EFFECTS

relating to skills:

PEK_U01 Can design and configure static routing rules, can configure chosen routing protocols in computer network

PEK_U02 Can diagnose and solve the problems related to routing and accessibility of devices in computer network, including analysis of route table on router and describing an algorithm of packet processing in accordance with route table

PEK_U03 Can design classless addressing scheme in complex computer network

relating to social competences:

PEK_K01 Can cooperate in team, can plan the tasks distribution among team members, can formulate conclusions base on partial knowledge of team members

PROGRAMME CONTENT		
Form of classes - laboratory		**Number of hours**
Lab 1	Introduction, router architecture, rules of router configuration	2
Lab 2	Static routing: design, configuration, troubleshooting	4
Lab 3	Designing of addressing schemes in complex computer networks	2
Lab 4	Dynamic routing - distance-vector routing protocols: configuration, troubleshooting	6
Lab 5	Class and classless addressing, routes summarization	2
Lab 6	Dynamic routing – link-state routing protocols: configuration, troubleshooting	4
Lab 7	Analysis of route table structure and route table lookup algorithm	2
Lab 8	Individual practical assignment – implementing of complex computer network, designing of address scheme, configuration of different sources of the route information	6
Lab 9	Packets of routing protocols, monitoring of routing process, criteria in routing algorithms	2
	Total hours	**30**

TEACHING TOOLS USED
N1. Practical lab assignments N2. Tests on e-learning platform N3. Discussion N4. Self-study – preparation for colloquium and laboratory N5. Consultations with lecturers

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01- PEK_U03, PEK_K01	Quiz, monitoring realization of laboratory exercises, report from laboratory, tests on e-learning platform
P = F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Tannenbaum A., S., Sieci komputerowe, Helion, Gliwice, 2004
[2] Sportack M., A., Routing IP, Podstawowy podręcznik, Mikom, Warszawa, 2000
[3] Comer D., E., Sieci komputerowe TCP/IP, zasady, protokoły i architektura, tom 1, WNT, Warszawa, 1997
[4] Graziani R., Johnson A., 'Akademia sieci Cisco CCNA Exploration : semestr 2: protokoły i koncepcje routingu', Wydawnictwo Naukowe PWN, Warszawa, 2008
[5] Cisco course materials in the form of multimedia presentation

SECONDARY LITERATURE:

[1] Deepankar M., Karthikeyan R., 'Network routing : algorithms, protocols and architectures', Elsevier/Morgan Kaufmann Publishers, Amsterdam, 2007
[2] RFC documents (www.ietf.org) and IEEE standards (www.ieee.org)
[3] Documentation of network devices provided by producers

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

TCP/IP networks

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION **Computer Systems and Networks**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_U01	S11SK_U01	C1	Lab1, Lab2, Lab4, Lab6, Lab8	N1-N5
PEK_U02	S11SK_U01	C1	Lab2, Lab4, Lab6, Lab7, Lab9	N1-N5
PEK_U03	S11SK_U01	C2	Lab3, Lab5, Lab8	N1-N5
PEK_K01	S1ISK_K01	C3	Lab2, Lab4, Lab6	N1, N3

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

*** - from table above

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Rozległe sieci komputerowe**
Name in English	**Wide Area Networks**
Main field of study (if applicable):	**Computer Science**
Specialization :	**Computer Systems and Networks**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES416**
Group of courses	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			15	
Number of hours of total student workload (CNPS)	30			30	
Form of crediting	crediting with grade			crediting with grade	
For group of courses mark (X) final course	X				
Number of ECTS points	2				
including number of ECTS points for practical (P) classes				1	
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. K1INF_W02, K1INF_U02
2. K1INF_W21, K1INF_U19, K1INF_U20
3. KTINF_W13, K1INF_U12

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SUBJECT OBJECTIVES

C1 Acquire the competences about the Wide Area Networks such as: communication protocols, practical network analysis and fundamental design methodology.
C2 Acquire the ability to various interpretations and understanding of the problems of network analysis and design.
C3 Acquire the extensive competences about internet protocols.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 To possess the competence about the principles and science of Wide Area Network.
PEK_W02 To possess the competence about Wide Area Network communications protocols.
PEK_W03 To possess the competence about the procedure for doing network analysis and design.

relating to skills:

PEK_U01 To be able to analyze and interpret the properties of the communication protocols and match these protocols for designed network taking into account the designing assumptions.
PEK_U02 To be able to use the current catalogue of Wide Area Network devices.

PEK_U03 To be able to design the Wide Area Network satisfying the user requirements.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to Wide Area Networks	1
Lec 2	Structure and architecture of Wide Area Network	1
Lec 3	Protocols of the Data Link Layer: HDLC and LAP-B	1
Lec 4	Principles of channels switching and packet switching	1
Lec 5	Protocols X.25 and Frame Relay	1
Lec 6	Protocols TCP/IP	1
Lec 7	ATM	1
Lec 8	X.121 addressing. IP address design	1
Lec 9	Flows in networks and performance measures	1
Lec 10	Routing protocols	1
Lec 11	Wide Area Network Topologies	1
Lec 12	Design methodology of Wide Area Networks	3
Lec 13	Access procedures to Wide Area Networks	1
	Total hours	15

Form of classes - project		Number of hours
Proj 1	To compile the conception of the Wide Area Network taking into account requirements specification	1
Proj 2	The desidn of the network topology	2
Proj 3	Ewaluation of the network reliability	1
Proj 4	The design of the network equipments placement	3
Proj 5	Developing a Routing Strategy	4
Proj 6	Developing an Addressing Strategy	1
Proj 7	Network management	1
Proj 8	Project estimate	2
	Total hours	15

TEACHING TOOLS USED

N1. Lecture
N2. Consultation
N3. Discussion – talk problematic
N4. Own work – own study
N5. Own work – project preparing

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	colloquium
F2	PEK_U01, PEK_U02, PEK_U03	Final project (in writing form)
P=0.4 F1+0.6 F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Kasprzak A., Rozległe sieci komputerowe z komutacją pakietów, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 1999
[2] Tannenbaum A., S., Sieci komputerowe, Helion, Gliwice, 2004
[3] Graziani R., Vachon B., Akademia sieci Cisco CCNA Exploration: Sieci WAN – zasady dostępu, Pwn, Warszawa, 2009
[4] Sportack M., A., Routing IP, Podstawowy podręcznik, Mikom, Warszawa, 2000
[5] Comer D., E., Sieci komputerowe TCP/IP, zasady, protokoły i architektura, tom 1, WNT, Warszawa, 1997

SECONDARY LITERATURE:

[6] Current catalogue of corporations making wide area network devices
[7] Wajda K. red., Budowa sieci komputerowych w technologii ATM, Wydawnictwo Fundacji Postępu Telekomunikacji, Kraków, 1997

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Wide Area Networks

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION **Computer Systems and Networks**

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	S1ISK_W02	C1	Lec1, Lec2, Lec4,Lec10	N1, N5
PEK_W02	S1ISK_W02	C1, C2	Lec3, Lec5, Lec6, Lec7, Lec8	N1, N5
PEK_W03	S1ISK_W02	C1, C2	Lec8, Lec9, Lec11, Lec12, Lec13	N1, N5
PEK_U01	S1ISK_U03	C2, C3	Lec5, Lec6, Lec7, Proj1	N2, N3
PEK_U02	S1ISK_U03	C2, C3	Proj4, Proj7	N4, N5
PEK_U03	S1ISK_U03	C2, C3	Proj1, Proj2, Proj3, Proj5, Proj6, Proj8	N2, N5

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

*** - from table above

FACULTY OF ELECTRONICS

SUBJECT CARD

Name in Polish	**Transmisja danych**
Name in English	**Data transmission**
Main field of study:	**Computer Science**
Specialization:	**Computer Systems and Networks**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INES417**
Group of courses	**YES**

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1INF_W16,
2. K1INF_U14

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SUBJECT OBJECTIVES

C1 Acquisition of basic knowledge on determining the amount of information, its transformation and transmission.

C2 Learning the basic equipment for data transmission systems design, including the elements and principles of local network cabling.

C3 Getting independent learning skills, preparation the presentation and reporting their knowledge of data transmission in computer networks.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 – student knows the concept of information, the amount of information, the entropy of discrete and continuous source, the entropy of memory source and the concept of extended source.

PEK_W02 – student knows the concept of discrete channel and continuous channel with additive Gaussian noise and has a basic knowledge of the channel capacity.

PEK_W03 – student has a basic knowledge of a continuous signal digitization and interpolation.

PEK_W04 – student has a basic knowledge of a block codes and of optimal codes design.

PEK_W05 – student has a basic knowledge of an error detection and error correction.

PEK_W06 – student has a basic knowledge of the sinusoidal modulation, pulse modulation and of the spectra of signals and pulse spectra.
PEK_W07 – student has a basic knowledge of the use of links: mechanical, acoustic, wire, radio and optic fiber.
PEK_W08 – student has a basic knowledge of the serial binary interfaces, modem technology and the parameters of the binary channel.
PEK_W09 – student has a basic knowledge of the techniques of channel multiplexing.
PEK_W10 – student has a basic knowledge of the structured cabling design principles, he knows the active and passive devices included in the cabling system.

relating to skills:
PEK_U01 – student is able to evaluate the ability of sources to generate an information and is able to encode the discrete information.
PEK_U02 – student is able to assess the suitability of channels to send the amount of information
PEK_U03 – student is able to select the transmission medium and modems to achieve the transmission with a given rate and at a given distance.
PEK_U04 – student is able to find the right active and passive devices and to find a cable types to design a network cabling.
PEK_U05 – student can independently acquire the necessary knowledge in the field of data transmission in computer networks and is able to demonstrate their knowledge.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Organizational matters. Basic concepts: information, the amount of information provided by the event. Units of information. Source of information, entropy of one-dimensional discrete random variable. Memory sources, Extended memoryless sources.	2
Lec 2	Digital channel and its capacity, capacity of a symmetric channel. A continuous source entropy. Continuous channel capacity, channel with additive white Gaussian noise. The concept of digitization. Quantization, quantization error. Sampling, Shannone'a theorem. Polynomial interpolation, the interpolation error.	2
Lec 3	Uniquely decodable block codes without delay. The average length of the code and the entropy. Optimal codes, Huffman codes. Hamming space, error detection and error correction, codes with parity-check, cyclic codes, Hamming Code.	2
Lec 4	Link and its components, carriers and their modulation, simple modulation, sinusoidal modulations, digital modulations, modulation rate and bit rate. Spectrum AM, PM, FM, and PAM signals. Spectrum of pulses and pulses with finite spectrum.	2
Lec 5	Types and characteristics of transmission paths. Mechanical and acoustic paths. Wire cables, twisted pairs and their categories, coaxial cables. EIA/TIA-568 standard. Optical fibers and optical fiber cables. Properties of radio waves and wireless paths. Characteristics of linear channels and parameters of the electrical paths.	2

Lec 6	Binary channel parameters. Models of errors. Serial binary interfaces. Gilbert's Model. Asynchronous and synchronous transmission. S1 and S2 interfaces and their normalization - ITU V.24/28. Serial RS-232-C, EIA-574, RS-449 and RS530, RS-422, RS-423-A, X.21, V.35 standards. Null modem. Modems: ITU-T recommendations, primary and secondary channel, examples of modems. Modem control.	2
Lec 7	Channel multiplexing, synchronization methods: spatial multiplexing, differential multiplexing, frequency multiplexing, time multiplexing, correlation multiplexing, code multiplexing, central synchronizing and autonomous synchronizing, discrete phase correction. Structured cabling: the concept, principles and elements of the system, distribution frames and horizontal cabling, scalability and flexibility of wiring. Selected problems: the quality of data transmission.	2
Lec 8	Repertory.	1
	Total hours	**15**
Form of classes - seminar		**Number of hours**
Sem 1	Organizational matters. Discussion of these topics, forms of presentation and principles of assessment. The initial distribution of themes to be developed.	2
Sem 2	Discussion on themes suggested by the students, and the final distribution of themes to be developed.	2
Sem 3-7	Presenting the seminars for students with discussion.	10
Sem 8	Discussion of appearances and score all seminaries.	1
	Total hours	**15**

TEACHING TOOLS USED

N1. Traditional lectures using multimedia presentations, the final test.
N2. Discussion on themes suggested by the students, and the final distribution and themes to be developed.
N3. Presenting the seminars for students with discussion.
N4. Individual work - preparing for lectures and final test.
N5. Individual work - development of the theme and the execution of the seminar presentation.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 – PEK_W10 PEK_U01 – PEK_U04	Colloquium in the form of an e-quiz.
F2	PEK_W01 – PEK_W10 PEK_U01 – PEK_U05	Rating of presentation preparation and delivery a seminar, rating of participation in discussions.
C = 0,5 F1 + 0,5 F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Abramson N., Information theory and coding, McGraw-Hill Education, 1963.
[2] A.Simmonds; Data communications and transmission principles an introduction, Palgrave Macmillan, 1997.
[3] Catalogues of equipment: www.rad.com, www.blacbox.com.
[4] Catalogues of copper cables - www.nktcables.com
[5] Catalogues of optical fibers - www.swiatlowody.com.pl

SECONDARY LITERATURE:

[1] Rutkowski J., Theory of information and coding, Gliwice, The Publishing House of the Silesian University of Technology, 2006.
[2] Cover T.M., Joy A. Thomas J.A., Elements of information theory, Hoboken, N.J., John Wiley and Sons, cop. 2006.
[3] Haykin S., Moher M., Modern wireless communications, Pearson Prentice Hall, 2005.
[4] Couch L.W.,Digital and analog communication systems, Upper Saddle River : Pearson/Prentice Hall, cop. 2007.
[5] Geier J., Wireless networks first-step, Cisco Press, Indianapolis, 2005.
[6] Tse D., Viswanath P., Fundamentals of wireless communication, Cambridge [etc.], Cambridge University Press, 2005.
[7] Stallings W., Data and computer communications, Boston [etc.], Prentice Hall, cop. 2011.

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Data transmission

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

AND SPECIALIZATION **Computer Systems and Networks**

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	S1ISK_W01	C1	Lec1	N1, N3, N4
PEK_W02	S1ISK_W01	C1	Lec2	N1, N3, N4
PEK_W03	S1ISK_W01	C1	Lec2	N1, N3, N4
PEK_W04	S1ISK_W01	C1	Lec3	N1, N3, N4
PEK_W05	S1ISK_W01	C1	Lec3	N1, N3, N4
PEK_W06	S1ISK_W01	C1	Lec4	N1, N3, N4
PEK_W07	S1ISK_W01	C1, C2	Lec5	N1, N3, N4
PEK_W08	S1ISK_W01	C1, C2	Lec6, Sem3 – Sem7	N1, N2, N3, N4
PEK_W09	S1ISK_W01	C1, C2	Lec7, Sem3 – Sem7	N1, N2, N3, N4
PEK_W10	S1ISK_W01	C1, C2	Lec7, Sem3 – Sem7	N1, N2, N3, N4, N5
PEK_U01	S1ISK_U02	C1	Lec1, Lec3	N1, N3
PEK_U02	S1ISK_U02	C1	Lec2, Lec4	N1, N3
PEK_U03	S1ISK_U02	C2	Lec5, Lec6	N1, N3, N5
PEK_U04	S1ISK_U02	C2	Lec5, Lec7, Sem3 – Sem7	N1, N2, N3, N5
PEK_U05	S1ISK_U02	C3	Sem3 – Sem7	N2, N5

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF ELECTRONICS

SUBJECT CARD

Name in Polish	**Podstawy programowania**
Name in English	**Programming principles**
Main field of study (if applicable):	**Control Engineering and Robotics, Electronics, Computer Science, Telecommunications, Teleinformatics**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code	**INEW0001**
Group of courses:	**YES**

	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)	40	40	40		
Form of crediting	crediting with grade	crediting with grade	crediting with grade		
For group of courses mark (X) final course	X				
Number of ECTS points	4				
including number of ECTS points for practical (P) classes	-	1	2		
including number of ECTS points for direct teacher-student contact (BK) classes	1	1	1		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

SUBJECT OBJECTIVES

C1 Acquisition of basic knowledge on computer algorithms, how they are presented and analyzed.

C2 Learning the basic programming constructs which are common to most of algorithmic languages: types, variables, conditional branching, looping, functions with arguments, recursion, arrays, lists, files

C3 Acquiring the ability of the structural and procedural programming in C + +.

C4 Getting familiar with standard algorithms processing large amounts of data, i.e.: searching, aggregating and sorting.

C5 Getting Acquainted with selected forms of dynamic and complex data structures: list, stack, queue and tree

C6 Acquiring the ability to configure and use the selected integrated development environment to improve the processes of editing, compiling and testing multi-file programming projects.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01	Has a basic knowledge of modern programming languages and paradigms.
PEK_W02	Knows fundamental principles and structures to represent algorithm in the form of flowchart
PEK_W03	Knows the syntax, semantics, specific programming constructs and concepts in C++ programming language.
PEK_W04	Knows the principles of structured and procedural programming.
PEK_W05	Understands concepts of iteration, recursion, memory organization, pointer arithmetic, dynamic resource allocation and release.
PEK_W06	Knows the basic algorithms for searching, aggregation and sorting of the data.
PEK_W07	Has the knowledge of the selected dynamic and complex data structures.
PEK_W08	Has knowledge of modern software tools and integrated development environments supporting the work of the programmer

relating to skills:

PEK_U01	Can represent an algorithm in the flowchart form.
PEK_U02	Can construct a solution for simple programming tasks that require the use of several branches, loops or recursion.
PEK_U03	Can define and invoke functions, choose the way of passing the input and output parameters.
PEK_U04	Can define, initialize and process basic data representations: arrays, strings, structures and their combinations.
PEK_U05	Can properly structure the program code and data in C + +, in accordance with the principles of structured and procedural programming.
PEK_U06	Can program the data storage operations in non-volatile memory using file-streams.
PEK_U07	Can appropriately use pointers and dynamic memory management, including proper allocation / deallocation procedures.
PEK_U08	Is able to design and program a set of functions that hide implementation details for complex and dynamic data structures.
PEK_U09	Is able to propose and carry out the testing procedure for symbolic or dynamic software validation.
PEK_U10	Can use the integrated development environment to configure, edit, and test single-threaded console applications.
PEK_U11	Is able to retrieve information about programming constructs and concepts from the technical documentation, the Internet and other sources in Polish and English.

relating to social competences:

PEK_K01	Understands the need for lifelong learning, systematic review of new publications in the field of computer science and studying documentation of new programming tools.
PEK_K02	Is conscious of the legal and social aspects of information technology and the need for ethics in professional activities.

PROGRAMME CONTENT		
Form of classes – lecture		**Number of hours**
Lec 1	The algorithms and methods for their representation. The dominant programming paradigms. The flowcharts. The stages and tools used during software development. The overall structure, syntax and semantics of the program in C++. Examples of source code for simple console applications.	2
Lec 2	Computer data and their representations. Data types and ranges of values. Program variables, variable declaration and initialization. The visibility of identifiers. Storage classes. Predefined scalar types and user defined types (typedef). Logic, bitwise and arithmetic operators. Rules for calculation of algebraic expressions. The standard mathematical functions. Dealing with streams and basic input/output operations. Dialogue with the user in text mode. Formatted input and output using standard libraries <stdio.h> <iostream>.	2
Lec 3	Basic programming instructions: assignment, conditional selection and choice. Controlling the flow of the algorithm, folding and nesting conditional instructions. Examples of algorithms that process small amounts of data (without using a loop). The concept of iterations in the program. The types of loops: while, do-while, for. Terms of completion and nesting the loops. Instructions to break or continue the loop. Simple iterative algorithms: counting, searching the minimum or maximum, summing up the data values retrieved from the stream.	2
Lec 4	Arrays in C++. Array declaring, defining and indexing. Processing array data using a loop. One-dimensional and multi-dimensional arrays.	2
Lec 5	Functions and procedures in programming languages. Declaring, defining and invoking the function. Parameter-less functions. Explicit passing of the data via the argument list or the return statement. Passing arguments by value and by reference. Default values for arguments. Overloaded functions. Inline functions. Recursion.	2
Lec 6	Computer memory addresses, pointers to variables and memory, pointers arithmetic in C/C++. The relationship between pointers and arrays. Working with arrays using the pointer notation i. Passing arguments to the function by address. Standard C functions which operate directly on computer memory <mem.h> (memset, memcpy, memcmp, memmove, etc.)	2
Lec 7	Array representation of strings in C/C++. Declaring, defining, and manipulating the strings. Standard C library <string.h> (strcpy, strcmp, strcat, strlen, etc.). Examples of user-defined functions for processing textual data.	2
Lec 8	Midterm (forming) exam Program specification, testing, error handling, code documentation.	2
Lec 9	Recursion and recursive algorithms. Binary search and sorting of the arrays.	2
Lec 10	Structural type - the concept of structures in C. Definition, declaration and initialization of structural variables. Nesting of composite types (structures and arrays). An example of a simple in+memory database using the representation in the form of arrays of structures.	2
Lec 11	Support for external memory in the form of raw data files. Random access and text files. Procedural <stdio.h> and object-oriented <fstream> <stream> libraries for standard file operations. Input and output operations for the characters, strings and formatted data. Binary data - block files. Portability of the data representation between different operating systems.	2
Lec 12	Dynamic memory allocation. Allocating and freeing the allocated memory (malloc, calloc, free, new and delete operators). Heap overflow and dynamic data corruption. Dynamic allocation and reallocation of arrays of a specified size.	2

Lec 13	The complex pointer data structures. The array of pointers to simple variables, array of pointers to arrays, dynamic array of pointers to dynamic strings. Pointers to functions. Standard qsort function.	2
Lec 14	Dynamic and recursive data structures: the pointer-driven list, stack, queue, priority queue, binary tree, and their properties.	2
Lec 15	Lecture summary and final test	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl 1	Overview of the program and the organization of classes. Writing algorithms using flowcharts language.	1
Cl 2	Representation of standard data types in C. Appropriate selection of the data type for variables. Data representation constraints. The dialogue with the user using standard printf and scanf functions. Formatting data (construction of format strings containing different control sequences) Writing mathematical expressions in C/C++. Write boolean expressions.	2
Cl 3	The concept of iterations. The role and selection of the control variables for the loop. Loop breaking constructs. Iterative algorithms (count, sum, maximum, minimum, calculation of the series). The equivalence of the loop. Structured and procedural programming. Sub-division of tasks into functions, the concept of program menu. Visibility range and overriding the identifiers.	2
Cl 4	Basic array processing algorithms (filling, comparing items, search, move, delete, add items). Pseudo-dynamic array (static array with a counter of used items). Parameterization of algorithms. Appropriate selection of the method for passing input/output parameters between the functions.	2
Cl 5	Text processing functions. Code analysis of the standard functions <string.h> library. User-defined functions for character string processing. Dynamic allocation and reallocation of memory. One-dimensional arrays of variable size. Pointer arithmetic and pointer casting. Exercise with accessing the memory through pointers.	2
Cl 6	The structural decomposition of large programs and complex data representation. Discussion and practice the representation of simple in-memory database (using an array of structures). User defined data type, enumeration. Encoding data using the dictionary. Exercises with data storage in external memory using file streams. Text and binary representation of numerical data. Error detection during file stream input / output operations. Controlling the location of the file position indicator. Basic algorithms for sequential processing of text and raw binary files.	2
Cl 7	Analysis of the standard implementations of complex-dynamic data structures: the linked list, stack, queue, priority queue. Analysis of the standard implementation of selected array sorting algorithms.	2
Cl 8	Repetition and examination	2
	Total hours	15

Form of classes - laboratory		Number of hours
Lab 1	Overview of the program and the organization of the laboratory classes. Workplace training in health and safety. Setting up development environment (DevC + +, Visual Studio). An example of a console program using simple variables, assignment statements, and console input output operations. Editing, compiling, running and debugging the program.	1
Lab 2	Exercises with the creation of example programs illustrating the use of basic C/C++ constructs and concepts: assignment, conditional branching (if, if-else), selection (switch, case, break, default). Nesting branching instructions. The calculation of mathematical expressions.	2
Lab 3	Exercises with the creation of programs that illustrate the use of the user loop (while, do-while, for). Standard iterative algorithms: counting, summing, searching the maximum and minimum. Exercises with creating user-defined functions. Parameterless functions. Local variables. Passing parameters through global variables.	2
Lab 4	Exercises with the creation of programs that illustrate the use of the array data representation. Processing arrays using a loop. Selected algorithms for processing arrays: linear and binary search, bubble sort and insertion sort. The functions with explicit argument list. Passing arguments by value, reference and address.	2
Lab 5	Exercises with the creation of programs illustrating the processing of textual data, represented as an array of characters. Accessing the variables using pointers. Programs that use dynamic allocation and re-allocation of one-dimensional arrays. Debugging and testing the correctness of the programs.	2
Lab 6	Implementing simple in-memory database using representation in the form of an array of structures (or array of pointers to dynamic structures). Extending the functionalities of database program: adding archiving operations in the external memory (in the form of text or binary files).	2
Lab 7	User-defined implementation of selected dynamic data structure: the linked list, queue, priority queue or a tree. Exercises with creating programs using recursion.	2
Lab 8	Repetition and assessment	2
	Total hours	15

TEACHING TOOLS USED
N1. Traditional lectures using multimedia projector N2. Individual work - preparing for the classes by solving predefined exercises N3. Individual work - self-implementation of appointed laboratory programs N4. Program code inspections carried out by the laboratory instructor N5. Individual work - self-study and preparation for tests N6. 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_U01 – U02, PEK_U08 – U09, PEK_U11, PEK_K01 – K02	Assessment of oral questioning. Evaluation of the individual solution for class sample exercises. Final test for the class form.
F2	PEK_U03 – U07, PEK_U10	Assessment of the progress of laboratory exercises. Code inspection of the programs created by student, carried out by laboratory instructor.
F3	PEK_W01 – W04	Midterm lecture test
F4	PEK_W05 – W07	Final lecture test
P = 1/4*F1 + 1/4*F2 + 1/2*(1/3*F3 + 2/3*F4)		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Gręboszˇ J., Symfonia C++, Standard, Editions 2000, Kraków, 2005, 2008, 2010
[2] Stroustrup B., Język C++, WNT, Warszawa 2004
[3] Eckel B., Thinking in C++, Helion, Gliwice 2002
[4] Wróblewski P., Algorytmy, struktury danych i techniki programowania. Helion, 2009

SECONDARY LITERATURE:

[1] Kernighan R., Ritchie C., Język C, PWN, Warszawa
[2] Segewick C., Algorytmy w C++. W.N.-T., Warszawa, 1999
[3] Lippman S. B., Lajoie J., Podstawy języka C++, WNT, Warszawa 2003
[4] Neapolitan R., Naimipour K., Podstawy algorytmów z przykładami w C++. Wyd. Helion, 2004

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

Dr inż. Marek Piasecki, marek.piasecki@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS
FOR SUBJECT: **Programming principles**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Control Engineering and Robotics, Electronics,
Computer Science, Telecommunications, Teleinformatics

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)*	Subject objectives	Programme content	Teaching tool number
PEK_W01 (knowledge)	K1AIR_W09, K1EKA_W08, K1INF_W09, K1TEL_W08, K1TIN_W40	C1, C2, C3	Lec1	N1, N5
PEK_W02	K1AIR_U08, K1EKA_U06, K1INF_U07, K1TEL_U06, K1TIN_U07	C1	Lec1	N1, N2
PEK_W03	K1AIR_W09, K1EKA_W08, K1INF_W09, K1TEL_W08, K1TIN_W40	C2	Lec2, Lec3, Lec4, Lec5	N1, N2, N3, N4
PEK_W04	K1AIR_W09, K1EKA_W08, K1INF_W09, K1TEL_W08, K1TIN_W40	C1, C3	Lec1, Lec3, Lec10	N1, N2, N3
PEK_W05	K1AIR_W09, K1EKA_W08, K1INF_W09, K1TEL_W08, K1TIN_W40	C1, C2	Lec3, Lec6, Lec9	N1, N2, N3
PEK_W06	K1AIR_W09, K1EKA_W08, K1INF_W09, K1TEL_W08, K1TIN_W40	C1, C4	Lec3, Lec4, Lec5, Lec9, Lec11	N1, N2, N3
PEK_W07	K1AIR_W09, K1EKA_W08, K1INF_W09, K1TEL_W08, K1TIN_W40	C5	Lec12, Lec13, Lec14	N1, N2, N3, N4, N6
PEK_W08	K1AIR_U09, K1EKA_U07, K1INF_U08, K1TEL_U07, K1TIN_U08	C6	Lec1	N1, N3, N4
PEK_U01 (skills)	K1AIR_U08, K1EKA_U06, K1INF_U07, K1TEL_U06, K1TIN_U07	C1	Cl1	N1, N2
PEK_U02	K1AIR_U08, K1EKA_U06, K1INF_U07, K1TEL_U06, K1TIN_U07	C1, C4	Cl2, Cl3, Lab2	N1, N2, N3, N6
PEK_U03	K1AIR_U09, K1EKA_U07, K1INF_U08, K1TEL_U07, K1TIN_U08	C2	Cl3, Lab3	N1, N2, N3
PEK_U04	K1AIR_U09, K1EKA_U07, K1INF_U08, K1TEL_U07, K1TIN_U08	C2	Lec4, Lec7, Lec10, Cl4, Cl5, Cl6, Lab4, Lab5, Lab6	N1, N2, N3
PEK_U05	K1AIR_U08, K1EKA_U06, K1INF_U07, K1TEL_U06, K1TIN_U07	C3	Cl3	N1, N2
PEK_U06	K1AIR_U09, K1EKA_U07, K1INF_U08, K1TEL_U07, K1TIN_U08	C2	Cl6, Lab6	N1, N2, N3, N5
PEK_U07	K1AIR_U09, K1EKA_U07, K1INF_U08, K1TEL_U07, K1TIN_U08	C2, C5	Cl5, Lab5	N1, N2, N3
PEK_U08	K1AIR_U08, K1EKA_U06, K1INF_U07, K1TEL_U06, K1TIN_U07	C5	Cl7, Lab7	N1, N2, N3, N5, N6
PEK_U09	K1AIR_U08, K1EKA_U06, K1INF_U07, K1TEL_U06, K1TIN_U07	C6	Lab1, Lab4, Lab5	N3, N4
PEK_U10	K1AIR_U09, K1EKA_U07, K1INF_U08, K1TEL_U07, K1TIN_U08	C6	Lab1	N3, N4, N6
PEK_K01 (competences)	K1AIR_U09, K1EKA_U07, K1INF_U08, K1TEL_U07, K1TIN_U08	C1, C2, C3	Lec1, Cl7, Lab7	N1, N4, N5, N6
PEK_K02	K1AIR_W09, K1EKA_W08, K1INF_W09, K1TEL_W08, K1TIN_W40	C6	Lec1, Lec8, Cl1, Lab1	N1, N4

Zał. nr 4 do ZW 64/2012

FACULTY OF ELECTRONICS

SUBJECT CARD

Name in Polish:	**Programowanie obiektowe**
Name in English:	**Object Oriented Programming**
Main field of study (if applicable):	**Computer Science**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code:	**INEW002**
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	credited with grade		credited with grade		
For group of courses mark (X) final course	X				
Number of ECTS points	**6**				
including number of ECTS points for practical (P) classes	-		2		
including number of ECTS points for direct teacher-student contact (BK) classes	1		2		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. K1AIR_W09, K1EKA_W08, K1INF_W09, K1TEL_W08, K1TIN_W40
2. K1AIR_U09, K1EKA_U07, K1INF_U08, K1TEL_U07, K1TIN_U08

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SUBJECT OBJECTIVES

C1 The student would be introduce in the basis of object oriented programming, its engineering and methodology

C2 The student would know how to prepare program source code using object oriented approach

SUBJECT EDUCATIONAL EFFECTS	
relating to knowledge:	
PEK_W01	Student knows the idea of the object oriented approach.
PEK_W02	Can explain the fundaments of object oriented methodology as the tool of the comprehending the real world.
PEK_W03	Can know an idea of object oriented methodology based on Unified Modeling Language (UML).
PEK_W04	Student knows basic tools and paradigms of the object oriented approach.
PEK_W05	Student knows basic programming tools on the exampled object oriented programming C++ language.
Relating to skills:	
PEK_U01	Can independently formulate and use the technology of the object oriented programming.
PEK_U02	Can create and execute the parts of the source code containing definitions of constructors both in the basis and in the derived classes.
PEK_U03	Can create and execute the parts of the independently drawn up source code containing virtual functions and overloaded operators.

PROGRAM CONTENT		
Form of the lecture		**Number of hours**
Lec1	Introduction. Object oriented approach – a general idea.	2
Lec2	Presentation of the main application of the object oriented approach (project management, etc.) and the nowadays object oriented programming languages	2
Lec3	Object oriented programming language C++. Main paradigms, Constructors and destructors.	2
Lec4	Gadgets in C++. Default arguments, references, complex declarators, modificators, etc. A copy constructor and the assignment operator.	2
Lec5	Assessment of the main nowadays object oriented programming languages: C++, C# and Java. Microsoft .NET framework.	2
Lec6	Object oriented programming language Java. Main ideas. Packages and implementations.	2
Lec7	Object oriented programming language C#. Main ideas. Interfaces and garbage collection.	2
Lec8	Object oriented approach. Encapsulation and inheritance. Virtual functions and abstract classes.	2
Lec9	Creation of the simple class. Encapsulation. Static data and functions. Operator overloading as the global and member function. Operator overloading in C++ and C#.	2
Lec10	Inheritance and derived classes. Multiply inheritance in C++ and interfaces in C# and Java.	2
Lec11	C# language. Classes, expressions and operators.	2
Lec12	Inheritance, interfaces, iterators, exceptions handling, processes and threads	2

Lec13	Virtual functions and abstract classes. Basis of the Unified Modeling Language (UML). Class diagrams. Examples, case studies.	4
Lec14	Recapitulatory lecture.	2
	Total hours	30

Form of the laboratory		Number of hours
L1,2	Getting acquainted with the programming platform. Simple program in structural methodology.	4
L3-6	Application of the object oriented approach for the individual simple program in C++ agreed with the lecturer	8
L7-10	Individual program in C++ agreed with the lecturer	8
L11-12	Individual simple program in C# or Java agreed with the lecturer	4
L13-15	Individual program in C# or Java agreed with the lecturer	6
	Total hours	**30**

TEACHING TOOLS USED
N1. LCD Projector, blackboard N2. Computer with an access to the Internet, Integrated Development Environment *(*IDE), MS .NET Framework, MS Office

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-W05	Lectures credited with grade
F2	PEK_U01-U03	Program code presented and credited with grade
P = 0.6 * F1 + 0.4 * F2 (while lab ranked)		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Gręboszj., Symfonia C++ standard. Programowanie w języku C++ orientowane obiektowo, Kraków, Oficyna Kallimach, 2005.

[2] Stroustrup B., Język C++, Warszawa, WNT, 2004.

[3] Eckel, B.Thinking in Java, Wydawnictwo Helion, 2006

[4] Hejlsberg A., Torgersen M., Wiltamuth S., Golde P., Język C#. Programowanie. Wydanie III, Microsoft .NET Development Series

[5] Kisilewicz J., Język C++. Programowanie obiektowe, Wrocław, Oficyna Wydawnicza Politechniki Wrocławskiej, 2005.

SECONDARY LITERATURE:

[6] Martin F., UML w kropelce, Warszawa, Oficyna Wydawnicza LTP, 2005.

[7] Martin J., Odell J.J., Podstawy metod obiektowych, WNT, 1997

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

Jerzy Kotowski (jerzy.kotowski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Object Oriented Programming

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Computer Science

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***
(knowledge)				
PEK_W01	K1AIR_W13, K1EKA_W12, K1INF_W13, K1TEL_W12, K1TIN_W12	C1	Lec1-2	N1
PEK_W02	K1AIR_W13, K1EKA_W12, K1INF_W13, K1TEL_W12, K1TIN_W12	C1	Lec3, Lec5	N1
PEK_W03	K1AIR_W13, K1EKA_W12, K1INF_W13, K1TEL_W12, K1TIN_W12	C1	Lec13	N1
PEK_W04	K1AIR_W13, K1EKA_W12, K1INF_W13, K1TEL_W12, K1TIN_W12	C1	Lec6-7,Lec8, Lec11-12	N1
PEK_W05	K1AIR_W13, K1EKA_W12, K1INF_W13, K1TEL_W12, K1TIN_W12	C1	Lec4, Lec9, Lec10	N1
(skills)				
PEK_U01	K1AIR_U13, K1EKA_U11, K1INF_U12, K1TEL_U11, K1TIN_U12	C2	L1-6	N2
PEK_U02	K1AIR_U13, K1EKA_U11, K1INF_U12, K1TEL_U11, K1TIN_U12	C2	L7-10	N2
PEK_U03	K1AIR_U13, K1EKA_U11, K1INF_U12, K1TEL_U11, K1TIN_U12	C2	L11-15	N2

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

*** - from table above

FACULTY

SUBJECT CARD

Name in English	Mathematical Analysis 2.3A
Name in Polish	Analiza Matematyczna 2.3 A
Main field of study (if applicable)	
Specialization (if applicable)	
Level and form of studies	1st level, full-time
Kind of subject	obligatory
Subject code	MAP1149
Group of courses	Yes

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	0			
Number of hours of total student workload (CNPS)	150	0			
Form of crediting	exam				
For group of courses mark (X) final course	X				
Number of ECTS points	5	0			
including number of ECTS points for practical (P) classes	3	0			
including number of ECTS points for direct teacher-student contact (BK) classes	3	0			

PREREQUISITIES

Knowledge of differential and integral calculus of function of one variable

SUBJECT OBJECTIVES

C1. Knowledge of basic properties of infinite series and power series.
C2. Understanding the basic concepts of differential calculus of several variables.
C3. Understanding the basic concepts of integral calculus of functions of several variables.
C4. Understanding the Laplace transform and Fourier transform.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEK_W1. Know the basic criteria of convergence of infinite series.
PEK_W2. Know the basic concepts of differential and integral calculus of functions of several variables.

PEK_W3. Know the basic concepts of differential and integral calculus of functions of several variables.

Relating to skills:
PEK_U1. Can find power series of a function, knows how to use power series for approximations of functions
PEK_U2. Can compute the partial derivatives, directional and gradient functions of several variables and interpret the wielkośći, able to solve problems for the optimization of functions of several variables
PEK_U3. Is able to calculate and interpret the integral multiple, able to solve engineering problems using double and triple integrals
PEK_U4. Can calculate integral transforms from simple functions

Relating to social competences:
PEK_K1. Understand the role played by Mathematical Analysis to analyze technical problems

PROGRAM CONTENT		
	Form of classes - lectures	**Hours**
Wy1	Improper integrals. Cauchy principal value.	2.0
Wy2	Infinite series. The basic criteria for convergence of series. Absolute and conditional convergence. Leibniz criterion.	2.0
Wy3	Power series. The radius and interval of convergence. Cauchy theorem - Hadamard. Taylor Series.	2.0
Wy4	Properties of the space R^n. Subsets of the space R^n. Functions of several variables.	2.0
Wy5	Partial derivatives of the first order. Definition. Geometric interpretation. Higher order partial derivatives. Schwarz theorem	2.0
Wy6	The plane tangent to the graph of a function of two variables. Directional derivatives. Gradient of a function.	2.0
Wy7	Local extremes of functions of two variables. Sufficient conditions for the existence of extreme. The smallest and the largest value of the function on the set. Examples of extremal problems in geometry and technology.	2.0
Wy8	Conditional extremes conditional function of two variables. Applications. Examples of optimization problems.	2.0
Wy9	Double integrals. The definition of the double integral. Geometric and physical interpretation. Calculation of double integrals normal regions.	2.0
Wy10	Properties of double integrals. Jacobian function. Change of variables in double integrals. Double integral in polar coordinates.	2.0
Wy11	Triple integrals. Reversal iterated integrals. Change of variables in cylindrical and spherical coordinates	2.0
Wy12	Applications of double and triple integrals in geometry and physics.	2.0
Wy13	Laplace transform.	2.0
Wy14	Inverse Laplace transform and its applications	2.0
Wy15	Introduction to the Fourier transform.	2.0
	Total hours	**30**

TEACHING TOOLS USED

N1. Lecture - traditional method
N3. Student’s self work with the assistance of mathematical packages

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F-forming; P -	Educational effect number	Way of evaluating educational effect

concluding)		achievement
F1	PEK_W1, PEK_W2, PEK_U1, PEK_U2, PEK_K1	test
F2	PEK_W2, PEK_U2, PEK_U3, PEK_K1	test
F3	all	exam
P - sets the lecturer		

LITERATURE

PRIMARY

A1. F. Leja, Rachunek Różniczkowy i Całkowy, Wydawnictwo Naukowe PWN, 2012
A2. R. Leitner, Zarys Matematyki Wyższej dla Studiów Technicznych, Cz. 1-2 WNT, Warszawa, 2006.

SECONDARY

B1. W. Krysicki, L. Włodarski, Analiza Matematyczna w Zadaniach, Cz. II, PWN, Warszawa 2006
B2. G. M. Fichtenholz, Rachunek Różniczkowy i Całkowy, T. I-II, PWN, Warszawa 2007
B3. M. Gewert, Z. Skoczylas, Analiza Matematyczna 2. Przykłady i Zadania, Oficyna Wydawnicza GiS, Wrocław 2011

SUBJECT SUPERVISORS

1. Komisja Programowa Instytutu Matematyki i Informatyki
2. prof. dr hab. Jacek Cichoń (Jacek.Cichon@pwr.wroc.pl)
3. dr Agnieszka Wyłomańska (Agnieszka.Wylomanska@pwr.wroc.pl)

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Analiza Matematyczna 2.2 B MAP1149

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_W1		C1	Wy1 Wy2 Wy3	N1, N3
PEK_W2		C2 C3	Wy4 Wy5 Wy6 Wy7 Wy8 Wy9 Wy10 Wy11 Wy12	N1, N3
PEK_W3		C4	Wy13 Wy14 Wy15	N1, N3
PEK_U1		C1	Wy1 Wy2 Wy3	N1, N3
PEK_U2		C2	Wy5 Wy6 Wy7 Wy8	N1, N3
PEK_U3		C3	Wy9 Wy10 Wy11 Wy12	N1, N3
PEK_U4		C4	Wy13 Wy14 Wy15	N1, N3
PEK_K1		C1 C2 C3 C4	Wy1 Wy2 Wy3 Wy5 Wy6 Wy7 Wy8 Wy9 Wy10 Wy11 Wy12 Wy13 Wy14 Wy15	N1, N3

Zał. nr 4 do ZW

FACULTY OF ELECTRONICS

SUBJECT CARD

Name in Polish: RACHUNEK PRAWDOPODOBIEŃSTWA
Name in English: Probability Theory
Main field of study (if applicable):
Specialization (if applicable):

Level and form of studies: 1st/ ~~2nd*~~ level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional / university-wide~~*
Subject code: MAP1151
Group of courses ~~YES~~ /NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				
Number of hours of total student workload (CNPS)	30				
Form of crediting	Crediting with grade				
For group of courses mark (X) final course					
Number of ECTS points	1				
including number of ECTS points for practical (P) classes	0,5				
including number of ECTS points for direct teacher-student contact (BK) classes	0,75				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knows single variable calculus.
2. Has basic knowledge regarding theory of both numerical and power series.
3. Can compute two-dimensional integrals.

SUBJECT OBJECTIVES

C1 Study of basic concepts and methods of probability theory
C2 Study of classical probabilistic distributions, their properties and applications to practical problems from different areas of science and technology

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 knows basic concepts and probability theory methods

PEK_W02 knows classical probabilistic distributions and their properties

relating to skills:

PEK_U01 understands basic concepts of probability theory

PEK_U02 can use basic probabilistic methods to solve both theoretical and practical problems from different areas of science and technology

relating to social competences:

PEK_K01 can, without assistance, search for necessary information in the suggested literature and acquire knowledge independently

PEK_K02 understands the need for systematic and independent work on mastery of course material

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Wy1	Probability space. Events, and operations on events. The axiomatic definition of probability. General properties of probability. Classical and geometric probability. Variations, permutations and combinations.	2
Wy2	Definition of conditional probability. The law of total probability. Bayes theorem. Independent events.	1
Wy3	Random variables, definition and examples. Distribution of a random variable. Cumulative distribution function and its properties. Classification of random variables. Distribution of a function of random variable.	2
Wy4	Discrete random variables. Review of discrete distributions: Bernoulli, binomial and Poisson distributions. Poisson approximation to binomial distribution.	1
Wy5	Continuous random variables. Probability density function and its relationship with cumulative distribution function. Review of continuous distributions: uniform, normal, exponential distributions.	1
Wy6	Parameters of random variables. Expectation and its properties. Higher order moments. Variance and its properties. Quantile of order p. Expected values, variances, medians and quartiles for selected distributions. Standardization of a normally distributed random variable. Standard normal distribution table.	2
Wy7	Bivariate random variables. Definitions of cumulative distribution function and probability density function. Marginal distributions. Independence of random variables. Moments, correlation coefficient. Sequences of random variables: sums of independent random variables, expectation and variance of such sums. (Weak) law of large numbers.	3
Wy8	Convergence in distribution. Central Limit Theorem, Lindeberg-Levy theorem, De Moivre-Laplace theorem. Test.	3
	Total hours	**15**

TEACHING TOOLS USED
1. Lecture – traditional method. 2. Lists of exercises. 3. Consultations 4. Student's self work – preparation for the test.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
P	PEK_W01, PEK_W02 PEK_U01, PEK_U02, PEK_K01, PEK_K02	quizzes, tests

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] J. Jakubowski, R. Sztencel, Rachunek prawdopodobieństwa dla prawie każdego, Script, Warszawa 2002.
[2] A. Papoulis, Prawdopodobieństwo, zmienne losowe i procesy stochastyczne, WNT, Warszawa 1972.
[3] H. Jasiulewicz, W. Kordecki, Rachunek prawdopodobieństwa i statystyka matematyczna. Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2001.
[4] A. Plucińska, E. Pluciński, Probabilistyka, WNT, Warszawa 2006.
[5] W. Krysicki, J. Bartos, W. Dyczka, K. Królikowska, M. Wasilewski, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, Cz. I-II, PWN, Warszawa 2007.

SECONDARY LITERATURE:

[1] D. Bobrowski, Probabilistyka w zastosowaniach technicznych, PWN, Warszawa 1986.
[2] A. A. Borowkow, Rachunek prawdopodobieństwa, PWN, Warszawa 1975.
[3] W. Feller, Wstęp do rachunku prawdopodobieństwa, T. I, PWN, Warszawa 2006.
[4] M. Fisz, Rachunek prawdopodobieństwa i statystyka matematyczna, PWN, Warszawa 1967.
[5] T. Inglot, T. Ledwina, Z. Ławniczak, Materiały do ćwiczeń z rachunku prawdopodobieństwa i statystyki matematycznej, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1984.
[6] J. Jakubowski, R. Sztencel, Wstęp do teorii prawdopodobieństwa, Script, Warszawa 2001.
[7] W. Kordecki, Rachunek prawdopodobieństwa i statystyka matematyczna. Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2002.

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

Program Committee of the Institute of Mathematics and Computer Science

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
PROBABILITY THEORY MAP1151
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)		C1, C2	Wy1- Wy8	1, 2
PEK_W02		C2	Wy4 – Wy6	1, 2
PEK_U01 (skills)		C1	Wy1- Wy8	1, 2, 3
PEK_U02		C1, C2	Wy1- Wy8	1, 2, 3
PEK_K01 (competences)		C1, C2	Wy1- Wy8	1, 2, 3
PEK_K02		C1, C2	Wy1- Wy8	1, 2, 3

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

WYDZIAŁ ELEKTRONIKI

KARTA PRZEDMIOTU

Nazwa w języku polskim: **Algebra liniowa 2**
Nazwa w języku angielskim: **Linear Algebra 2**
Kierunek studiów: **Informatyka, Teleinformatyka**
Stopień studiów i forma: **I stopień, stacjonarna**
Rodzaj przedmiotu: **obowiązkowy, ogólnouczelniany**
Kod przedmiotu: **MAP1152**
Grupa kursów: **NIE**

	Wykład	Ćwiczenia	Laboratorium	Projekt	Seminarium
Liczba godzin zajęć zorganizowanych w Uczelni (ZZU)	15				
Liczba godzin całkowitego nakładu pracy studenta (CNPS)	30				
Forma zaliczenia	Zaliczenie na ocenę				
Dla grupy kursów zaznaczyć kurs końcowy (X)					
Liczba punktów ECTS	**1**				
w tym liczba punktów odpowiadająca zajęciom o charakterze praktycznym (P)	-				
w tym liczba punktów ECTS odpowiadająca zajęciom wymagającym bezpośredniego kontaktu (BK)	0,5				

WYMAGANIA WSTĘPNE W ZAKRESIE WIEDZY, UMIEJĘTNOŚCI I INNYCH KOMPETENCJI

1. K1INF_W01, K1INF_U02

CELE PRZEDMIOTU

C1. Poznanie podstawowych pojęć z teorii przestrzeni liniowych i przekształceń liniowych.
C2. Opanowanie podstawowej wiedzy o przestrzeniach euklidesowych.
C3. Poznanie podstawowych pojęć algebry abstrakcyjnej.
C4. Stosowanie nabytej wiedzy do tworzenia i analizy modeli matematycznych w celu rozwiązywania zagadnień teoretycznych i praktycznych w różnych dziedzinach nauki i techniki.

PRZEDMIOTOWE EFEKTY KSZTAŁCENIA

Z zakresu wiedzy:

PEK_W01 ma podstawową wiedzę o przestrzeniach i przekształceniach liniowych
PEK_W02 ma podstawową wiedzę z przestrzeni euklidesowych
PEK_W03 zna podstawowe pojęcia i własności struktur algebraicznych: grup, pierścieni i ciał
PEK_W04 wie, jak znajdować bazę przestrzeni liniowej oraz wyznaczać jądro, obraz, macierz oraz wartości i wektory własne przekształcenia liniowego
PEK_W05 wie, jak ortogonalizować wektory i znajdować rzuty ortogonalne wektora na podprzestrzeń liniową

Z zakresu kompetencji społecznych:

PEK_K01 potrafi wyszukiwać i korzystać z literatury zalecanej do kursu oraz samodzielnie zdobywać wiedzę
PEK_K02 rozumie konieczność systematycznej i samodzielnej pracy nad opanowaniem materiału kursu

TREŚCI PROGRAMOWE		
Forma zajęć - wykłady		**Liczba godzin**
Wy1	Zmiana bazy podprzestrzeni liniowej. Diagonalizacja macierzy. Przestrzeń euklidesowa. Iloczyn skalarny.	3
Wy2	Rząd macierzy. Przestrzenie rozwiązań układów równań liniowych. Baza ortonormalna. Ortogonalizacja Grama-Schmidta. Dopełnienie ortogonalne podprzestrzeni liniowej. Rzut ortogonalny. Macierz ortogonalna i macierz unitarna.	3
Wy3	Formy kwadratowe. Postać kanoniczna. Dodatnia określoność. Macierz hermitowska dodatnio określona.	2
Wy4	Grupa, podgrupa. Arytmetyka modularna.	3
Wy5	Pierścień. Pierścień wielomianów. Pierścień liczb całkowitych. Ciało liczb rzeczywistych i ciało liczb zespolonych.	2
Wy6	Największy wspólny dzielnik liczb całkowitych. Rozszerzony algorytm Euklidesa. Przystawanie modulo n. Małe twierdzenie Fermata. Obliczanie odwrotności modulo n. Ciało Zn.	2
	Suma godzin	**15**

STOSOWANE NARZĘDZIA DYDAKTYCZNE
N1. Wykład – metoda tradycyjna N2. Lista zadań N3. Konsultacje N4. Praca własna studenta – samodzielne rozwiązywanie list zadań

OCENA OSIĄGNIĘCIA PRZEDMIOTOWYCH EFEKTÓW KSZTAŁCENIA

Oceny (F – formująca (w trakcie semestru), P – podsumowująca (na koniec semestru)	Numer efektu kształcenia	Sposób oceny osiągnięcia efektu kształcenia
F1	PEK_W01-PEK_W05 PEK_K02	Kolokwium i/lub e-kolokwium
P = F1		

LITERATURA PODSTAWOWA I UZUPEŁNIAJĄCA

LITERATURA PODSTAWOWA:

[1] W. Żakowski, W. Leksiński, Matematyka, Cz. IV, WNT, Warszawa 2002.
[2] J. Klukowski, I. Nabiałek, Algebra dla studentów, WNT, Warszawa 2005.
[3] T. Huskowski, H. Korczowski, H. Matuszczyk, Algebra liniowa, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1980.
[4] T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1. Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2006.
[5] T. Jurlewicz, Z. Skoczylas, Algebra liniowa 2. Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2005.

LITERATURA UZUPEŁNIAJĄCA:

[1] G. Banaszak, W. Gajda, Elementy algebry liniowej, Cz. I-II, WNT, Warszawa 2002.
[2] J.A. Buchmann, Wprowadzenie do kryptografii, PWN, Warszawa 2006.
[3] T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1. Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2006.
[4] T. Jurlewicz, Z. Skoczylas, Algebra liniowa 2. Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2005.
[5] A. I. Kostrikin, Wstęp do algebry. Podstawy Algebry, PWN, Warszawa 2004.
[6] J. Rutkowski, Algebra abstrakcyjna w zadaniach, PWN, Warszawa 2000.
[7] W. Stankiewicz, Zadania z matematyki dla wyższych uczelni technicznych, Cz. A, PWN, Warszawa 2003. A. Białynicki-Birula, Algebra, PWN, Warszawa 1980.

OPIEKUN PRZEDMIOTU (IMIĘ, NAZWISKO, ADRES E-MAIL)

dr hab. Krystyna Ziętak, Krystyna.Zietak@pwr.wroc.pl

MACIERZ POWIĄZANIA EFEKTÓW KSZTAŁCENIA DLA PRZEDMIOTU
Algebra liniowa 2
Z EFEKTAMI KSZTAŁCENIA NA KIERUNKU
Informatyka, Teleinformatyka

Przedmiotowy efekt kształcenia	Odniesienie przedmiotowego efektu do efektów kształcenia zdefiniowanych dla kierunku studiów i specjalności (o ile dotyczy)	Cele przedmiotu	Treści programowe	Numer narzędzia dydaktycznego
PEK_W01	K1INF_W06, K1TIN_W05	C1, C4	Wy1	N1, N3, N4
PEK_W02	K1INF_W06, K1TIN_W05	C2, C4	Wy1-Wy3	N1, N3, N4
PEK_W03	K1INF_W06, K1TIN_W05	C3, C4	Wy4-Wy6	N1, N3, N4
PEK_W04	K1INF_W06, K1TIN_W05	C1, C4	Wy1	N2, N3, N4
PEK_W05	K1INF_W06, K1TIN_W05	C2, C4	Wy1-Wy3	N2, N3, N4
PEK_K01-PEK_K02	K1TIN_K02, K1INF_K02	C1-C4	Wy1_Wy6	N1-N4

Zał. nr 4 do ZW

SUBJECT CARD

Name in Polish: MATEMATYKA DYSKRETNA
Name in English: **Discrete Mathematics**
Main field of study (if applicable):
Specialization (if applicable):
Level and form of studies: 1st level, full-time / ~~part-time*~~
Kind of subject: obligatory / ~~optional / university-wide*~~
Subject code: MAP3019
Group if courses: YES / ~~NO*~~

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	30			
Number of hours of total student workload (CNPS)	120				
Form of crediting	Crediting with grade				
For group of courses mark (X) final course	X				
Number of ECTS points	4				
including number of ECTS points for practical (P) classes	3				
including number of ECTS points for direct teacher-student contact (BK) classes	3				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Graduating from high school.

SUBJECT OBJECTIVES

C1 Getting acquainted with basic logical notions: sentence, formula, proof. Learning how to use these notions.
C2. Getting acquainted with basic mathematical notions: set, function, relation. Learning how to use these notions.
C3. Getting acquainted with calculational tools of combinatorics. Learning how to use these tools.
C4. Learning discrete mathematics subjects helpful in engineer's and prorammer's practice: noticing recurrence, usage of formal procedures, learning the basics of algorithms constructions.
C5 Getting acquainted with basic facts of graph theory and learning how to interpret practical problems in graph-theoretical language.

*niepotrzebne skreślić

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student has basic knowledge of logic and set theory.

PEK_W02 Student has basic knowledge of combinatorics

PEK_W03 Student has basic knowledge of graph theory

relating to skills:

PEK_U01 student can use formalism for reasonings using logic, can use set-theoretic notation, in particular sets, functions, relations, in stating and solving mathematical problems.

PEK_U02 student can use formalism for problem of combinatorial or graph-theoretic nature that appear in technology type problems.

PEK_U03 student can solve basic combinatorial problem of counting type.

PEK_U04 student can use graph theory theorems to determine properties of a givengraph.

relating to social competences:

PEK_K01 student can convey his/her knowledge justifying usage of discrete mathematical tools in technology type problems.

PEK_K02 student can independently work with scientific literature.calculus

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Wy1	. Elements of logic. Propositional calculus, logical functors, logical connectives, valuations, tautologies. First order languages, formulas, quantifiers	2
Wy2	Sets, functions, relations, applications of logical tools. Basic operations on sets, the notion of cartesian product, applications of logic in set theory. Injections, surjections, inverse function.	2
Wy3	Sets, functions, relations, applications of logical too- cont. Composition of functions – examples, properties. Partial orders, Hasse diagram, the beggest element, maximal element. Applications of logic.	2
Wy4	Natural numbers, mathematical induction. The notion of a sequence as a function defined on natural numbers. The principle of mathematical induction.	2
Wy5	The notion of proof in a mathematical theory. Deduction system, formal notion of proof. Modus ponens, resolution.	2
Wy6	Combinatorics: Basic notions of combinatorics, variations, permutations, combinations. Connections with to discrete probability – examples. Binomial coefficients, Pascal's triangle. Stirling's numbers of the first and the second type.	2
Wy7	Combinatorics – cont. Catalan's numbers. Inclusion-exclusion principle.	2
Wy8	Recurrence. Recursively defined sequences, Fibonacci's sequence, Characteristic equation, generating functions.	4

Wy9	Graphs and Trees, Basic notions of graph theory (simple graph, directed graph, clique, Hamilton's cycle, Euler's cycle, tree, spanning tree of a graph, bipartide graph, chromatic number, planar graphs.	6
Wy10	Recurrent algorithms on trees and graphs. Search on a tree, the shortest path in graphs with weights, finding a spanning tree. Travelling salesman problem.	2
Wy11	Basic theorems of graph theory Characterization of Euler's graphs.	2
Wy12	Basic theorems of graph theory - cont. Dirac's and Ore's theorems (sufficient conditions for being a Hamilton graph).	2
	Total hours	**30**

Classes		**Number of hours**
Ćw1	Examples illustrating the material covered during the lecture. Tautologies, truth tables. Usage of quantifiers.	2
Ćw2	Examples of relations, partial orders and functions in various contexts: geometric, analytic, algebraic.	2
Ćw3	Examples of relations, partial orders and functions in various contexts: geometric, analytic, algebraic –cont.	2
Ćw4	Problems solving using mathematical induction.	2
Ćw5	Problems involving elementary formal proofs.	2
Ćw 6	Problems involving elementary counting of combinatorial objects.	4
Ćw7	Problems involving the inclusion-exclusion principle.	2
Ćw8	Problems involving the characteristic equation and generating functions.	4
Ćw9	Recognizing elementary properties of graphs.	4
Ćw10	Algorithms on graphs.	2
Ćw11	Applications of Euler's, Ore's and Dirac's theorems.	4
	Total number of hours	**30**

TEACHING TOOLS USED
1. Lecture – traditional method 2. Theoretical and calculation type problems – traditional metod. 3. Office hours – consulting students. 4. Students' homeworks.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F-Ćw	PEK_W01-PEK_W04 PEK_U01-PEK_U05 PEK_K01-EK_K02	Tests, oral presentations, small In-class test
F-Wy	PEK_W01-PEK_W04 PEK_U01-PEK_U05 PEK_K01-EK_K02	Exam type test
P=2/3*Wy+1/3*Ćw		

PRIMARY AND SECONDARY LITERATURE

LITERATURA PODSTAWOWA:

[1] W. Lipski, Kombinatoryka dla programistów, WNT, Warszawa 2007.
[2] W. Lipski, W. Marek, Analiza kombinatoryczna, PWN.
[3] R.J. Wilson, Wprowadzenie do teorii grafów, PWN.
[4] Z. Palka, A. Ruciński, Wykłady z kombinatoryki

LITERATURA UZUPEŁNIAJĄCA:

[1] K. A. Ross, C. R. B. Wright, Matematyka dyskretna, PWN, Warszawa 2008.
[2] R. Graham, D. Knuth, O. Patashnik, Matematyka konkretna, PWN, Warszawa 2006.

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

Prof. dr hab. Michał Morayne (Michal.Morayne@pwr.wroc.pl)

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Discrete mathematics
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		C1,C2	Wy1-Wy3	1-4
PEK_W02		C3,C4	Wy4-Wy8	1-4
PEK_W03		C5	Wy9-Wy12	1-4
PEK_U01		C1,C2	Ćw1-Ćw5	2-4
PEK_U02		C4	Ćw1-Ćw11	2-4
PEK_U03		C3	Ćw6-Ćw8	2-4
PEK_U04		C5	Ćw9-Ćw11	2-4
PEK_K01		C1-C5	Wy1-Wy12 Ćw1-Ćw11	1-4
PEK_K02		C1-C5	Wy1-Wy12 Ćw1-Ćw11	1-4

** - from table above

FACULTY

SUBJECT CARD

Name in English	Mathematical Analysis 1.2A
Name in Polish	Analiza Matematyczna 1.2A
Main field of study (if applicable)	
Specialization (if applicable)	
Level and form of studies	1st level, full-time
Kind of subject	obligatory
Subject code	MAP3045
Group of courses	Yes

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	15			
Number of hours of total student workload (CNPS)	150	90			
Form of crediting	exam				
For group of courses mark (X) final course	X				
Number of ECTS points	8	0			
including number of ECTS points for practical (P) classes	3	0			
including number of ECTS points for direct teacher-student contact (BK) classes	5	0			

PREREQUISITIES

It is recommended that the knowledge of mathematics is equivalent to secondary school certificate at the advanced level.

SUBJECT OBJECTIVES

C1. Understanding the basic methods of analysis of the graph of functions of one variable.
C2. Understanding the concept of definite integral and its basic properties and methods of determination.
C3. Understanding the practical applications of mathematical methods for the analysis of functions of one variable.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:
PEK_W1. Knows the basic definitions and theorem from Mathematical Analysis of functions of one variable.
PEK_W2. Knows the notion of definite integral and its basic applications.

Relating to skills:
PEK_U1. Can examine graphs of simple functions.
PEK_U2. Can calculate integrals of simple functions.

Relating to social competences:
PEK_K1. Understand how calculus affects on the development of technical civilization

PROGRAM CONTENT		
Form of classes - lectures		**Hours**
Wy1	Mathematical notations (logical connetives, quantifieries), elements of set theory, real numbers, subsets of real numbers (intervals, half-lines). Linear and quadratic functions.	2.0
Wy2	Basic properties of functions (injective and monotonic functions). Composition of functions. The inverse function. Power and exponential functions, and opposite to them. Properties of logarithms.	2.0
Wy3	Trygonometric functions and their inverses. Graphs of trigonometric and of its inverses.	2.0
Wy4	Sequences and limits. Basic formulas and theorems. Number e. Improper limits.	2.0
Wy5	The limit of a function in a point. Directional limits of function. Asymptotics of function.	2.0
Wy6	Continuity of a function in a point and on the interval. Basic properties of conituous functions. Approximate solutions of equations. Points of discontinuity.	2.0
Wy7	The definition of derivative. Basic formulas and theorems. Geometric and physics interpretations. Mean value theorem. De L'Hospital rule.	2.0
Wy8	Extreme values, monotonicity. Higher order derivatives. Convexity of function.	2.0
Wy9	Examination of the graph of a function.	2.0
Wy10	Taylor formula. Aproximation of function. Applications.	2.0
Wy11	Definite integral. Simple examples. Connection between interal and derivative (Fundamental Theorem of Calculus). Simple examples	2.0
Wy12	Indefinite integral: basic formulas. Areas of simple figures.	2.0
Wy13	The basic methods of calculus of integrals: integration by parts and by substitution.	2.0
Wy14	The basic methods of calculus of integrals: simple rational funnctions. Area and perimeter of a circle. The volume of rotary figures.	2.0
Wy15	Application of methods of mathematical analysis of one variable functions.	2.0
	Total hours	**30**
Form of classes - classes		**Hours**
Cw1	Tautologies, de Morgan laws, union, intersection and complement of set	1.0
Cw2	Natural numbers, integers, rational and real numbers. Logarithm.	1.0
Cw3	Graphs of simple functions. Inverse function. Composition of functions.	1.0
Cw4	Trygonometric functions and trygonometric identities.	1.0
Cw5	Limit of sequences.	1.0
Cw6	The limit of a function in point.	1.0
Cw7	Continuous functions	1.0
Cw8	Points of discontinuity. Solutions of equations	1.0
Cw9	Derivatives. Tangent line to a graph of a function.	1.0
Cw10	Examination of graphs of functions - I	1.0
Cw11	Examination of graphs of functions - II	1.0
Cw12	Taylor formula. De L'Hospital rule	1.0
Cw13	Integration - I	1.0
Cw14	Integration - II	1.0
Cw15	Integration - applications	1.0
	Total hours	**15**

TEACHING TOOLS USED

N1. Lecture - traditional method

N2. Classes - traditional method
N3. Student’s self work with the assistance of mathematical packages

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F-forming; P - concluding)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W1, PEK_U1, PEK_K1	kolokwium na cwiczeniach, odpowiedzi ustne
F2	PEK_W2, PEK_U2, PEK_K1	kolokwium na cwiczeniach, odpowiedzi ustne
F3	all	exam
P - sets the lecturer		

LITERATURE

PRIMARY

A1. F. Leja, Rachunek Różniczkowy i Całkowy, Wydawnictwo Naukowe PWN, 2012
A2. W. Krysicki, L. Włodarski, Analiza Matematyczna w Zadaniach, Cz. I, PWN, Warszawa 2006

SECONDARY

B1. K. Kuratowski, Rachunek Różniczkowy i Całkowy. Funkcje Jednej Zmiennej, Wydawnictwo Naukowe PWN, 2012
B2. G. M. Fichtenholz, Rachunek Różniczkowy i Całkowy, T. I-II, PWN, Warszawa 2007
B3. M. Gewert, Z. Skoczylas, Analiza Matematyczna 1. Przykłady i Zadania, Oficyna Wydawnicza GiS, Wrocław 2011

SUBJECT SUPERVISORS

1. Komisja Programowa Instytutu Matematyki i Informatyki
2. prof. dr hab. Jacek Cichoń (Jacek.Cichon@pwr.wroc.pl)
3. dr Agnieszka Wyłomańska (Agnieszka.Wylomanska@pwr.wroc.pl)

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Analiza Matematyczna 1.2 MAP3045

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_W1		C1	Wy1 Wy2 Wy3 Wy4 Wy5 Wy6 Wy7 Wy8 Wy9 Wy10 Wy11 Wy12 Wy13 Wy14 Wy15 Cw1 Cw2 Cw3 Cw4 Cw5 Cw6 Cw7 Cw8 Cw9 Cw10 Cw11 Cw12 Cw15	N1, N2, N3
PEK_W2		C2 C3	Wy11 Wy12 Wy13 Wy14 Wy15 Cw13 Cw14 Cw15	N1, N2, N3
PEK_U1		C1	Wy1 Wy2 Wy3 Wy4 Wy5 Wy6 Wy7 Wy8 Wy9 Wy10 Wy15 Cw1 Cw2 Cw3 Cw4 Cw5 Cw6 Cw7 Cw8 Cw9 Cw10 Cw11 Cw12 Cw15	N1, N2, N3
PEK_U2		C1 C2 C3	Wy11 Wy12 Wy13 Wy14 Wy15 Cw13 Cw14 Cw15	N1, N2, N3
PEK_K1		C1 C2	Wy9 Wy10 Wy11 Wy12 Wy13 Wy14 Wy15 Cw12 Cw13 Cw14 Cw15	N1, N2, N3

SUBJECT CARD

Name in English: ALGEBRA AND ANALYTIC GEOMETRY A
Name in Polish: ALGEBRA Z GEOMETRIĄ ANALITYCZNĄ A
Main field of study (if applicable):
Specialization (if applicable):
Level and form of studies: 1st level, full time
Kind of subject: obligatory
Subject code: MAP003046
Group of courses: YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	15			
Number of hours of total student workload (CNPS)	120				
Form of crediting	Exam				
For group of courses mark (X) final course	X				
Number of ECTS points	4				
including number of ECTS points for practical (P) classes	4				
including number of ECTS points for direct teacher-student contact (BK) classes	2,5				

PREREQUISITIES

It is recommended to know the basic algebraic operations on rational and real numbers, and knowledge of basic geometric figures and shapes.

SUBJECT OBJECTIVES

C1. Understanding the basic properties of complex numbers.
C2. Learning basic algebraic properties of polynomials.
C3. Mastering the concept of a vector, a vector space and the base of a linear space.
C4. Learning how to calculate the distance between the points in the space R^n, how to determine the equations of lines and planes and understanding the concept of conic sections.
C5. Mastering the concepts of matrices, matrix operations, and learn the methods of solving systems of linear equations.

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:

PEK_W01 knows basic properties of complex numbers
PEK_W02 knows basic algebraic properties of polynomials
PEK_W03 knows basic concepts of theory of linear spaces and methods of description of lines, planes and conic sections
PEK_W04 knows basic methods of solving systems of linear equations

Relating to skills:

PEK_U01 can carry out calculations with complex numbers
PEK_U02 can add, multiply and divide polynomials
PEK_U03 can find the equations of planes and lines in three dimensional space
PEK_U04 can add and multiply matrices and calculate determinants
PEK_U05 can solve systems of linear equations

Relating to social competences:

PROGRAM CONTENT		
Form of classes - lectures		**Hours**
W1	Natural, rational and real numbers. Mathematical induction. Newton's binomial formula.	2
W2	Complex numbers. Basic operations, modulus, complex conjugate.	2
W3	Polar form of complex number. Multiplication, division and exponentiation in polar form. Roots of complex numbers. The notion of algebraic field.	2
W4	Polynomials. Addition and multiplication of polynomials. Roots of polynomial. Polynomial remainder theorem. **Fundamental theorem of algebra**.	2
W5	The decomposition of a polynomial with real coefficients into product of linear and quadratic factors. Rational functions. Real simple rational factors. Decomposition of the functions into rational simple factors.	2
W6	Vectors in the space R^n. Addition and multiplication by scalars. Distance between points. Scalar product. Length of vector. **Cauchy–Schwarz inequality**. The angle between vectors.	2
W7	Analytic geometry of the plane. Straight line formulas (normal parametric and directional form). Distance of a point from a line. The angle between lines	2
W8	Analytic geometry of the space R^3. Equations for lines and planes. Distance between point and a plane. Intersection of planes.	2
W9	Linear combinations of vectors. Linearly independent vectors. The base of a space. Linear mappings. Matrix representation of linear mappings.	2
W10	Addition and multiplication of matrices and its correlation with operations on linear mappings. Example of matrices.	2

W11	Permutations and its sign..Definition of determinant and methods of calculation of determinant Algebraic complement of an element of a matrix. Laplace' formula for determinant. **Determinant and volume**.	2
W12	Inverse matrix. Systems od linear equations. **Cramer's formulas**. Examples. Homogeneous and non-homogeneous systems.	2
W13	Properties of linear mappings (kernel, image, rank). **Rouché – Capelli theorem**. Gaussian elimination.	2
W14	Eigenvalues and eigenvectors.	2
W15	Conic sections.	2
	Total hours	**30**

Form of classes – classes		**Hours**
Cw1	Real and complex numbers.	2
Cw2	Polynomials.	2
Cw3	Geometry of the plane.	2
Cw4	Geometry of the space R^3.	2
Cw5	Basis and linear mappings.	2
Cw6	Matrices and determinants.	2
Cw7	Systems of linear equations.	2
Cw8	Test	1
	Total hours	**15**

TEACHING TOOLS USED
N1. Lecture - traditional method N2. Classes - traditional method N3. Student's self work with the assistance of mathematical packages

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F -forming; P - concluding)	**Educational effect number**	**Way of evaluating educational effect achievement**
F - Cw	PEK_U01-PEK_U05	Oral answers, quizzes, written tests and/or e-tests
F – W	PEK_W01-PEK_W04	Exam or e-exam
F=(2/3)*W+(1/3)*Cw		

LITERATURE

PRIMARY:

[1] A. Białynicki-Birula, Algebra Liniowa z Geometrią, PWN 1976.
[2] F. Leja, Geometria analityczna, PWN, Warszawa 1972.
[3] A. Mostowski, M. Stark, Elementy algebry wyższej, PWN, Warszawa 1963.
[4] G. Banaszak, W. Gajda, Elementy algebry liniowej, część I, WNT, Warszawa 2002

SECONDARY:

[1] G. Farin, D. Hansford, Practical Linear Algebra: A Geometry Toolbox 2004, AK Peters, 2005.
[2] T. Jurlewicz, Z. Skoczylas, Algebra i geometria analityczna. Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2011.
[3] T. Jurlewicz, Z. Skoczylas, Algebra liniowa. Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2005.
[4] T. Jurlewicz, Z. Skoczylas, Algebra i geometria analityczna.. Definicje, twierdzenia i wzory. Oficyna Wydawnicza GiS, Wrocław 2011.
[5] T. Jurlewicz, Z. Skoczylas, Algebra liniowa. Definicje, twierdzenia i wzory. Oficyna Wydawnicza GiS, Wrocław 2005.
[6] E. Kącki, D. Sadowska, L. Siewierski, Geometria analityczna w zadaniach, PWN, Warszawa 1993.
[7] W. Stankiewicz, Zadania z matematyki dla wyższych uczelni technicznych, Cz. A, PWN, Warszawa 2003.

SUBJECT SUPERVISORS

prof. dr hab. Jacek Cichoń, dr Agnieszka Wyłomańska
Komisja programowa Instytutu Matematyki i Informatyki

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

ALGEBRA AND ANALYTIC GEOMETRY A MAP003046

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		C1	W1, W2, W3, W14	1,3
PEK_W02		C2	W4, W5	1,3
PEK_W03		C3, C4	W6, W7, W8, W9, W15	1,3
PEK_W04		C5	W10, W11, W12, W13	1,3
PEK_U01		C1	Cw1, Cw6, Cw7	1,2,3
PEK_U02		C2	Cw2	1,2,3
PEK_U03		C3, C4	Cw3, Cw4, Cw5	1,2,3
PEK U04		C5	Cw6, Cw7	1,2,3
PEK_U05		C5	Cw6, Cw7	1,2,3

** - z tabel powyżej

STUDIUM NAUK HUMANISTYCZNYCH

KARTA PRZEDMIOTU

Nazwa w języku polskim:	**Własność intelektualna i prawo autorskie**
Nazwa w języku angielskim:	**Intellectual Property Law and Copyright**
Stopień studiów i forma:	**I stopień, stacjonarna**
Rodzaj przedmiotu:	**obowiązkowy**
Kod przedmiotu:	**PREW002**
Grupa kursów:	**NIE**

	Wykład	Ćwiczenia	Laboratorium	Projekt	Seminarium
Liczba godzin zajęć zorganizowanych w Uczelni (ZZU)	15				
Liczba godzin całkowitego nakładu pracy studenta (CNPS)	30				
Forma zaliczenia	Zaliczenie na ocenę				
Dla grupy kursów zaznaczyć kurs końcowy (X)					
Liczba punktów ECTS	**1**				
w tym liczba punktów odpowiadająca zajęciom o charakterze praktycznym (P)	-				
w tym liczba punktów ECTS odpowiadająca zajęciom wymagającym bezpośredniego kontaktu (BK)	0,5				

WYMAGANIA WSTĘPNE W ZAKRESIE WIEDZY, UMIEJĘTNOŚCI I INNYCH KOMPETENCJI

CELE PRZEDMIOTU

C1 – przedstawienie polskiego systemu źródeł prawa;
C2 – omówienie podstawowych instytucji prawa publicznego i prywatnego;
C3 – analiza przepisów prawnych dotyczących prawa publicznego i prywatnego;
C4 – nabycie praktycznych umiejętności w zakresie analizy przepisów prawa.

PRZEDMIOTOWE EFEKTY KSZTAŁCENIA

Z zakresu wiedzy:
PEK_HUM W08
PEK_HUM W10
Brak opisu PEK.

Z zakresu umiejętności:

Z zakresu kompetencji społecznych:
Żadnych kompetencji społecznych? Przedmiot aż się prosi o takowe.

TREŚCI PROGRAMOWE		
Forma zajęć - wykład		**Liczba godzin**
Wy1	Wprowadzenie do polskiego systemu źródeł prawa oraz wykładnia i stosowanie prawa	2
Wy2	Normy etyczne i kodeksy norm etycznych	2
Wy3	Podstawowe instytucje prawa cywilnego	2
Wy4	Podstawowe instytucje prawa własności intelektualnej	2
Wy5	Podstawowe instytucje prawa własności przemysłowej	2
Wy6	Ochrona danych osobowych	2
Wy7	Ogólne zasady odpowiedzialności karnej	2
Wy8	Repetytorium	1
	Suma godzin	**15**

STOSOWANE NARZĘDZIA DYDAKTYCZNE

N1. Wykład informacyjny.
N2. Wykład interaktywny (dyskusja).
N3. Rozwiązywanie kazusów prawnych indywidualnie i w grupach.
N4. Prezentacja multimedialna.
N5. Analiza orzecznictwa sądowego.
N6. Prezentacja wybranych zagadnień przez uczestników wykładu.

OCENA OSIĄGNIĘCIA PRZEDMIOTOWYCH EFEKTÓW KSZTAŁCENIA

Oceny (F – formująca (w trakcie semestru), P – podsumowująca (na koniec semestru)	Numer efektu kształcenia	Sposób oceny osiągnięcia efektu kształcenia
P	PEK_HUM W08 PEK_HUM W10	Zaliczenie ustne lub pisemne

LITERATURA PODSTAWOWA I UZUPEŁNIAJĄCA
LITERATURA PODSTAWOWA: [1] A. Bator (red.), *Wprowadzenie do nauk prawnych. Leksykon tematyczny*, Warszawa 2010 r. [2] E. Gniewek(red.), *Podstawy prawa cywilnego*, Warszawa 2011 r. [3] R. Skubisz, *Prawo własności przemysłowej*, Warszawa 2012 r. **LITERATURA UZUPEŁNIAJĄCA:** [1] P. Kostański, *Prawo własności przemysłowej. Komentarz*, Warszawa 2010 r. [2] J. Barta, R. Markiewicz (red.), *Prawo autorskie i prawa pokrewne. Komentarz*, Warszawa 2011 r. [3] A. Adamski, *Prawo karne komputerowe*, Warszawa 2000 r.
OPIEKUN PRZEDMIOTU (IMIĘ, NAZWISKO, ADRES E-MAIL)
Dr Adam Haręża, adam.hareza@pwr.wroc.pl

MACIERZ POWIĄZANIA EFEKTÓW KSZTAŁCENIA DLA PRZEDMIOTU

Prawo własności intelektualnej

Własność intelektualna i prawo autorskie

Przedmiotowy efekt kształcenia	Odniesienie przedmiotowego efektu do efektów kształcenia zdefiniowanych dla kierunku studiów i specjalności (o ile dotyczy)	Cele przedmiotu	Treści programowe	Numer narzędzia dydaktycznego
PEK_HUM W08 **PEK_HUM W10**		C1 – C4	Wy 1- Wy 8	N1 - N6

WYDZIAŁ ELEKTRONIKI

KARTA PRZEDMIOTU

Nazwa w języku polskim:	**Etyka inżynierska**
Nazwa w języku angielskim:	**Engineering Ethics**
Kierunek studiów:	**Automatyka i robotyka, Elektronika, Telekomunikacja, Informatyka, Teleinformatyka**
Stopień studiów i forma:	**I stopień, stacjonarna**
Rodzaj przedmiotu:	**obowiązkowy, ogólnouczelniany**
Kod przedmiotu:	**PSEW001**
Grupa kursów:	**NIE**

	Wykład	Ćwiczenia	Laboratorium	Projekt	Seminarium
Liczba godzin zajęć zorganizowanych w Uczelni (ZZU)	15				
Liczba godzin całkowitego nakładu pracy studenta (CNPS)	30				
Forma zaliczenia	Zaliczenie na ocenę				
Dla grupy kursów zaznaczyć kurs końcowy (X)					
Liczba punktów ECTS	**1**				
w tym liczba punktów odpowiadająca zajęciom o charakterze praktycznym (P)	-				
w tym liczba punktów ECTS odpowiadająca zajęciom wymagającym bezpośredniego kontaktu (BK)	0.5				

WYMAGANIA WSTĘPNE W ZAKRESIE WIEDZY, UMIEJĘTNOŚCI I INNYCH KOMPETENCJI

CELE PRZEDMIOTU

C1: Zdobycie przez studentów elementarnej wiedzy z etyki ogólnej i zawodowej;
C2: Ukształtowanie wrażliwości na dylematy moralne w pracy inżyniera;
C3: Zapoznanie studentów z kodeksami etyki inżynierskiej.

PRZEDMIOTOWE EFEKTY KSZTAŁCENIA

Z zakresu wiedzy:

PEK_HUM[1] W08 PEK_W01: Po zakończeniu kursu student ma wiedzę niezbędną do rozumienia etyczno-społecznych uwarunkowań działalności inżynierskiej, takich jak: filozoficzny namysł nad istotą techniki i konkretne rozstrzygnięcia na gruncie „wartościowania techniki" (*technology assessment*).

Z zakresu umiejętności:

PEK_ HUM U01: Student potrafi pozyskiwać informacje z literatury filozoficzno-etycznej, a także interpretować naukowe teksty z dziedziny etyki ogólnej i etyki inżynierskiej. W oparciu o wiedzę z zakresu uzasadnienia norm etycznych w różnych nurtach filozoficznych, student potrafi sproblematyzować dylematy etyczne związane z wykonywaniem zawodu.

Jest tylko wykład, a wykład nie generuje umiejętności.

TREŚCI PROGRAMOWE		
Forma zajęć - wykład		**Liczba godzin**
Wy1	Etyka jako dyscyplina filozoficzna	1
Wy2	Główne szkoły metaetyczne	1
Wy3	Problem sumienia	1
Wy4	Podstawowe pojęcia etyczne – problem uzasadnienia norm etycznych	1
Wy5	Sposoby uzasadnienia norm w etykach deontologicznych	1
Wy6	Sposoby uzasadnienia norm w etyce utylitarystycznych	1
Wy7	Problemy działalności technicznej	1
Wy8	Determinizm techniczny w świetle sporu o możliwość wolności	1
Wy9	Elementy socjologii zawodu	1
Wy10	Status etyki inżynierskiej	1
Wy11	Problem odpowiedzialności zawodowej inżyniera	1
Wy12	Etyczna ocena wdrażania nowych technologii (TA)	1
Wy13	Struktura i funkcja kodeksów inżynierskiej etyki zawodowej	1
Wy14	Prezentacja wybranych inżynierskich kodeksów etycznych cz. 1.	1
Wy15	Prezentacja wybranych inżynierskich kodeksów etycznych cz. 2.	1
	Suma godzin	**15**

STOSOWANE NARZĘDZIA DYDAKTYCZNE
N1. Prezentacja multimedialna N2. Wykład informacyjny N3. Dyskusja

[1] - Skrót: „PEK_HUM" - Przedmiotowy Efekt Kształcenia realizowany w ramach kursów humanistycznych, opracowany w odniesieniu do *Efektów kształcenia w zakresie nauk technicznych.*

OCENA OSIĄGNIĘCIA PRZEDMIOTOWYCH EFEKTÓW KSZTAŁCENIA

Oceny (F – formująca (w trakcie semestru), P – podsumowująca (na koniec semestru)	Numer efektu kształcenia	Sposób oceny osiągnięcia efektu kształcenia
F1	PEK_ HUM U01	Warunkująca przystąpienie do kolokwium końcowego rozprawka rozwiązująca wybrany problem postawiony w materiale wykładów
P	PEK_HUM W08	Kolokwium pisemne z materiału wykładów

LITERATURA PODSTAWOWA I UZUPEŁNIAJĄCA

LITERATURA PODSTAWOWA:

1) Agazzi E., *Dobro, zło i nauka*, tłum. E. Kałuszyńska, Warszawa 1997.
2) Anzenbacher A., *Wprowadzenie do etyki*, 2008.
3) Birnbacher D., *Odpowiedzialność za przyszłe pokolenia*, Kraków 1999.
4) Chyrowicz B. [red.], *Etyka i technika w poszukiwaniu ludzkiej doskonałości*, Lublin 2004.
5) Galewicz W. [red.], *Moralność i profesjonalizm. Spór o pozycję etyk zawodowych*, Kraków 2010.
6) Gasparski W., *Dobro, zło i technika*, [w:] *Problemy etyczne techniki*, Instytut Problemów Współczesnej Cywilizacji, Warszawa 1999, s. 17-26.
7) Gasparski W., *Dobro, zło i technika*, „Zagadnienia Naukoznawstwa" 1999 nr 3-4, s. 386-391.
8) Goćkowski J. Pigoń K., *Etyka zawodowa ludzi nauki*, Wrocław 1991.
9) Jonas H., *Zasada odpowiedzialności. Etyka dla cywilizacji technologicznej*, tłum. M. Klimowicz, Kraków 1996.
10) Kiepas A., *Człowiek – technika – środowisko: człowiek współczesny wobec wyzwań końca wieku*, Katowice 1999.
11) Kiepas A., *Człowiek wobec dylematów filozofii techniki*, Katowice 2000.
12) Kiepas A., *Nauka – technika – kultura: studium z zakresu filozofii techniki*, Katowice 1984.
13) Ossowska M., *Normy moralne. Próba systematyzacji*, Warszawa 2003.
14) Postman N., *Technolpol: triumf techniki nad kulturą*, Warszawa 1995.
15) Styczeń T., *Wprowadzenie do etyki*, Lublin 1993.

LITERATURA UZUPEŁNIAJĄCA:

1) Bober, W. J., *Powinność w świecie cyfrowym: etyka komputerowa w świetle współczesnej filozofii moralnej*, 2008.
2) Kotarbiński T., *Dzieła wszystkie. Prakseologia*, Ossolineum 2003.
3) Lisak M. Elementy etyki w zawodzie architekta, 2006.
4) Słowiński B., *Podstawy sprawnego działania*, Koszalin 2007.
5) Sołtysiak G., *Kodeksy etyczne w Polsce*, Warszawa 2006.
6) Sułek M., Swiniarski J., *Etyka jako filozofia dobrego działania zawodowego*, Warszawa 2001.
7) Ślipko T., *Zarys etyki ogólnej*, Kraków 2004.
8) Ślipko T., *Zarys etyki szczegółowej*: t.1: *Etyka osobowa*, t.2: *Etyka społeczna*, Kraków 2005.
9) Wawszczak, W., *Humanizacja Inżynierów*, „Forum Akademickie" nr 9, wrzesień 2003, s. 38-40.

OPIEKUN PRZEDMIOTU (IMIĘ, NAZWISKO, ADRES E-MAIL)
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MACIERZ POWIĄZANIA EFEKTÓW KSZTAŁCENIA DLA PRZEDMIOTU
Etyka inżynierska
Z EFEKTAMI KSZTAŁCENIA W ZAKRESIE NAUK TECHNICZNYCH

Przedmiotowy efekt kształcenia	**Odniesienie przedmiotowego efektu do efektów kształcenia zdefiniowanych dla kierunku studiów i specjalności (o ile dotyczy)**	**Cele przedmiotu**	**Treści programowe**	**Numer narzędzia dydaktycznego**
(wiedza) PEK_HUM W08	T1A_ W08; T2A_ W08	C1, C3	Wy 1 – Wy 15	N1, N2, N3
(umiejętności) PEK_HUM U01	T1A_U01; T2A_U01	C2	Wy 7, Wy 8 Wy 10 –Wy15	N1, N2, N3

Zał. nr 4 do ZW 64/2012

FACULTY **ELECTRONICS**

SUBJECT CARD

Name in Polish	**Podstawy zarządzania jakością**
Name in English	**Principles of Quality Management**
Main field of study (ifapplicable):	**Computer Science**
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory, university-wide**
Subject code	**ZMZ0340**
Group of courses	**NO**

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

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. No

\

SUBJECT OBJECTIVES

C1 Acquisitionof knowledge ofthe concepts ofquality managementin organizations,in particularthe terms and the principles ofquality management in the philosophy ofTQMandKAIZEN.

C2Acquisition ofknowledgeof self-assessment of the quality management and criteriaof qualityawardscompetitions.

C3Acquisition ofknowledge of the quality system standardization bodies.

C4 Acquisition ofknowledge ofthe design, implementation, operation, maintenance andimprovement ofquality management systemsin business organizations, with particular emphasis onformal arrangements for thestandardization and conformity assessmentof productsand quality systemsin Poland andthe European Union.

C5 Acquisition ofknowledge ofthe interpretation and implementation of requirements of ISO 9001.

C6Acquisition ofknowledge of quality managementsystems integrationwith other managementorganizations systems(e.g. environmental management systemsandsafety management systems).

C7 Acquisition ofknowledgeabout the basictechniques and methods of improving the quality management.

C8Acquisition of ability to understand the importance ofethical conductin management.

C9Understanding theimportant role ofthe engineerin the implementation ofa qualitymanagement systemin the organization.

C10Understanding theimportance ofindividual and teamactivitiesbeyond theengineeringactivitiesin achieving thequality objectivesof the organization.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Knows basic terms and definitions connected with the quality management.

PEK_W02 Knows concepts ofquality managementin organizations,in particularthe principles ofquality management according to TQMandKAIZEN.

PEK_W03 Knows the principles ofself-assessment ofquality in accordancewith the model ofself-Polish Quality Award.

PEK_W04Knows theformal andlegal arrangements for thestandardization and conformity assessmentof productsand quality systemsin Poland andthe European Union.

PEK_W05Knows theinstitutions ofthe normalization of thequality managementsystems.

PEK_W06 Knows the quality management standards according ISO 9000 series.

PEK_W07 Knows how to design,implement, maintenance and improvement ofquality management systemsin business organizations.

PEK_W08 To have abasic knowledge ofthe principles ofquality managementsystems integrationwith other management systems.

PEK_W09 Knows the basictechniques and methods ofquality management improvement.

relating to social competences:

PEK_K01Is aware ofthe role ofethicsin the management.

PEK_K02Is aware ofthe role of theengineerin the implementation ofquality systemsin organizations.

PEK_K03Is aware ofthe importance ofindividual and teamactivitiesin quality management beyondengineeringactivities.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1-2	Introduction tothe lecture.Basic terms (quality, characteristics of quality, quality management). Evolution ofapproachesto quality and quality management.	4
Lec 3-4	Quality managementstyles. The concept ofKaizen.	4
Lec 5-6	The conceptand principles ofTotal Quality Management-TQM.	4
Lec 7	Self-assessment ofthe quality management system. Self-assessment according to of Polish Quality Award.	2
Lec 8	Standard-setting bodies.Assessmentof product conformityandquality systems inPoland andthe European Union.	2
Lec 9	Standardization of the quality management systems. ISO 9000 family.	2
Lec 10-11	Requirements of the quality management according to the ISO 9001standard.	4
Lec 12	The ISO 9001 auditing and certification.	2
Lec 13	Other standards of quality management. Integrated management systemsof quality, environmentandsafety.	2
Lec 14	Selected tools of quality management.	2
Lec 15	Passing test	2
	Total hours	**30**

TEACHING TOOLS USED

N1. Traditionallecture- presentationusing aslide projector.

N2.Own work- independentliterature studiesand preparation for thefinal test.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educationaleffectnumber	Way of evaluating educational effect achievement
F1	PEK_W01÷ PEK_W09	Written test

P=F1		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] The materials publishedon the coursewebsite.
[2] Grudowski P., „Podejście procesowe w systemach zarządzania jakością w małych i średnich przedsiębiorstwach", Wydawnictwo Politechniki Gdańskiej, Gdańsk 2007.
[3] Hamrol A., „Zarządzanie jakością z przykładami", PWN, Warszawa 2011.
[4] Imai M., „Kaizen: klucz do konkurencyjnego sukcesu Japonii", Wydawnictwo MT Biznes, Warszawa 2007.
[5] PN-ISO 9001: 2009, „System zarządzania jakością. Wymagania", Polski Komitet Normalizacyjny, Warszawa 2009.
[6] Zymonik Z., Hamrol A., Grudowski P., „Zarządzanie jakością i bezpieczeństwem", Polskie Wydawnictwo Ekonomiczne, Warszawa 2013.

SECONDARY LITERATURE:

[1] Gruszka A., Niegowska E., „Zarządzanie jakością: komentarz do norm ISO serii 9000", Polski Komitet Normalizacyjny, Warszawa 2011.
[2] Łazicki A., „System zarządzania przedsiębiorstwem: Techniki Lean Management i Kaizen" , Wiedza i Praktyka, Warszawa 2011.
[3] Maleszka A., Łagowski E. „Wdrażanie zintegrowanych systemów zarzadzania ", Wyższa Szkoła Logistyki, Poznań 2009.
[4] www:iso.org
[5] www.pkn.pl
[6] Szczepańska K.: „Zarządzanie jakością: w dążeniu do doskonałości", C.H. Beck, Warszawa 2011
[7] Zymonik Z., Koszty jakości w zarządzaniu przedsiębiorstwem". Wydawnictwo Politechniki Wrocławskiej, Wrocław 2003.

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

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