DEPARTMENT OF COMPUTER SCIENCE AND MANAGEMENT

**SUBJECT CARD**

**Name in Polish Administrowanie serwerami Linux**
**Name in English Administering  Linux Servers**
**Main field of study (if applicable): Informatics**
**Specialization (if applicable): ---**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code INZ007646**
**Group of courses YES / NO\***

|  | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 9 |  | 18 |  |  |
| Number of hours of total student workload (CNPS) | 30 |  | 60 |  |  |
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course |  |  |  |  |  |
| Number of ECTS points | 1 |  | 2 |  |  |
| including number of ECTS points for practical (P) classes | 0 |  | 2 |  |  |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,4 |  | 0,8 |  |  |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**
1. Knowledge of the general principles of the modern operating systems.
2. Knowledge of the basic principles of operation of computer networks based on TCP / IP.
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**SUBJECT OBJECTIVES**
C1 Acquisition of basic knowledge and practical skills in the administration of the Linux server and workstation.
C2 Acquisition of basic knowledge and practical skills in managing the network infrastructure and network services using Linux.
C3. Acquisition of the ability to work independently with Linux and in a team of administrators.

| | SUBJECT EDUCATIONAL EFFECTS | |
|---|---|---|
| **SUBJECT EDUCATIONAL EFFECTS** |

relating to knowledge:

PEK_W01 - knows the basics of the Linux architecture and its use as a server or workstation in information systems based on the Linux platform;

PEK_W02 - have knowledge of the basics of the system Lunux in the network and the use of Linux in the construction of network infrastructure and network services;

PEK_W03-have basic knowledge of Linux system configuration including security aspects.

relating to skills:

PEK_U01 - can perform basic administrative tasks associated with the installation and configuration of Linux as a server and workstation;

PEK_U02 - can configure the basic elements of the network subsystem of the Linux platform and run on it network services;

PEK_U03 - can secure Linux operating system on the basic level.

relating to social competences:

PEK_K01 - can work in a team to solve problems.

## PROGRAMME CONTENT

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Linux distributions. The system architecture. Installation of the system. | 0.5 |
| Lec 2 | Command line: shell, basic commands, scripts. | 1 |
| Lec 3 | Managing user accounts and groups. | 0.5 |
| Lec 4 | Disk and filesystem management. | 0.5 |
| Lec 5 | Data Compression. Protection against data loss - Backup. Scheduling operations | 0.5 |
| Lec 6 | Upgrading a system. Install, update and uninstall any software. Using the installation packages. | 0.5 |
| Lec 7 | Printing in Linux. The graphical environment - X Window System. | 0.5 |
| Lec 8 | Managing network connections. Routing. | 0.5 |
| Lec 9 | Firewalls and control of network traffic. | 0.5 |
| Lec 10 | Configuration and management of DHCP and DNS servers. | 1 |
| Lec 11 | Configuration and management of the file server (NFS, Samba, FTP). | 0.5 |
| Lec 12 | Configuration and management of the web server. Content Management Systems (CMS). | 1 |
| Lec 13 | Virtualization on Linux. | 0.5 |
| Lec 14 | Securing the server. Remote system administration. | 0.5 |
| Lec 15 | Configuration and management of the mail server. | 0.5 |
| | Total hours | **9** |

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab 1 | Introduction to the laboratory. Health and Safety Training. | 1 |
| Lab 2 | Installing Linux. | 1 |
| Lab 3 | Command line: shell, basic commands, scripts. | 1 |
| Lab 4 | Practical management of user accounts and groups. | 1 |
| Lab 5 | Practical management of disk and filesystem. | 1 |
| Lab 6 | Performing data compression. Backing up and recovering data. Scheduling operations. | 1 |
| Lab 7 | Upgrading, installing, updating and uninstalling any software using the installation packages and software repositories. | 1 |

| | | |
|---|---|---|
| Lab 8 | Configuring printing on Linux.<br>The graphical environment - X Window System.<br>Practical test - Managing the server operating system and a workstation. | 2 |
| Lab 9 | Managing network connections. Routing. | 1 |
| Lab 10 | Firewalls and control of network traffic. | 1 |
| Lab 11 | Configuration and management of  DHCP and DNS servers. | 1 |
| Lab 12 | Configuration and management of the file server (NFS, Samba, FTP). | 1 |
| Lab 13 | Configuration and management of the web server. Content Management Systems (CMS). | 1 |
| Lab 14 | Set up and run virtual machines on Linux.<br>Securing the server. Remote system administration. | 2 |
| Lab 15 | Practical test - Infrastructure management and network services. | 2 |
| | Total hours | 18 |

## TEACHING TOOLS USED

N1. Traditional lecture.
N2. Computer laboratories with full access to computers with the Linux operating system.
N3. Consultations for students.
N4. Own work - preparing for laboratories.
N5. Own work - self-study and exam preparation.

## EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| F1 | PEK_U01 | Practical test - Managing the server and workstation operating system. (La8) |
| F2 | PEK_U02, PEK_U03 PEK_K01 | Practical test – Network infrastructure and services management. (La15) |
| P | PEK_W01 ÷ PEK_W03 PEK_K01 | Examination. |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[1] Ben Whaley, Evi Nemeth, Garth Snyder, Trent R. Hein, Unix i Linux. Przewodnik administratora systemów, Helion, 2011.
[2] Christopher Negus, Linux. Biblia. Ubuntu, Fedora, Debian i 15 innych dystrybucji, Helion, 2011.
[3] Łukasz Sosna, Linux. Komendy i polecenia. Helion 2010.

**SECONDARY LITERATURE:**

[1] Daniel J. Barrett, Richard E. Silverman, Robert G. Byrnes, Linux. Bezpieczeństwo. Receptury, Helion 2003
[2] Andrew Ford, Apache 2. Leksykon kieszonkowy, Helion, 2010

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

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

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Administering  Linux Servers**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION ---

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W10 | C1 | Lec1- Lec7 | N1,3,5 |
| PEK_W02 | K1INF_W11 | C2 | Lec8- Lec13, Lec15 | N1,3,5 |
| PEK_W03 | | C1, C2 | Lec14 | N1,3,5 |
| PEK_U01 (skills) | K1INF_U14, K1INF_U09 | C1 | Lab1-Lab8 | N2,3,4 |
| PEK_U02 | K1INF_U08 | C2 | Lab9-Lab15 | N2,3,4 |
| PEK_U03 | K1INF_U09 | C1, C2 | Lab14 | N2,3,4 |
| PEK_K01 (competences) | | C3 | Lec1-Lec15, Lab1-Lab15 | N1,2,3,4,5 |

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

Zał. nr 4 do ZW 64/2012

FACULTY W8 / DEPARTMENT I-32

**SUBJECT CARD**
**Name in Polish Administrowanie Systemami Microsoft Windows**
**Name in English Administering Microsoft Windows Systems**
**Main field of study (if applicable): Computer science**
**Specialization (if applicable): -**
**Level and form of studies: 1st/ 2nd* level, full-time / part-time***
**Kind of subject: obligatory / optional / university-wide***
**Subject code INZ007645**
**Group of courses YES / NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 9 | | 18 | | |
| Number of hours of total student workload (CNPS) | 30 | | 60 | | |
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 1 | | 2 | | |
| including number of ECTS points for practical | 0 | | 2 | | |

| | | | | | |
|---|---|---|---|---|---|
| (P) classes | | | | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,4 | | 0,8 | | |

*delete as applicable

## PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of contemporary operating systems architectures.
2. Knowledge of TCP/IP networks.

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## SUBJECT OBJECTIVES

C1 Gaining knowledge of architecture of Microsoft Windows:
       C1.1. architecture and services of single server,
       C1.2. directory services,
       C1.3. network architecture and services.
C2 Gaining competencies of administering Windows systems using GUI and text interface:
       C2.1. management of accounts, groups and access to resource,
       C2.2. centralized management of distributed IT environment,
       C2.3. management of network infrastructure.
C3 Improve collaborative working, self-paced studying and solving problems.

## SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 –knows architecture of Windows system as well as different account and group types,
       knows relationship between them
PEK_W02 – knows mechanisms of centralized administration, is conscious about their possibilities and
       restrictions
PEK_W03 – knows services supporting computer networks, including remote access and secure
       network traffic.

relating to skills:
PEK_U01 can configure single computer and give a user access to selected resources on required level
PEK_U02 can leverage directory services to centralized management of distributed environment
PEK_U03 can configure simple computer network with remote access using computer running
       Windows system.

relating to social competences:
PEK_K01 is able to collaboratively solve administrative problems

## PROGRAMME CONTENT

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | System setup and installation. Introduction to domain environment. | 1 |
| Lec 2 | Account and group management. | 1 |
| Lec 3 | Disk resources management. | 1 |
| Lec 4 | Configuration of distributed environment using group policy. | 2 |
| Lec 5 | Configuration of multiple domain environment | 1 |
| Lec 6 | System monitoring and auditing. | 1 |

| Lec 7 | DNS and DHCP servers. | 1 |
|---|---|---|
| Lec 8 | Routing and remote access. | 1 |
| | Total hours | 9 |

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab 1 | Getting started with class environment. Installation and configuration of directory services. | 2 |
| Lab 2 | Configuration user accounts. Configuration of groups. Script management of accounts. | 2 |
| Lab 3 | Sharing disk resources. | 2 |
| Lab 4 | Configuration of distributed environment using Group Policies. Configuration of advanced settings using Group Policies. | 2 |
| Lab 5 | Replication management.  Performance monitoring and auditing. | 2 |
| Lab 6 | Test 1 – Centralized administering using directory services and controlling access to resources. | 2 |
| Lab 7 | DNS and DHCP servers. | 2 |
| Lab 8 | Routing and remote access configuration. | 2 |
| Lab 9 | Test2 – Network infrastructure management. | 2 |
| | Total hours | 18 |

| TEACHING TOOLS USED |
|---|
| N1.Lecture with slides and live demonstrations.<br>N2.Class using systems with full administrative access.<br>N3.Consultations<br>N4.Self-paced preparation to class<br>N5.Self-paced preparation to exam |

### EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| F1 | PEK_U01 ÷ PEK_U03 | Evaluation of activity and engagement during class |
| F2 | PEK_U01 ÷ PEK_U03 | Evaluation of environment configured by student during class |
| F3 | PEK_U01 ÷ PEK_U03 PEK_W01 ÷ PEK_W08 | Electronic exam using e-learning portal. |
| C=F3 | | |

| PRIMARY AND SECONDARY LITERATURE |
|---|

**PRIMARY LITERATURE:**

[1]     W.R. Stanek, Microsoft Windows Server 2012. Vademecum administrator, APN Promise, 2012.
[2]     R.Morimoto, M.Noel, O.Droubi, R. Mistry, C.Amaris, Windows Server 2012 Unleashed, Sams Publishing, 2012 (on-line access through proxy BG PWr.) , polish translation: "Windows Server 2012. Księga eksperta", wyd. Helion.
[3]     M. Minasi, D. Gibson, A. Finn, W. Henry, B. Hynes, Mastering Windows Server® 2008 R2, Sybex, 2011 (access on-line through proxy BG PWr.)

**SECONDARY LITERATURE:**

[1]     J.Savill, The complete guide to Windows 2008 Server, Addison Wesley, 2008.
[2]     D.Holme, D.Ruest, N.Ruest, Training Kit 70-640 Konfigurowanie Active Directory w Windows Server 2008, APN Promise, 2009.
[3]     Training kit 70-642 Konfigurowanie infrastruktury sieciowej Windows Server 2008, APN Promise, 2009.

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

Wojciech Thomas, wojciech.thomas@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

……………………………

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ………………………..
AND SPECIALIZATION ……………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | | C1.1 | Le1÷Le3 | 1,3,5 |
| PEK_W02 | | C1.2 | Le4÷Le6 | 1,3,5 |
| PEK_W03 | | C1.3 | Le7÷Le8 | 1,3,5 |
| PEK_U01 (skills) | | C2.1 | Lab1÷Lab6 | 2,3,4 |
| PEK_U02 | | C2.2 | Lab7÷Lab11 | 2,3,4 |
| PEK_U03 | | C2.3 | Lab2÷Lab15 | 2,3,4 |
| PEK_K01 (competences) | K1INF_K1, K1INF_K3 | C3 | Le1-Le8 Lab1-Lab15 | 1÷5 |

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

*** - from table above

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FACULTY *****

## 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:        I level, part - time**

**Kind of subject:    obligatory**

**Subject code:        MAP3056**

**Group of courses: YES**

|  | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 18 | | | |
| Number of hours of total student workload (CNPS) | 90 | 90 | | | |
| 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 | 2 | | | | |
| 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.

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**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:

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| 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. | 1 |

| W3 | Polar form of complex number.  Multiplication, division and exponentiation in polar form. Roots of complex numbers. The notion of algebraic field. | 1 |
|---|---|---|
| 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. | 1 |
| 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. | 1 |
| 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 | 1 |
| W8 | Analytic geometry of the space $R^3$. Equations for lines and planes. Distance between point and a plane. Intersection of planes. | 1 |
| W9 | Linear combinations of vectors. Linearly independent vectors. The base of a space. Linear mappings. Matrix representation of linear mappings. | 1 |
| W10 | Addition and multiplication of matrices and its correlation with operations on linear mappings. Example of matrices. | 1 |
| 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**. | 1 |
| W12 | Inverse matrix. Systems od linear equations. **Cramer's formulas**. Examples. Homogeneous and non-homogeneous  systems. | 1 |
| W13 | Properties of linear mappings (kernel, image, rank). **Rouché – Capelli theorem**.  Gaussian elimination. | 2 |
| W14 | Eigenvalues and eigenvectors. | 1 |
| W15 | Conic sections. | 1 |
| | **Total hours** | **18** |

| | **Form of classes – classes** | **Hours** |
|---|---|---|
| Cw1 | Real and complex numbers. | 4 |
| 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. | 3 |
|------|----------------------------|-----|
| Cw7 | Systems of linear equations. | 2 |
| Cw8 | Test | 1 |
| | **Total hours** | **18** |

## 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 |
| P=sets the lecturer | | |

## 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, MAP3056**

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 |

** - from the above tables

FACULTY of **Computer Science and Management**/ DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish:  Algorytmy i techniki programowania równoległego**
**Name in English:  Parallel Programming - Algorithms and Techniques**
**Main field of study (if applicable): Informatics**
**Specialization (if applicable):**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code INZ007651Wl**
**Group of courses YES / NO\***

|  | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 |  | 18 |  |  |
| Number of hours of total student workload (CNPS) | 60 |  | 60 |  |  |
| Form of crediting | ~~Examination~~ / crediting with grade~~*~~ | Examination / crediting with grade* | ~~Examination~~ / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course |  |  |  |  |  |
| Number of ECTS points | **2** |  | 2 |  |  |
| including number of ECTS points for practical (P) classes | 0 |  | 2 |  |  |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 |  | 0,8 |  |  |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**
1. Basic knowledge about computer architecture and organization
2. Programming skills at a basic level in C/C++ language

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**SUBJECT OBJECTIVES**
C1    Acquainting students with basic techniques of parallel processing.
C2    Acquainting students with basic knowledge about parallel algorithms
C3    Acquainting students with popular parallel processing environments.
C4    Acquisition of the ability to write simple parallel programs.
C5    Acquisition of the ability of using popular parallel programming environments.
C6    Acquisition of skills to plan and conduct simple computer experiments
C7    Acquiring the ability to documenting the experiments and their presentation in Polish
       and English

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**SUBJECT EDUCATIONAL EFFECTS**
relating to knowledge:
PEK_W01   Knows the basic techniques of parallel programming.
PEK_W02   Knows the basic parallel algorithms
PEK_W03  Knows chosen  parallel processing environments
relating to skills:

PEK_U01  He is able to write simple parallel programs
PEK_U02  He is able to use chosen parallel programming environments.
PEK_U03  He is able to plan and conduct simple computer experiment.
PEK_U04  He is able to draw conclusions of the performed experiment, prepare its documentation and
        prepare a presentation on the results of an experiment in Polish and English

**PROGRAMME CONTENT**

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Parallel programming languages, shared-memory and distributed memory programming paradigms, data and algorithm parallelism. MPI standard. Message passing communication - basic concepts. | 2 |
| Lec 2 | Group communication algorithms ("one-to-all", "all-to-all" & others) for different network topologies and routing strategies – its implementation in MPI. | 2 |
| Lec 3 | Parallel matrix multiplication and sorting algorithms | 2 |
| Lec 4 | Parallel graph algorithms. | 2 |
| Lec 5 | Search algorithms for discrete optimization problems and systolic algorithms. | 2 |
| Lec 6 | Architecture and programming of GPU. Programming in CUDA environment. | 2 |
| Lec 7 | Evaluation of parallel algorithms, computational complexity, speedup, efficiency. | 2 |
| Lec 8 | Advanced mechanisms in MPI. Profiling of parallel programs. | 2 |
| Lec9 | Test. Parallel program design methodology. | 2 |
| | Total hours | 18 |
| Form of classes - class | | Number of hours |
| Cl 1 | | |
| | Total hours | |
| Form of classes - laboratory | | Number of hours |
| Lab1 | Presentation of lab scope, presentation of grading principles, training from health and safety at work. Familiarization with used at laboratory MPI environment. | 2 |
| Lab2 | Testing execution environment, running simple programs that implement communication between two processors in MPI environment. | 2 |
| Lab3 | Implementation of parallel algorithm that implement vector matrix multiplication in MPI environment. | 2 |
| Lab4 | Implementation of chosen parallel matrix multiplication algorithm, carrying out the tests for different data, calculation of speedup, preparation the report and short presentation on received results in Polish in English. Presentation results of experiments performed. | 2 |
| Lab5 | Implementation of chosen parallel sorting algorithm, carrying out the tests for different data, calculation of speedup, preparation the report and short presentation on received results in Polish in English. Presentation results of experiments performed. | 2 |
| Lab6 | Implementation of chosen parallel search algorithm, carrying out the tests for different data, calculation of speedup, preparation the report and short presentation on received results in Polish in English. Presentation results of experiments performed | 2 |
| Lab7 | Familiarization with CUDA environment, running simple programs. | 2 |
| Lab8 | Implementation of chosen algorithm that used shared memory at GPU, carrying out the tests and calculation of speedup. | 2 |
| Lab9 | Implementation of chosen algorithm with data parallelism in CUDA environment, calculation of speedup, preparation the report and short presentation on received results in Polish in English. Presentation results of experiments performed. | 2 |

| | Total hours | 18 |
|---|---|---|

| Form of classes - project | | Number of hours |
|---|---|---|
| Proj1 | | |
| Proj2 | | |
| | Total hours | |

| Form of classes - seminar | | Number of hours |
|---|---|---|
| Sem1 | | |
| Sem2 | | |
| | Total hours | |

## TEACHING TOOLS USED

N1. Lecture supported by multimedia presentations (slideshow)
N2. Cluster of computers running under MPI
N3. GPU server with CUDA environment

## EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| F1 – (lecture) | PEK_W01<br>PEK_W02<br>PEK_W03 | Quizzes and test during the lecture, student activity during the lecture, students answering on questions during lecture. |
| F2 – (laboratory) | PEK_U01<br>PEK_U02<br>PEK_U03<br>PEK_U04 | Checking of student preparation for exercise realization, assessment of the reports of the exercises. Evaluation of the quality of submitted by students programs, Evaluation of students presentations (point allocation). |

P - the final grade from lecture will be issued on the basic of partial grades (points) received from the test (T) and quizzes (Q) as follows: Grade = 20% * Q + 80% *T. The final grade from the laboratory will be issued on the basis of partial grades (points) obtained from all exercises.

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[1] Kumar Vipin, Grama Ananth, Gupta Anshul, Karypis George "Introduction to Parallel Computing" The Benjamin/Cumming Publishing Company, Inc.
[2] B. Wilkinson, M. Allen, "Parallel Programming, Prentice Hall, 2005
[3] Writing Message-Passing Parallel Programs with MPI, Course Notes,
        http://www.zib.de/zibdoc/mpikurs/mpi-course.pdf
[4] Peter Pacheco, Parallel Programming with MPI, Morgan Kaufmann Pub.
        http://www.cs.usfca.edu/~peter/ppmpi/
[5] Zbigniew Czech, Wprowadzenie do obliczeń równoległych, PWN, Warszawa 2010

**SECONDARY LITERATURE:**

[1] Karbowski, E. Niewiadomska-Szynkiewicz, "Obliczenia Równoległe i Rozproszone", Wyd. Politechniki Warszawskiej, 2001

[2]  Ian Foster, Designing and Building Parallel Programs, http://www.mcs.anl.gov/~itf/dbpp/

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

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# MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Parallel Programming - Algorithms and Techniques**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W04 | C1 | Lec1, Lec 6, Lec 7, Lec 8, Lec 9 | N1 |
| PEK_W02 | K1INF_W04 | C2 | Lec 3 – Lec 5, Lec 9 | N1 |
| PEK_W03 | K1INF_W04 | C3 | Lec 1, Lec 2, Lec 8, Lec 9 | N1 |
| PEK_U01 (skills) | K1INF_U06 | C4 | Lab2,Lab3, Lab4, Lab5, Lab6, Lab8, Lab9 | N2, N3 |
| PEK_U02 | K1INF_U06 | C5 | Lab1, Lab2, Lab7, Lab8 | N2, N3 |
| PEK_U03 | K1INF_U07 | C6 | Lab4, Lab5, Lab6, Lab9 | N2, N3 |
| PEK_U04 | K1INF_U13 | C7 | Lab4, Lab5, Lab6, Lab9 | N2, N3 |

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

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FACULTY W-8 / ~~DEPARTMENT~~……………
**SUBJECT CARD**
**Name in Polish**          **Algorytmy i Struktury Danych**
**Name in English**          **Algorithms and Data Structures**
**Main field of study (if applicable):**   Informatics….
**Specialization (if applicable):**       ……………………..
**Level and form of studies:**        1st/ ~~2nd~~* level, ~~full-time~~ / part-time*
**Kind of subject: obligatory** ~~/ optional~~ / ~~university-wide~~*
**Subject code**          INZ001645
**Group of courses**          YES / ~~NO~~*

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 9 | 18 | | |
| Number of hours of total student workload (CNPS) | 42 | 51 | 42 | | |
| Form of crediting | Examination / ~~crediting with grade~~* | ~~Examination~~ / crediting with grade~~*~~ | ~~Examination~~ / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | X | | | | |
| Number of ECTS points | 2 | 2 | 3 | | |
| including number of ECTS points for practical (P) classes | | | 3 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0.8 | 0.8 | 1.2 | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Knowledge of a programming language (Java).
2. Knowledge of object programming basics

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**SUBJECT OBJECTIVES**

C1. Gaining basic knowledge on abstract data types and their implementation.
C2. Rules of algorithm assessment and comparison.
C3. Getting to know simple graph, geometrical and text algorithms.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

PEK_W01.  Knows a concept of abstract data type.
PEK_W02.  Knows the principles of dynamic data structure construction.
PEK_W03.  Understands the rules of algorithm assessment and comparison.
PEK_W04.  Knows simple graph algorithms.
PEK_W05.  Knows simple geometrical algorithms.
PEK_W06.  Knows methods of searching for patterns in a text.

relating to skills:

PEK_U01.  Can implement abstract data type.
PEK_U02.  Can test and compare algorithms.

relating to social competences:

PEK_K01.  Can communicatively present own application and its test results.

| **Form of classes - lecture** | **Number of hours** |
|---|---|

| Lec 1 | Iterators – definition and use. | 2 |
|---|---|---|
| Lec 2 | Linked lists. | 2 |
| Lec 3 | Stacks and queues. | 2 |
| Lec 4 | Sorting algorithms (1) | 2 |
| Lec 5 | Sorting algorithms (2) | 2 |
| Lec 6 | Binary search trees. Red black trees, BTrees. | 2 |
| Lec 7 | Priority queues. Hash tables. Simple implementations of mapping. | 2 |
| Lec 8 | Graph algorithms. | 2 |
| Lec 9 | Geometrical algorithms. Text pattern searching. | 2 |
| | Total hours | **18** |

| Form of classes - class | | Number of hours |
|---|---|---|
| Cl 1 | Iterators. | 2 |
| Cl 2 | Lists, heaps, queues. Recursive list processing. | 2 |
| Cl 3 | Sorting – algorithms analysis and comparison. BST tree processing | 2 |
| Cl 4 | B-trees and hash tables. Graphs. | 3 |
| | Total hours | 9 |

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab 1 | Creation and use of own iterators. | 2 |
| Lab 2 | An implementation using dynamic data structures – lists, heaps, queues. | 6 |
| Lab 3 | Preparation of a client enabling testing of chosen sorting algorithms. Testing of chosen sorting algorithms and their comparison. | 4 |
| Lab 5 | Applications using trees and graphs. | 6 |
| | Total hours | 18 |

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

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

| TEACHING TOOLS USED |
|---|
| N1. Informational lecture. N2. E-learning system used to publish educational materials. |

| N3. Environment for software implementation and 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 |
| --- | --- | --- |
| P1 Final score from the course group. | PEK_W01-PEK_W06, PEK_U01,PEK_U02 | The score is given on the basic of the exam results. Attendance in the practical classes is a prerequisite for admission to the exam — one unjustified absence is allowed. The exam is passed if a student scores at least 50% of the points. |
| P2 Final score from the laboratory | PEK_U01,PEK_U02,PEK_K01 | Execution of tasks indicated by the lecturer. The final score is the average from the partial scores. |

| PRIMARY AND SECONDARY LITERATURE |
| --- |

**PRIMARY LITERATURE:**

[1] Sedgewick R., Algorytmy w Javie, Helion 2012
[2] Harris S., Ross J., Od Podstaw Algorytmy, Helion 2006

**SECONDARY LITERATURE:**

[1] Cormen T. H., Leiserson Ch. E., Rivest R. L., Wprowadzenie do Algorytmow, WNT 1997
[2] Harel D., Rzecz o Istocie Informatyki – Algorytmika, WNT 1992

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Algorithms and Data Structures**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION ……………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W04 | C1 | Lec1- Lec 3, Cl 1, Cl 2 | N1, N2 |
| PEK_W02 | K1INF_W04 | C1 | Lec 1- Lec7, Cl 2- Cl 4, Lab 4 | N1, N2, N3 |
| PEK_W03 | K1INF_W04 | C2 | Lec 4 – Lec 8, Cl3, Lab 3, Lab4 | N1, N2, N3 |
| PEK_W04 | K1INF_W04 | C3 | Lec 6 – Lec 8, Cl 4, Lab 4 | N1, N2,N3 |
| PEK_W05 | K1INF_W04 | C3 | Lec 9 | N1, N2 |
| PEK_W06 | K1INF_W04 | C3 | Lec 9 | N1, N2 |
| PEK_U01 (skills) | K1INF_U01, K1INF_U014 | C1 | Lec 1- Lec 8, Cl 2- Cl 4, La 2- La 4 | N1, N2, N3 |
| PEK_U02 | K1INF_U01 | C2 | Lec 4, Cl 4, Lab 3, Lab 4 | N1, N2, N3 |
| PEK_K01 (competences) | K1INF_W04 | | Lab 1- Lab 4 | N2, N3 |

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

*** - from table above

FACULTY

**SUBJECT CARD**

Name in English          **Mathematical Analysis 1.1 A**

| | Name in Polish | **Analiza Matematyczna 1.1 A** |
|---|---|---|

Name in Polish      **Analiza Matematyczna 1.1 A**

Main field of study (if applicable)

Specialization (if applicable)

Level and form of studies      I level, part-time

Kind of subject      obligatory

Subject code      MAP3058

Group of courses      Yes

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 18 | | | |
| Number of hours of total student workload (CNPS) | 240 | 0 | | | |
| 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. | 1.0 |
| Wy3 | Trygonometric functions and their inverses. Graphs of trigonometric and of its inverses. | 1.0 |
| Wy4 | Sequences and limits. Basic formulas and theorems. Number e. Improper limits. | 1.0 |
| Wy5 | The limit of a function in a point. Directional limits of function. Asymptotics of function. | 1.0 |
| Wy6 | Continuity of a function in a point and on the interval. Basic properties of conituous functions. Approximate solutions of equations. Points of discontinuity. | 1.0 |
| 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. | 1.0 |
| Wy9 | Examination of the graph of a function. | 1.0 |
| Wy10 | Taylor formula. Aproximation of function. Applications. | 1.0 |
| 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. | 1.0 |
| Wy13 | The basic methods of calculus of integrals: integration by parts and by substitution. | 1.0 |
| Wy14 | The basic methods of calculus of integrals: simple rational funnctions. Area and perimeter of a circle. The volume of rotary figures. | 1.0 |
| Wy15 | Application of methods of mathematical analysis of one variable functions. | 1.0 |

| | Total hours | 18 |
|---|---|---|
| | **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. | 2.0 |
| 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. | 2.0 |
| 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 | 2.0 |
| Cw14 | Integration - II | 1.0 |
| Cw15 | Integration - applications | 1.0 |
| | **Total hours** | **18** |

**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 | colloquium during classes, oral answers |
| F2 | PEK_W2, PEK_U2, PEK_K1 | colloquium during classes, oral answers |
| 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**

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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 1.1 A MAP3058

## 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 |

FACULTY

# SUBJECT CARD

Name in English **Mathematical Analysis 2.4 A**

Name in Polish **Analiza Matematyczna 2.4 A**

Main field of study (if applicable)

Specialization (if applicable)

Level and form of studies I level, part-time

Kind of subject Obligatory

Subject code MAP3060

Group of courses Yes

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 9 | | | |
| Number of hours of total student workload (CNPS) | 120 | | | | |
| Form of crediting | exam | | | | |
| 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 | 2.5 | | | | |

## 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 wielkości, 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. | 1.0 |
| Wy2 Infinite series. The basic criteria for convergence of series. Absolute and conditional convergence. Leibniz criterion. | 1.0 |

| | | |
|---|---|---|
| Wy3 | Power series. The radius and interval of convergence. Cauchy theorem - Hadamard. Taylor Series. | 1.0 |
| Wy4 | Properties of the space $R^n$. Subsets of the space $R^n$. Functions of several variables. | 1.0 |
| Wy5 | Partial derivatives of the first order. Definition. Geometric interpretation. Higher order partial derivatives. Schwarz theorem | 1.0 |
| Wy6 | The plane tangent to the graph of a function of two variables. Directional derivatives. Gradient of a function. | 1.0 |
| 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. | 1.0 |
| 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. | 1.0 |
| Wy11 | Triple integrals. Reversal iterated integrals. Change of variables in cylindrical and spherical coordinates | 1.0 |
| Wy12 | Applications of double and triple integrals in geometry and physics. | 2.0 |
| Wy13 | Laplace transform. | 1.0 |
| Wy14 | Inverse Laplace transform and its applications | 1.0 |
| Wy15 | Introduction to the Fourier transform. | 1.0 |
| | **Total hours** | **18** |
| **Form of classes - classes** | | **Hours** |
| Cw1 | Infinitie series | 0.5 |
| Cw2 | Power series | 0.5 |
| Cw3 | The functions of two variables. | 0.5 |

| | | |
|---|---|---|
| Cw4 | Partial derivatives. | 0.0 |
| Cw5 | Gradient. Tangent planes. | 0.5 |
| Cw6 | Extremes of functions of two variables. | 0.5 |
| Cw7 | Conditional Extremes. | 0.5 |
| Cw8 | The study of functions of several variables - I | 1.0 |
| Cw9 | The study of functions of several variables - II | 1.0 |
| Cw10 | Double integrals. | 0.5 |
| Cw11 | Triple integrals. | 0.5 |
| Cw12 | Integrals of functions of several variables. | 0.5 |
| Cw13 | Applications of multiple integrals | 1.0 |
| Cw14 | Laplace transform | 0.5 |
| Cw15 | Integral transforms | 0.5 |
| | **Total hours** | **9** |

**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_W2, PEK_U1, PEK_U2, PEK_K1 | test on exercises, oral answer |
| F2 | PEK_W2, PEK_U2, PEK_U3, PEK_K1 | test on exercises, oral answer |
| 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**

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# MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

## Mathematica Analysis 2.4A MAP3060

## 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 Cw1 Cw2 | N1, N2, N3 |
| PEK_W2 | | C2 C3 | Wy4 Wy5 Wy6 Wy7 Wy8 Wy9 Wy10 Wy11 Wy12 Cw3 Cw4 Cw5 Cw6 Cw7 Cw8 Cw9 Cw10 Cw11 Cw12 Cw13 | N1, N2, N3 |
| PEK_W3 | | C4 | Wy13 Wy14 Wy15 Cw14 | N1, N2, N3 |
| PEK_U1 | | C1 | Wy1 Wy2 Wy3 Cw1 Cw2 | N1, N2, N3 |
| PEK_U2 | | C2 | Wy5 Wy6 Wy7 Wy8 Cw3 Cw4 Cw5 Cw6 Cw7 Cw8 Cw9 | N1, N2, N3 |
| PEK_U3 | | C3 | Wy9 Wy10 Wy11 Wy12 Cw10 Cw11 Cw12 Cw13 | N1, N2, N3 |
| PEK_U4 | | C4 | Wy13 Wy14 Wy15 Cw14 Cw15 | N1, N2, N3 |
| PEK_K1 | | C1 C2 C3 C4 | Wy1 Wy2 Wy3 Wy5 Wy6 Wy7 Wy8 Wy9 Wy10 Wy11 Wy12 Wy13 Wy14 Wy15 Cw1 Cw2 Cw3 Cw4 Cw5 Cw6 Cw7 Cw8 Cw9 Cw10 Cw11 Cw12 Cw13 Cw14 Cw15 | N1, N2, N3 |

FACULTY of **Computer Science and Management**/ DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish:  Architektura systemów komputerowych**
**Name in English: Computer Systems Architecture**

**Main field of study (if applicable): Informatics**
**Specialization (if applicable):**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code INZ001646Wl**
**Group of courses YES / NO\***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | | 18 | | |
| Number of hours of total student workload (CNPS) | 60 | | 90 | | |
| Form of crediting | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* |
| For group of courses mark (X) final course | X | | | | |
| Number of ECTS points | 2 | | 3 | | |
| including number of ECTS points for practical (P) classes | 0 | | 3 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 1 | | 1 | | |

\*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

3. Basic knowledge of computer systems organization and design of combinational and sequential circuits
4. Programming skills at a basic level

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**SUBJECT OBJECTIVES**

C1    Acquainting students with the architecture of modern computers, including the memory organization, and evaluation of their performance

C2    Acquisition of skills to design and construct simple combinational and sequential circuits

C3    Acquisition of programming skills in assembly language of selected processor at a basic level

C4    Acquisition of the ability to apply the principles of health and safety work

| SUBJECT EDUCATIONAL EFFECTS |
|---|

relating to knowledge:

PEK_W01 Knows different computer architectures including  the architecture of the parallel
computers

PEK_W02 Knows the computer memory organization, especially cache memory

PEK_ W03 Knows the basics of pipeline processing, including how to solve the problems associated
with this type of processing

PEK_W04 Knows the basic methods of evaluating the performance of parallel computers

relating to skills:

PEK_U01 Is able to write simple programs in assembly language of selected processor

PEK_U02 Can design and build  simple combinational and sequential circuits

PEK_U03 Is able to use  the principles of safety and health at work

relating to social competences:

PEK_K01…

| PROGRAMME CONTENT | |
|---|---|
| **Form of classes - lecture** | **Number of hours** |
| Lec 1 Introduction - taxonomy of computer architectures, memory hierarchy. Harvard, Princeton and Harvard-Princeton architectures. | 2 |
| Lec 2 RISC computer organization: pipelining, cache memory, control unit. | 2 |
| Lec 3 Instruction set of the chosen RISC processor, the fundamentals of assembler programming. | 2 |
| Lec 4 Working environment. Programming in assembly language. | 2 |
| Lec 5 Advanced assembly programming techniques. | 2 |
| Lec 6 Memory organization, cache memory – methods if it's realization (associative, direct mapped, set-associative), virtual memory. | 2 |
| Lec 7 Pipeline processing, identification of conflicts and it's avoiding, delay branches, branch prediction algorithms. | 2 |
| Lec 8 Multiprocessor and multicomputer systems – distributed and shared memory, vector processors. Static and dynamic interconnection networks. | 2 |
| Lec 9 System evaluation: performance metrics, system scalability, Amdhal's Law. New trends in computer architecture | 2 |
| Total hours | 18 |
| **Form of classes - class** | **Number of hours** |
| Cl 1 | |
| Total hours | |
| **Form of classes - laboratory** | **Number of hours** |
| Lab1 Presentation of lab scope, presentation of grading principles,  training from health and safety at work. Familiarization with laboratory tool used for the realization of combinational and sequential circuits. | 2 |

| Lab2 | Designing of combinational circuits | 2 |
|------|-------------------------------------|---|
| Lab3 | The analysis of systems with static hazard | 2 |
| Lab4 | The analysis and synthesis of the synchronous circuit | 2 |
| Lab5 | Introduction to the laboratory in assembly language programming, familiarization with the working environment | 2 |
| Lab6 | Implementation of a simple program in assembler, running it in different execution modes, observing the contents of the registers during program execution. | 2 |
| Lab7 | Implementation of a program that uses conditional branches | 2 |
| Lab8 | Familiarization with the implementation of different iteration instructions in assembly language | 2 |
| Lab9 | Familiarization with procedure implementation in assembly language. | 2 |
| | Total hours | 18 |

| Form of classes - project | Number of hours |
|---------------------------|-----------------|
| Proj1 | | |
| | Total hours | |

| Form of classes - seminar | Number of hours |
|---------------------------|-----------------|
| Sem1 | | |
| | Total hours | |

| TEACHING TOOLS USED |
|---------------------|
| N1. Lecture supported by multimedia presentations (slideshow)<br>N2. SPIM and MIPS32 Simulator - http://pages.cs.wisc.edu/ ~ Larus / spim.html<br>N3. MARS (MIPS Assembler and Runtime Simulator) -<br>　http://courses.missouristate.edu/KenVollmar/MARS/<br>N4. Mounting plates allowing realization of combinational and sequential circuits |

## EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| Evaluation(F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| F1 – (lecture) | PEK_W01<br>PEK_W02<br>PEK_W03<br>PEK_W04 | Quizzes during the lecture, student activity during the lecture, students answering on questions during lecture |
| F2 – (switching theory laboratory) - (Lab1- Lab4) | PEK_U01<br>PEK_U03 | Checking of student preparation for exercise realization, assessment (points allocated) to the reports of the exercises |

| | | |
|---|---|---|
| F3 – (assembly programming laboratory) - (Lab5- Lab9) | PEK_U02 PEK_U03 | Evaluation of the quality of submitted by students programs, implementation during the laboratory additional tasks formulated during the laboratory (on-line programing) |

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

Grade = 40% * E + 10% * F1 + 25% * F2 + 25% * F3

### PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[1]    D. Patterson, J. Hennessy, Computer Organization and design, Elsevier
[2]    Materiały firmowe - dokumenty techniczne dostępne w sieci WWW - MIPS, Intel, AMD
[3]    W. Stallings, „Organizacja i Architektura systemu komputerowego", Warszawa WNT
[4]    W. Komorowski, „Krótki kurs architektury i organizacji komputerów", Mikom 2004

**SECONDARY LITERATURE:**

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

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

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

# MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
## Computer Systems Architecture
### AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION………………………………

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W08 | C1 | Lec1, Lec2, Lec7, Lec8, Lec9 | N1 |
| PEK_W02 | K1INF_W08 | C1 | Lec2, Lec6 | N1 |
| PEK_W03 | K1INF_W08 | C1 | Lec2, Lec7 | N1 |
| PEK_W04 | K1INF_W08 | C1 | Lec9 | N1 |
| PEK_U01 (skills) | K1INF_U06 | C3 | Lec3, Lec4, Lec5, Lab5 – Lab19 | N1, N2, N3 |
| PEK_U02 | K1INF_U06 | C2 | Lab1- Lab4 | N4 |
| PEK_U03 | K1INF_U14 | C4 | Lab1 – Lab9 | N2,N3,N4 |
| PEK_K01 (competences) | | | | |

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

*** - from table above

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FACULTY ……… / DEPARTMENT………………

**SUBJECT CARD**

**Name in Polish: Baza danych Oracle - programowanie**
**Name in English: Oracle Database - programming**
**Main field of study (if applicable): Informatics**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd* level, full-time / part-time***
**Kind of subject:**        ~~obligatory~~ / optional / ~~university-wide~~*
**Subject code**        INZ007631
**Group of courses**        ~~YES~~ / NO*

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 9 | | | 18 | |
| Number of hours of total student workload (CNPS) | 30 | | | 90 | |

| Form of crediting | ~~Examination /~~ crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | ~~Examination~~ / crediting with grade* | Examination / crediting with grade* |
|---|---|---|---|---|---|
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 1 | | | 3 | |
| including number of ECTS points for practical (P) classes | 0 | | | 3 | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,4 | | | 1.2 | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**
1. Knowledge of the rules of the projecting and building relation databases.
2. Skill in defining simple SQL queries.
3. Competences in the field of the structural and object-oriented programming paradigm.

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**SUBJECT OBJECTIVES**

C1 Gain basic knowledge of Oracle database programming environment.
C2 Gain basic knowledge of Oracle SQL extensions.
C3 Gain basic knowledge of the PL/SQL language.
C4 Gain basic knowledge of the object-oriented extensions of Oracle database.
C5 Gain basic knowledge of Oracle database security mechanisms.
C6 Gain basic knowledge of query optimization for Oracle database.

C7 Acquiring basic programming skills in the use of the programming environment of Oracle database.
C8 Acquiring basic programming skills in the use of Oracle SQL extensions.
C9 Acquiring basic programming skills in the use of PL / SQL language on the database server side.
C10 Acquiring basic programming skills in the use of Oracle object-oriented extensions for the database schema and for the programming on the database server side.
C11 Acquiring basic programming skills in the use of security mechanisms offered by the Oracle database.
C12 Acquiring basic skills development in the field of query optimization to an Oracle database.
C13 Learning how to navigate the literature and other sources to find information, expanding knowledge of the Oracle database programming.

C14 Obtaining competence in persuading and justifying the need for their solutions to work with the Oracle database.
C15 Awareness of the need for further work to expand knowledge of the Oracle database programming.
C16 Obtaining competence in the division of the solved problem, concerning database programming, into sub-problems in such a way that they can be passed to the implementation of co-workers, co-ordinating the work yourself.
C17 Awareness of the social dangers connected with incorrect or incomplete data

| | protection. | |
|---|---|---|

## SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01  He has a basic knowledge about the programming environment of Oracle database.

PEK_W02  He has knowledge about extensions of Oracle SQL

PEK_W03  He knows the structures of PL / SQL language.

PEK_W04  He has knowledge about object-oriented extensions of Oracle database.

PEK_W05  He has knowledge about the security mechanisms of Oracle database.

PEK_W06  He has knowledge connected with optimizers and with the principles of SQL queries optimization  in an Oracle database

relating to skills:

PEK_U01  He can navigate in the programming environment of Oracle database

PEK_U02  He can construct advanced SQL queries to Oracle.

PEK_U03  Using PL / SQL language,  he can program on the server-side of Oracle database.

PEK_U04  He can use the object-oriented extensions of the Oracle database, both in the definition of database scheme as well as programming in PL / SQL.

PEK_U05  He can define the basic security structures for Oracle database.

PEK_U06  He can modify the query to an Oracle database improving their efficiency and he can use Oracle database optimizers.

PEK_U07  He can navigate the literature and other sources to find extending information about programming of Oracle database..

relating to social competences:

PEK_K01  He can argue and justify the need to use their solutions at work with the Oracle database.

PEK_K02  He is aware of the need for further individual work in order to improve knowledge on Oracle database programming.

PEK_K03  He can divide a problem solved, connected with database programming, into sub-problems in such a way that they can be passed to the implementation of co-workers, co-ordinating the work yourself.

PEK_K04  He is aware of the social risks associated with incorrect or incomplete data protection.

## PROGRAMME CONTENT

| | Form of classes - lecture | Number of hours |
|---|---|---|
| Lec 1 | Preliminary information on the Oracle DBMS. | 1 |
| Lec 2 | Oracle SQL dialect - specific extensions and advanced queries.          PL / SQL language - commands and their syntax. | 2 |
| Lec 3 | Advanced mechanisms of language PL / SQL. | 2 |
| Lec 4 | Object-oriented extensions of the Oracle database. | 2 |
| Lec 5 | Oracle security mechanisms, query optimization and optimizers. | 2 |
| | Total hours | **9** |

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

| | Total hours | |
|---|---|---|

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

| **Form of classes - project** | | **Number of hours** |
|---|---|---|
| Proj 1 | Preview, health and safety course, introduction to the Oracle programming environment. | 2 |
| Proj 2 | Discussion and pass a project list No. 1 concerning advanced SQL in Oracle dialect. | 2 |
| Proj 3 | Consulting to the project list No. 1, its implementation and reception. | 2 |
| Proj 4 | Discussion and pass a project list No. 2, concerning the structures of PL / SQL. Test No. 1 concerning advanced Oracle SQL dialect. | 2 |
| Proj 5 | Consulting to the project list No. 2, its implementation and reception. | 2 |
| Proj 6 | Discussion and pass a project list No. 3 concerning the object-oriented extensions of the Oracle database. Test No. 2 concerning PL/SQL. | 2 |
| Proj 7 | Consulting to the project list No. 3, its implementation and reception. | 2 |
| Proj 8 | Discussion and pass a project list No. 4, concerning using optimizer and the use of security mechanisms of Oracle database. | 2 |
| Proj 9 | Consulting to the project list No. 4, its implementation and reception. Credits. | 2 |
| | Total hours | **18** |

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

| **TEACHING TOOLS USED** |
|---|
| N1. Lecture using the projector.<br>N2. Projects as a project task lists.<br>N3. Consultation.<br>N4. Student's own work - preparation of project tasks lists and self-refer to the topics identified by the teacher.<br>N5. Test (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 |
|---|---|---|

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| | | |
|---|---|---|
| F1 | PEK_W02, PEK_U02, PEK_U07 | Test No. 1. Point scale - up to 20% of the total number of points which one can obtain during the whole project. |
| F2 | PEK_W03, PEK_U03, PEK_U07 | Test No. 2. Point scale - up to 20% of the total number of points which one can obtain during the whole project. |
| F3 | PEK_W01, PEK_W02, PEK_U01, PEK_U02, PEK_U07 | Oral answer during passing a project list No. 1. Point scale - up to 15% of the total number of points which one can obtain during the whole project. |
| F4 | PEK_W03, PEK_U03, PEK_U07 | Oral answer during passing a project list No. 2. Point scale - up to 15% of the total number of points which one can obtain during the whole project. |
| F5 | PEK_W04, PEK_U04, PEK_U07 | Oral answer during passing a project list No. 3. Point scale - up to 15% of the total number of points which one can obtain during the whole project. |
| F6 | PEK_W05, PEK_W06, PEK_U05, PEK_U06, PEK_U07 | Oral answer during passing a project list No. 4. Point scale - up to 15% of the total number of points which one can obtain during the whole project. |
| P1 - final evaluation of the lecture | PEK_W02, PEK_W03, PEK_U02, PEK_U03, PEK_U07 | Evaluation determined on the basis of the total number of points scored in the evaluations forming F1 and F2 (the percentage of the total number of points available under these evaluations) according to the formula:<br>< 0%, 50%)  → ndst<br><50%, 60%>  → dst<br>( 60%, 70%>  → dst+<br>( 70%, 80%>  → db<br>( 80%, 90%>  → db+<br>( 90%, 100%> → bdb |
| P2 - final evaluation of the project | PEK_W01, PEK_W02, PEK_W03, PEK_W04, PEK_W05, PEK_W06, PEK_U01, PEK_U02, PEK_U03, PEK_U04, PEK_U05, PEK_U06, PEK_U07, PEK_K01, PEK_K02, PEK_K03, PEK_K04 | Evaluation determined on the basis of the total number of points scored in the evaluations forming F1, F2, F3, F4, F5, F6 and F7 (the percentage of the total number of points to obtain the project) according to the formula:<br>< 0%, 60%)  → ndst<br><60%, 68%>  → dst<br>( 68%, 76%>  → dst+<br>( 76%, 84%>  → db<br>( 84%, 92%>  → db+<br>( 92%, 100%> → bdb |
| C | | |
| **PRIMARY AND SECONDARY LITERATURE** | | |

**PRIMARY LITERATURE:**

[5]     J. Price, Oracle Database 11g i SQL. Programowanie, Wydawnictwo Helion, Gliwice 2009.

[6]      K. Loney, Oracle Database 11g. Kompendium administratora, Wydawnictwo Helion, Gliwice 2010.

[7]     M. McLaughlin, Oracle Database 11g. Programowanie w języku PL/SQL, Wydawnictwo Helion, Gliwice 2009.

[8]     A. Pelikant, Programowanie serwera Oracle 11g SQL i PL/SQL. eBook, Wydawnictwo Helion, Gliwice 2012.

[9]     F. Steven, Oracle PL/SQL. Najlepsze praktyki, Wydawnictwo Naukowe PWN, Warszawa 2009.

[10]    Materiały dostarczone przez wykładowcę.

**SECONDARY LITERATURE:**

[1]     T. Connolly, C. Begg, Systemy baz danych, T. 1 i 2, Wydawnictwo RM, Warszawa 2004.

[2]     H. Ladanyi, SQL, Księga eksperta, Wydawnictwo Helion, Gliwice 2000.

[3]

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

**Zbigniew Staszak, zbigniew.staszak@pwr.wroc.pl**

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Oracle Database - programming**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION …………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W05, K1INF_W10, K1INF_W16, K1INF_W22 | C1 | Wy1, Pr1 | N1, N2 |
| PEK_W02 | K1INF_W06, K1INF_W16, K1INF_W22 | C2 | Wy2, Pr2, Pr3 | N1, N2, N3, N4, N5 |
| PEK_W03 | K1INF_W04, K1INF_W05, K1INF_W06, K1INF_W16, K1INF_W22 | C3 | Wy2, Wy3, Pr4, Pr5 | N1, N2, N3, N4, N5 |
| PEK_W04 | K1INF_W04, K1INF_W05, K1INF_W06, K1INF_W16, K1INF_W22 | C4 | Wy4, Pr6, Pr7 | N1, N2, N3, N4 |
| PEK_W05 | K1INF_W08, K1INF_W10, K1INF_W13, K1INF_W14, K1INF_W16, K1INF_W22 | C5 | Wy5, Pr8, Pr9 | N1, N2, N3, N4 |
| PEK_W06 | K1INF_W04, K1INF_W05, K1INF_W06,  K1INF_W08, K1INF_W10, K1INF_W16, K1INF_W22 | C6 | Wy5, Pr8, Pr9 | N1, N2, N3, N4 |
| PEK_U01 (skills) | K1INF_U06, K1INF_U16, K1INF_U19 | C7 | Wy1, Pr1 | N1, N2 |
| PEK_U02 | K1INF_U01, K1INF_U03, K1INF_U04, K1INF_U19 | C8 | Wy2, Pr2, Pr3 | N1, N2, N3, N4, N5 |
| PEK_U03 | K1INF_U01, K1INF_U03, K1INF_U19 | C9 | Wy2, Wy3, Pr4, Pr5 | N1, N2, N3, N4, N5 |
| PEK_U04 | K1INF_U02. K1INF_U15, K1INF_U19 | C10 | Wy4, Pr6, Pr7 | N1, N2, N3, N4 |
| PEK_U05 | K1INF_U06, K1INF_U14, K1INF_U19 | C11 | Wy5, Pr8, Pr9 | N1, N2, N3, N4 |

| PEK_U06 | K1INF_U01, K1INF_U03, K1INF_U04, K1INF_U19 | C12 | Wy5, Pr8, Pr9 | N1, N2, N3, N4 |
|---|---|---|---|---|
| PEK_U07 | K1INF_U05, K1INF_U11, K1INF_U17 | C13 | Pr2, Pr3, Pr4, Pr5, Pr6, Pr7, Pr8, Pr9 | N2, N4 |
| PEK_K01 (competences) | K1INF_K04, K1INF_K06, K1INF_K08 | C14 | Pr3, Pr5, Pr7, Pr9 | N2, N3 |
| PEK_K02 | K1INF_K01, K1INF_K08 | C15 | Wy1, Wy2, Wy3, Wy4, Wy5, Pr1, Pr2, Pr3, Pr4, Pr5, Pr6, Pr7, Pr8, Pr9 | N1, N2, N3 |
| PEK_K03 | K1INF_K03, K1INF_K04, K1INF_K06 | C16 | Wy1, Wy2, Wy3, Wy4, Wy5, Pr1, Pr2, Pr3, Pr4, Pr5, Pr6, Pr7, Pr8, Pr9 | N1, N2, N3, N4 |
| PEK_K04 | K1INF_K02, K1INF_K05 | C17 | Pr1, Pr2, Pr3, Pr4, Pr5, Pr6, Pr7, Pr8, Pr9 | N1, N2, N3 |

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

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FACULTY **Computer Science and Management** / DEPARTMENT **Computer Science**
**SUBJECT CARD**
**Name in Polish Bazy danych**
**Name in English Database**
**Main field of study (if applicable):  Computer Science**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code *INZ001653***
**Group of courses YES / NO\***

|  | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 9 | 9 |  |  |
| Number of hours of total student workload (CNPS) | 60 | 30 | 60 |  |  |
| Form of crediting | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* |
| For group of courses mark (X) final course |  |  |  |  |  |

| Number of ECTS points | 2 | 1 | 2 | | |
|---|---|---|---|---|---|
| including number of ECTS points for practical (P) classes | | | 1 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 | 0,4 | 0,8 | | |

*delete as applicable

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1.
2.
3.
\

**SUBJECT OBJECTIVES**

C1. Getting familiar with the basic concepts, terminology and issues related to databases.
C2. Getting to know the relational database model.
C3. Learning to design a relational database with a chosen structured methodology.
C4. Learning to normalize relation schemes.
C5. Learning how to prepare database project documentation.
C6. Getting to know languages of databases.
C7. The ability to implement a simple database application.

**SUBJECT EDUCATIONAL EFFECTS**

**relating to knowledge:**
PEK_W01 - knows the chosen methodology of database design
PEK_W02 - knows the basic concepts, terminology and issues related to databases
PEK_W03 - knows the relational data model
PEK_W04 - has knowledge of the database normalization schema
PEK_W05 - knows the basic syntax of database languages
PEK_W06 - knows the rules for the preparation of a database project documentation
PEK_W07 - knows the issues of database security

**relating to skills**:
PEK_U01 - can correctly use the terminology associated with databases
PEK_U02 - can see an area where there is a need to design a database
PEK_U03 - can design a database for the selected fragments of reality
PEK_U04 - can perform a database schema normalization
PEK_U05 - can prepare documentation of the database project in the accordance with the
        requirements
PEK_U06 - can create a sample database and populate it with data
PEK_U07 - can formulate queries in selected query languages
PEK_U08 - can develop prototypes of simple views
PEK_U09 - observes safety rules when working in the laboratory

**relating to social competences**:
PEK_K01 - can work in a team (2-3 persons)
PEK_K02 - is aware of the importance of professional ethics
PEK_K03 - has a sense of responsibility for his own work and the willingness to comply with the rules
        of working in a team and to take responsibility for collaborative tasks
PEK_K04 - can takes criticism and properly hold discussions

PEK_K05 - can argue his views
PEK_K06 - is able to evaluate his own work and the work of other team members
PEK_K07 - has the ability to communicate with team members
PEK_K08 - develops abilities of self-esteem and self-control and the sense of responsibility for the
results of taken actions
PEK_K09 - can plan his work and carry it out regularly in the accordance with a specific timetable

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - lecture** | | **Number of hours** |
| Lec 1 | Basic concepts and terminology of databases. The architecture of a database system. | 1 |
| Lec 2 | Data models. Relational model. | 2 |
| Lec 3 | Conceptual design. Entity-Relation Diagram (ERD). | 2 |
| Lec 4 | Logical Design. Transforming an ERD to a database schema. | 2 |
| Lec 5 | Features of a well-designed database. What determines a poor database design? Discussion of examples. | 1 |
| Lec 6 | Functional dependencies. Normal Forms. | 1 |
| Lec 7 | Database schema normalization. | 1 |
| Lec 8 | Databases languages. Designing queries using Query by Example. | 1 |
| Lec 9 | The syntax of SQL queries. | 1 |
| Lec 10 | A language based on the predicate calculus. | 1 |
| Lec 11 | A language based on the algebra of relations. | 1 |
| Lec 12 | A distributed database. | 1 |
| Lec 13 | Confidentiality in database systems. | 1 |
| Lec 14 | Database security. | 1 |
| Lec 15 | Processing of transactions in databases. | 1 |
| | Total hours | 18 |
| **Form of classes - class** | | **Number of hours** |
| Cl 1 | Basic concepts: a database, DBMS, database system. Examples. | 1 |
| Cl 2 | The relational model. Algebra of relations. | 1 |
| Cl 3 | Database modeling for a selected slice of reality. | 2 |
| Cl 4 | ERD. Transformation rules from a conceptual model to a logical model. | 1 |
| Cl 5 | Normal forms, database normalization. | 1 |
| Cl 6 | Query languages: QbE, SQL language (the rudiments). | 1 |
| Cl 7 | Languages based on the relational algebra and predicate calculus. | 1 |
| Cl 8 | The final test. | 1 |
| | Total hours | 9 |
| **Form of classes - laboratory** | | **Number of hours** |
| Lab 1 | Occupational Safety and Health (OSH) Training. Presentation of a selected DBMS. | 1 |

| Lab 2 | Formulation of the topic in order to design your own database. The analysis of the chosen domain. Documentation of the performed work. | 1 |
|---|---|---|
| Lab 3 | Development of a conceptual model. | 2 |
| Lab 4 | The development of a logical model of a database. | 1 |
| Lab 5 | Implementation of a sample database in DBMS and filling it with data. | 1 |
| Lab 6 | Development of queries to a database in selected database languages. | 1 |
| Lab 7 | Preparation of prototypes of chosen views. | 1 |
| Lab 8 | Assessment of the practical assignment. | 1 |
| | Total hours | 9 |

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

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

| TEACHING TOOLS USED |
|---|
| N1. Examples of documentation of database designs and examples of the discussed issues |

## EVALUATION 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 – attendance | PEK_K09 | Control of following the work schedule |
| F2 – evaluation for class participation | from PEK_U01 to PEK_U08 | Logging of being active |
| F3 – assessment of the database project | from PEK_U01 to PEK_U08 and from PEK_K01 to PEK_K09 | Assessment of the documentation of the database project |
| F4 – evaluation of tests | from PEK_W01 to PEK_W06 | Evaluation of the tests |

| F5 – exam grade | from PEK_W02 to PEK_W05, PEK_W07 | Exam grade |
|---|---|---|
| P1 – the credit rating of the lecture – exam grade (F5) | | |
| P2 – the credit rating of tutorials – weighted average of F1, F2, F4 | | |
| P3 – the credit rating laboratory – weighted average of F1, F2, F3 | | |

| PRIMARY AND SECONDARY LITERATURE |
|---|

**PRIMARY LITERATURE:**

[1] Mazur H., Mazur Z.: Projektowanie relacyjnych baz danych. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2004.

[2] Date C.J.: Relacyjne bazy danych. Helion, Gliwice, 2006.

[3] Date C.J., Darwen H.: SQL. Omówienie standardu języka. WNT, Warszawa, 2000.

**SECONDARY LITERATURE:**

[1] Pelikant A.: Bazy danych – pierwsze starcie. Helion, Gliwice, 2009.

[2] Jakubowski A.: Podstawy SQL – ćwiczenia praktyczne. Helion, Gliwice, 2001.

[3] Allen S.: Modelowanie danych. Helion, Gliwice, 2006.

[4] Garcia-Molina H., Ullman J.D., Widom J.: Systemy baz danych. Pełny wykład. WNT, Warszawa, 2006.

[5] Ullman J, D.: Podstawowy wykład z systemów baz danych. WNT, Warszawa, 2004.

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

**Dr hab. Zygmunt Mazur, prof. PWr., zygmunt.mazur@pwr.wroc.pl**

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Database**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
computer science
AND SPECIALIZATION ……………………………….

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 | K1INF_W07 | C3 | Lec3, Lec4 | N1 |
| PEK_W02 | K1INF_W22 | C1 | Lec1-Lec15 | N1 |
| PEK_W03 | K1INF_W07 | C2 | Lec2 | N1 |
| PEK_W04 | K1INF_W07 | C4 | Lec5-Lec7 | N1 |
| PEK_W05 | K1INF_W16 | C6 | Lec8-Lec11 | N1 |
| PEK_W06 | K1INF_W07 | C5 | Lec3, Lec4 | N1 |
| PEK_W07 | K1INF_W16 | C1 | Lec14 | N1 |
| PEK_U01 (skills) | K1INF_U03 | C1 | Lec1-Lec15, Cl1-Cl7 | N1 |
| PEK_U02 | K1INF_U03 | C3 | La2, Cl3 | N1 |
| PEK_U03 | K1INF_U03 | C3 | Cl3-Cl5, La2-La5, Lec3-Lec5 | N1 |
| PEK_U04 | K1INF_U03 | C4 | Lec6-Lec7, Cl5 | N1 |
| PEK_U05 | K1INF_U03 | C5 | Lec3-Lec5, Cl3-Cl4, La2-La7 | N1 |
| PEK_U06 | K1INF_U04, K1INF_U09 | C7 | Lec8-Lec11, Cl6-Cl7, La5-La7 | N1 |
| PEK_U07 | K1INF_U04 | C6 | La6 | N1 |

| | | | | |
|---|---|---|---|---|
| **PEK_U08** | K1INF_U19, K1INF_U09 | C7 | La7 | N1 |
| **PEK_U09** | K1INF_U14 | C7 | La1-La8 | N1 |
| **PEK_K01 (competences)** | K1INF_K01 | C1-C7 | Pr15 | N1 |
| **PEK_K02** | K1INF_K01 | C1-C7 | Pr15 | N1 |
| **PEK_K03** | K1INF_K01 | C1-C7 | Pr15 | N1 |
| **PEK_K04** | K1INF_K01 | C1-C7 | Pr15 | N1 |
| **PEK_K05** | K1INF_K01 | C1-C7 | Pr15 | N1 |
| **PEK_K06** | K1INF_K01 | C1-C7 | Pr15 | N1 |
| **PEK_K07** | K1INF_K01 | C1-C7 | Pr15 | N1 |
| **PEK_K08** | K1INF_K01 | C1-C7 | Pr15 | N1 |
| **PEK_K09** | K1INF_K01 | C1-C7 | Pr15 | N1 |

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

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

**SUBJECT CARD**

**Name in Polish: Bezpieczeństwo i ochrona danych**
**Name in English: : Computer Security and Data Protection**
**Main field of study (if applicable): ………………………….**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1ˢᵗ level, ~~full-time~~ / part-time\***
**Kind of subject: obligatory**
**Subject code INZ001659**
**Group of courses NO**

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | | 9 | | |
| 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 | | | | | |

| Number of ECTS points | **2** | | 1 | | |
|---|---|---|---|---|---|
| including number of ECTS points for practical (P) classes | 0 | | 1 | | 5 |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 | | 0,4 | | |

*delete as applicable

## PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
1. Basic knowledge of algebra and analysis
2. General knowledge of data transmission systems

## SUBJECT OBJECTIVES
C1 Skills and knowledge of data security level assessment and knowledge of the algorithms used during data security protection.
C2 Skills of selecting strategy and technical solutions for appropriate data security protection.
C3. Social competence and skills in organizational leadership, management and collaboration. Ability to work well in teams, self-motivate and understand conflict management. Understanding of organizational mission, governance and administrative systems. Understanding how to use decision making to support mission.

## SUBJECT EDUCATIONAL EFFECTS
relating to knowledge:
PEK_W01Has a basic knowledge of data security attributes.
PEK_W02 Has a knowledge of standards and algorithms related to data security
PEK_W03 Has a knowledge of data protection problems in IT systems
relating to skills:
PEK_U01Able to design data security architecture for IT systems
PEK_U02 Able to recognize the data security requirements of IT system
PEK_U03 Able to recognize the problems related to data security in IT systems
relating to social competences:
PEK_K01Unerstands the need of data security protection in IT systems
PEK_K02 Understands the role of data confidentiality, integrity and authentication in achieving the required security level

| PROGRAMME CONTENT | |
|---|---|
| **Form of classes - lecture** | **Number of hours** |
| Lec 1 Introduction to data security | 2 |
| Lec 2 Confidentiality protection and integrity | 2 |
| Lec 3 Data and users authentication and transmission security | 2 |
| Lec 4 Security models and management | 2 |
| Lec 5 Competency test | 1 |

| | Total hours | 9 |
|---|---|---|

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - Laboratory** | | **Number of hours** |
| Cl 1 | Introduction and technical issues | 2 |
| Cl 2 | Historical ciphers | 2 |
| Cl 3 | Modern symmetric ciphers | 2 |
| Cl 4 | Asymmetric ciphers | 2 |
| Cl 5 | Cryptographic has functions | 2 |
| Cl 6 | Electronic signature | 2 |
| Cl 7 | Application layer security | 2 |
| Cl 8 | E-mail security | 2 |
| Cl 9 | Data backup and integrity | 2 |
| | Total hours | 18 |

| TEACHING TOOLS USED |
|---|
| N1. Tradnitional and multimedia lectures<br>N2. Sudent's own work – project preparation<br>N3. Project  – methods of security related project preparation<br>N4. Tutorials<br>N5. Student's own work – literature study |

| EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT | | |
|---|---|---|
| **Evaluation** (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
| F1 | PEK_W01- PEK_W02, PEK_U01- PEK_U03, PEK_K01- PEK_K02, | Oral presentations and mid semestral reports of work progress |
| P PEK_W01- PEK_W02, Final test | | |

| PRIMARY AND SECONDARY LITERATURE |
|---|

PRIMARY LITERATURE:

[1] Stallings, William, Cryptography and Network Security: Principles and Practice
[2] Schneier, Bruce, Applied Cryptography: Protocols, Algorithms, and Source Code in C
[3] Menezes, Alfred J, Handbook of Applied Cryptography

SECONDARY LITERATURE:

[1] Kahn, David, The Codebreakers: The Comprehensive History of Secret Communication from Ancient Times to the Internet
[2] Dan Boneh, https://www.coursera.org/course/crypto
[3] Dan Boneh, Dawn Song and John C Mitchell, https://www.coursera.org/course/security

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

**Grzegorz Kołaczek,  Grzegorz.Kolaczek@pwr.wroc.pl**

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

……………………………

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ………………………..
AND SPECIALIZATION ……………………………

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W13 | C1 | Lec1-Lec5 | N1,N4-N5 |
| PEK_W02 | K1INF_W13 | C1 | Lec1,W5 | N1,N5 |
| PEK_U01 (skills) | K1INF_U09 | C2 | Lec1-Lec5 Cl1-Cl9 | N2-N4 |
| PEK_U02 | K1INF_U03, K1INF_U09 | C2,C3 | Lec1-Lec5 Cl1-Cl9 | N2-N4 |
| PEK_U03 | K1INF_U09, K1INF_U14 | C2,C3 | Lec1-Lec5 Cl1-Cl9 | N2-N4 |
| PEK_K01 (competences) | K1INF_U09 | C1,C3 | Lec1,Cl1-Cl5 | N4,N5 |
| PEK_K02 | K1INF_W13 | C1,C2,C3 | Lec5,Cl6-Cl9 | N4,N5 |

** - 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: Grafika komputerowa**
**Name in English: Computer graphics**
**Main field of study (if applicable): Informatics**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st level, part-time**
**Kind of subject: optional**
**Subject code INZ005739**
**Group of courses NO**

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | | 18 | | |
| Number of hours of | 60 | | 90 | | |

| total student workload (CNPS) | | | | | |
|---|---|---|---|---|---|
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | | 3 | | |
| including number of ECTS points for practical (P) classes | 0 | | 3 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0.8 | | 1.2 | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1.   Knows elementary notions and computational methods of linear algebra and geometry in 2D and 3D
2.   Is fluent in Java or C++ programming and knows basic general purpose algorithms and data types
3.   Knows one of popular development environments for C++ or Java

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**SUBJECT OBJECTIVES**

C1   The students should know and understand the methods of 2D image rendering and 2D visualization, deeply understand how they work and what are their features and limitations.
C2   The students should know how to use practically standard software components supporting 2D and 3D CG application development in Java environment
C3   The students should be able to select appropriate methods and software components according to the particular needs related to the CG application domain and build CG application that renders plain image or 3D scene view using these software components

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:
PEK_W01 Knows color spaces used in CG and understands differences between them
PEK_W02 Knows principles of transformation composition in homogenous coordinates
PEK_W03 Understands principles of curves modeling in 2D
PEK_W04 Knows properties of commonly used 3d rendering methods
PEK_W05 Knows and understands stages of typical 3D rendering pipeline
PEK_W06 Knows most popularly used geometry representation techniques for 3D
PEK_W07 Knows and correctly interprets components of Phong lighting model formula

relating to skills:
PEK_U01 Can implement procedural pattern rendering of regular 2D using raster and vector approach
PEK_U02 Is able to design and implement graphical UI using standard software components available in Java
PEK_U03 Can construct the transformation matrix in homogenous coordinates corresponding to visually specified transformation

PEK_U04 Can implement simple CG applications for 3D rendering based on OpenGL usage
PEK_U05 Can select scene description methods according to specified CG application and is able to find out reasons of defects appearing in obtained images
PEK_U06 Is able to evaluate efficiency of low-level methods and algorithms used in 2D and 3D CG

relating to social competences:
PEK_K01 Understands and appreciates the role of graphical interfaces in applications not directly related to computer science
PEK_K02 Is able to compose GUI and visualization methods appropriate to needs of end users not being IT specialists

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - lecture** | | **Number of hours** |
| Lec1 | Introduction, defining the scope of computer graphics, relation to other computer engineering domains, basic definitions and notions, raster graphics and vector graphics | 2 |
| Lec2 | CG program architecture, components for GUI building in Java2D and Swing | 2 |
| Lec3 | Color spaces in CG | 2 |
| Lec4 | Transformations in homogenous coordinates, general principles and advantages, affine transformation, transformation compositions | 2 |
| Lec5 | Curves modeling in 2D, Lagrange and Bezier curves, piecewise defined curves, B-splines | 2 |
| Lec6 | Introduction to 3D image synthesis, basic notions, scene description elements, lighting model, local and global illumination | 2 |
| Lec7 | 3D scene geometry description, boundary representation, CSG, implicit surfaces, metaballs, volumetric representations, lighting models, Phong lighting model | 2 |
| Lec8 | 3D scene geometry description, boundary representation, CSG, implicit surfaces, metaballs, volumetric representations, lighting models, Phong lighting model, visibility analysis | 2 |
| Lec9 | OpenGL library, core functionality, rendering program organization for OpenGL, observer settings, displaying simple geometry | 2 |
| | Total hours | 18 |
| **Form of classes - laboratory** | | **Number of hours** |
| La1 | Lab scope safety regulations grading policy presentation, installation of IDE, short introduction to CG packages in Java | 2 |
| La2 | Procedural rendering of 2D patterns using BufferedImage class | 2 |
| La3 | Image composition using affine transformations | 2 |
| La4 | Simple rendering of 3D scenes with Phong lighting model | 2 |
| La5 | 3D shape modeling by curve rotation and translation - conversion to triangle mesh, implementation of wireframe display of triangle meshes | 4 |

| La6 | Scene rendering program based on OpenGL or java3D | 2 |
|---|---|---|
| La7 | 3D visualization program with observer interactive setting | 4 |
| | Total hours | 18 |

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

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

| TEACHING TOOLS USED |
|---|
| N1. Multimedia presentation used in lectures<br>N2. Compilers and development environment for Java and C++<br>N3. Freeware and open source programs for 3D scene modeling<br>N4. E-learning system used to publish presentations, documents and other data related to the lecture<br>      and lab assignments |

**EVALUATION 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 - La2 | PEK_U01 | Assignment grading of La2 as scores in the range 0..1 or typical grade 2.0 – 5.0 |
| F4 - La3 | PEK_W01<br>PEK_W02<br>PEK_U03 | Assignment grading of La3 as scores in the range 0..1 or typical grade 2.0 – 5.0 |
| F7 - La4 | PEK_W01<br>PEK_W04<br>PEK_W05<br>PEK_W07<br>PEK_U05<br>PEK_U06 | Assignment grading of La4 as scores in the range 0..1 or typical grade 2.0 – 5.0 |
| F8 - La5 | PEK_W03<br>PEK_W06<br>PEK_U04<br>PEK_U05 | Assignment grading of La5 as scores in the range 0..3 or typical grade 2.0 – 5.0 |
| F9 - La6 | PEK_W04<br>PEK_W05<br>PEK_U02<br>PEK_U04<br>PEK_U05<br>PEK_U06 | Assignment grading of La6 as scores in the range 0..1 or typical grade 2.0 – 5.0 |
| F10 - La7 | PEK_W04<br>PEK_U02<br>PEK_U04 | Assignment grading of La7 as scores in the range 0..3 or typical grade 2.0 – 5.0 |

P1 – final laboratory grade computed according to the following scale
  0.00 - 4.49  - unsatisfactory
  4.50 - 5.49  - satisfactory
  5.50 - 6.49  - satisfactory plus
  6.50 - 7.49  - good
  7.50 - 8.29  - good plus
  8.30 - 9.00  - very good

P2 – final lecture grade will be based on written exam results. The exam consists in solving a number of test queries and computational problems. Each query is assigned a number of scores. The final grade is based on total scores percentage according to the following scale
  0 - 50%  - unsatisfactory
 51 - 60%  - satisfactory
 61 - 70%  - satisfactory plus
 80 - 89%  - good
 90 - 95%  - good plus
 96 - 100% - very good

| PRIMARY AND SECONDARY LITERATURE |
|---|

**PRIMARY LITERATURE:**

[1]    Jankowski M., Elementy grafiki komputerowej, WNT, W-wa, 2006
[2]    Wright R. S., Haemel N., Selles G., Lipchak B., OpenGL, Księga eksperta, Helion, 2011
[3]    Foley, J.D., Wprowadzenie do grafiki komputerowej, WNT, W-Wa, 2012
[4]    Lecture presentations as slideshows

**SECONDARY LITERATURE:**

[1]    Brackeen D.,, Barker B., Vanhelsuwe L., Java, Tworzenie gier. Helion, 2007
[2]    Kiciak P., Podstawy modelowania krzywych i powierzchni, WNT, 2009
[3]    Fraser B., Murphy C., Bunting F., Profesjonalne zarządzanie barwą, Helion, 2012

6

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

**Jerzy Sas, jerzy.sas@pwr.wroc.pl**

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

………………………….

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ………………………..

AND SPECIALIZATION ……………………………

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W23 | C1 | Lec1,Lec3 | N1,N4 |
| PEK_W02 | K1INF_W01, K1INF_W23 | C1,C3 | Lec4 | N1,N4 |
| PEK_W03 | K1INF_W01, K1INF_W23 | C1 | Lec5 | N1,N4 |
| PEK_W04 | K1INF_W23 | C1,C3 | Lec6 | N1,N4 |
| PEK_W05 | K1INF_W23 | C1 | Lec6,Lec7,Lec8 | N1,N4 |
| PEK_W06 | K1INF_W23, K1INF_W08 | C1,C3 | Lec7 | N1,N4 |
| PEK_W07 | K1INF_W23 | C1,C3 | Lec6,Lec7 | N1,N4 |
| PEK_U01 (skills) | K1INF_U04, K1INF_U09, K1INF_U12, K1INF_U16 | C2 | Lec1,Lec2,La2 | N2,N4 |
| PEK_U02 | K1INF_U04, K1INF_U12, K1INF_U16 | C2,C3 | Lec2,La3 | N2,N4 |
| PEK_U03 | K1INF_W01, K1INF_U11 | C1,C3 | Lec4,La3 | N1,N4 |
| PEK_U04 | K1INF_U04, K1INF_U12, K1INF_U16 | C2 | Lec9, La6,La7 | N2,N3,N4 |
| PEK_U05 | K1INF_U06, K1INF_U11 | C3 | Lec7,Lec8 La5.La6 | N1,N3,N4 |
| PEK_U06 | K1INF_U07, K1INF_U11 | C1,C3 | Lec9,Lec8, La4,La6 | N1,N2,N3,N4 |
| PEK_K01 (competences) | K1INF_K02, K1INF_K07 | C3 | Lec1,Lec2,La2, La7 | N1,N4 |
| PEK_K02 | K1INF_K02, K1INF_K07 | C3 | Lec1,Lec2,Lec8,Lec9, La2, La7 | N1,N2,N3,N4 |

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

*** - from table above

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FACULTY W-8 / DEPARTMENT………………

**SUBJECT CARD**

**Name in Polish  Hurtownie Danych**
**Name in English  Data warehouses**
**Main field of study (if applicable): Computer Science**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st, part-time**

**Kind of subject: obligatory**
**Subject code INZ001658**
**Group of courses NO**

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 9 | | 18 | | |
| Number of hours of total student workload (CNPS) | 30 | | 60 | | |
| Form of crediting | ~~Examination~~ / crediting with grade* | Examination / crediting with grade* | ~~Examination~~ / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 1 | | 2 | | |
| including number of ECTS points for practical (P) classes | 0 | | 2 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0.4 | | 0.8 | | |

*delete as applicable

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### PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
1. Basic knowledge of the organization of the database system
2. At least a basic knowledge of SQL query language.

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### SUBJECT OBJECTIVES
C1. Acquiring knowledge of typical data warehouse architecture and organization.
C2. Acquiring basic knowledge on the main issues of BI systems (Business Intelligence).
C3. Acquiring elementary knowledge of data warehouse  design process.
C4. Acquiring basic knowledge in the field of data mining in data warehouses.
C5. Acquiring basic skills of data warehouse creation and usage – including the ability to use multi-dimensional data model using Analysis Services (MS SQL Server).
C6. Acquiring basic skills to a database design for a data warehouse – ETL process using Integration Services (MS SQL Server).
C7. Acquiring basic skills of data mining – data mining tools in data warehouses.
C8. Acquiring basic skills of reporting – reporting data in data warehouses using Reporting Services (MS SQL Server).

| SUBJECT EDUCATIONAL EFFECTS |
|---|
| relating to knowledge: |
| PEK_W01. Knows the basic processing models - transactional and analytical. |
| PEK_W02. Knows the basic architecture and organization of typical data warehouse. |
| PEK_W03. Can describe and characterise common tasks of BI processes (Business Intelligence). |
| PEK_W04. Can describe in details the process of designing a data warehouse, including ETL data integration process. |
| PEK_W05. Knows the basics of MDX queries for multidimensional OLAP. |
| PEK_W06. Can formulate the basic tasks of data mining in data warehouses. |
| relating to skills: |
| PEK_U01. Can apply rules for the proper use of laboratory equipment. |
| PEK_U02. Can, using a dedicated software, build SQL queries using different methods of data aggregation. |
| PEK_U03. Can analyse an existing transactional database system. |
| PEK_U04. Can, using a dedicated software, prepare the database for the data warehouse, including the implementation of the ETL process. |
| PEK_U05. Can, using a dedicated software, design and implement a multi-dimensional cube - define measures, dimensions, calculated measures, partitions, aggregations, perspectives, key performance indicators. |
| PEK_U06. Can use a multidimensional data model using the MDX query language. |
| PEK_U07. Can, using a dedicated software, use the basic tools of data mining in data warehouses. |
| PEK_U08. Can, using a dedicated software, design and create simple reports in data warehouses. |
| relating to social competences: |
| PEK_K01. Knows the current issues of data analysis technology, understands the need to explore new solutions and further education. |
| PEK_K02. Understands the responsibilities and impact of data warehouse engineering on the business environment. |

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - lecture** | | **Number of hours** |
| Wy1 | Introduction – BI processes and tasks | **1** |
| Wy2 | Data processing models – OLAP / OLTP | **1** |
| Wy3 | Data models and Data Warehouse architecture | **1** |
| Wy4 | Implementation of Data Warehouses in SSBDS | **1** |
| Wy5 | Data Integration – ETL process | **1** |
| Wy6 | Multidimensional query language - MDX | **1** |
| Wy7 | Data Mining in Data Warehouses | **1** |
| Wy8 | Fundamentals of Data Warehouse Design process | **2** |
| | Total hours | **9** |

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

| CI 3 | | |
|---|---|---|
| CI 4 | | |
| .. | | |
| | Total hours | |

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| La1 | Health and Safety Training. Introduction. | 1 |
| La2 | SQL queries – focus on data aggregation. | 1 |
| La3 | Intro to MS SQL Server Management Studio and SQL Data Tools. Analysis of sample data source -  AdventureWorks. | 1 |
| La4 | Basics of Integration Services – focus on Control and Data Flow Tasks. | 2 |
| La5-7 | Basics of Analysis Services – focus on cube creation, dimension and measure analysis, partition and aggregation design. | 6 |
| La8 | Basics of MDX query language. | 2 |
| La9 | Data Presentation – focus on charts and pivot tables, basics of Reporting Services (focus on report design). | 2 |
| La10 | Basics of Data Mining – focus on DM model creation and testing. | 1 |
| La11 | Steps of the data warehouse design process – data source analysis, business analysis focus, cube development and implementation. | 2 |
| | Total hours | **18** |

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

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

| TEACHING TOOLS USED |
|---|

N1. Lecture.
N2. Group work - discussion, personal interview.
N3. Student's own work - programming.
N4. Student's own work - literature studies.
N5. Student's own work - analysis, design.

## EVALUATION 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_U04, PEK_U06, PEK_U07 | Student activities observation, including individual conversation regarding the current laboratory tasks (program demonstration, results, conclusions) |
| F2 | PEK_U03 | Student activities observation, including individual conversation regarding the current laboratory tasks (analysis results) |
| F3 | PEK_U05, PEK_U08 | Student activities observation, including individual conversation regarding the current laboratory tasks (design results presentation) |
| P PEK_W01-PEK_W06 Final Test | | |
| P PEK_U01-PEK_U08 Summary of student activities observation | | |

| PRIMARY AND SECONDARY LITERATURE |
|---|
| **PRIMARY LITERATURE:** |
| 4.    M. Jarke, M. Lenzerini, Y. Vassiliou, P. Vassiliadis. Hurtownie danych. Podstawa organizacji i funkcjonowania, WSiP, Warszawa 2003 |
| 5.    Inmon W., Building the Data Warehouse, John Wiley & Sons, New York 2002 |
| **6.**    Pelikant A., Hurtownie danych. Od przetwarzania analitycznego do raportowania, Helion, 2011 |
| **SECONDARY LITERATURE:** |
| [1]    Surma J., Business Intelligence, PWN, 2012 |
| [2]    Microsoft SQL Server 2012 Integration Services, APN Promise, 2012 |
| [3]    Scott C., Microsoft SQL Server 2008 Analysis Services Krok po kroku, Microsoft Press, 2009 |
| [4]    MacLennan J., Tang ZH., Crivat B., Data Mining with SQL Server 2008, Wiley Publishing, Inc, 2009 |
| **[5]**    Harinath S., Pihlgren R., Guang-Yeu Lee D., Sirmon J., M. Bruckner R., Professional Microsoft SQL Server 2012 Analysis Services with MDX and DAX, Wiley Publishing, Inc, 2012 |
| **SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)** |
|    **Radosław Katarzyniak,** radoslaw.katarzyniak@pwr.wroc.pl |

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Data Warehouses**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Computer Science**
AND SPECIALIZATION …………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W07, K1INF_W16 | C1, C2 | Wy1, Wy2 | N1, N4 |
| PEK_W02 | K1INF_W07, K1INF_W15, K1INF_W16, K1INF_U03 | C1, C3 | Wy3, Wy4 | N1, N4 |
| PEK_W03 | K1INF_W15 | C2 | Wy1, Wy8 | N1, N4 |
| PEK_W04 | K1INF_U03, K1INF_W15 | C3 | Wy5, Wy8 | N1, N4 |
| PEK_W05 | K1INF_U16, K1INF_W16 | C1, C5 | Wy6 | N1, N4 |
| PEK_W06 | K1INF_W15, K1INF_W16 | C4 | Wy7 | N1, N4 |
| PEK_U01 (skills) | K1INF_U14 | C5-8 | La1 | N2 |
| PEK_U02 | K1INF_U14, K1INF_U16 | C5 | La2 | N2, N3, N4 |
| PEK_U03 | K1INF_U03, K1INF_U14 | C2 | La3, La10 | N2, N3, N4 |
| PEK_U04 | K1INF_U03, K1INF_U04, K1INF_U14 | C5,C6 | La3-4 | N2, N3, N4, N5 |
| PEK_U05 | K1INF_U04, K1INF_U14, K1INF_U16 | C5, C6 | La5-7 | N2, N3, N4, N5 |
| PEK_U06 | K1INF_U04, K1INF_U14 | C5 | La8 | N2, N3, N4 |
| PEK_U07 | K1INF_U14, K1INF_U16 | C7 | La10 | N2, N3, N4 |
| PEK_U08 | K1INF_U03, K1INF_U04 | C8 | La8 | N2, N3, N4, N5 |
| PEK_K01 (competences) | K1INF_K01 | C1-2 | Wy1-8 | N1 |
| PEK_K02 | K1INF_K02 | C2,C7-8 | Wy1,La8-11 | N1, N2, N3 |

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

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FACULTY W-8 / DEPARTMENT………………

**SUBJECT CARD**

**Name in Polish:** *Hurtownie danych SAP*
**Name in English: SAP data warehouses**
**Main field of study (if applicable): Computer Science**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code INZ007655**
**Group of courses YES / NO\***

|  | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 |  | 18 |  |  |
| Number of hours of total student workload (CNPS) | 60 |  | 60 |  |  |
| Form of crediting | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* |
| For group of courses mark (X) final course |  |  |  |  |  |
| Number of ECTS points | 2 |  | 2 |  |  |
| including number of ECTS points for practical (P) classes | 0 |  | 2 |  |  |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 |  | 0,8 |  |  |

\*delete as applicable

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**
1. Knowledge of database and data warehouse design methods
2. Familiarity with multidimensional data models
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**SUBJECT OBJECTIVES**
C1 To obtain by students the ability of designing multidimensional data model in SAP BW Systems.
C2 To obtain by students the ability of designing ETL processes in SAP BW Systems.
C3 To obtain by students the ability of designing analytical reports in SAP BW Systems.

**SUBJECT EDUCATIONAL EFFECTS**
relating to knowledge:
PEK_W01 Has a basic knowledge about SAP BW tools for data warehouse development
PEK_W02 Has a basic knowledge about methods of data warehouse design and development in SAP
         BW environment.

relating to skills:
PEK_U01 Is able to design and develop multidimensional data model in SAP BW
PEK_U02 Is able to design and develop ETL processes in SAP BW
PEK_U03 Is able to design and develop analytical reports in SAP BW

relating to social competences:
PEK_K01Is able to work in and manager a small software development team

| PROGRAMME CONTENT | |
|---|---|

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Introduction, about SAP | 1 |
| Lec 2 | SAP BW architecture | 1 |
| Lec 3 | Data modelling:<br>   - Infoobjects<br>   - Infoproviders<br>   - Multiproviders | 4 |
| Lec 4 | ETL processes:<br>   - Source systems, Data sources<br>   - Transformations<br>   - DTPs, Process chains | 4 |
| Lec 5 | Analytical reporting:<br>   - BEx Queries (structures, filters, variables)<br>   - BEx Queries (key-figures, conditions, exceptions)<br>   - Workbooks and Query views | 4 |
| Lec 6 | Administration and optimization:<br>   - Query optimization<br>   - Infoproviders administration<br>   - Authorizations | 3 |
| Lec 7 | Test | 1 |
| | Total hours | 18 |

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

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab 1 | Introduction, Building of project teams | 2 |
| Lab 2 | Brainstorming | 2 |
| Lab 3 | Presentation of self prepared or chosen idea of data warehouse. | 2 |
| Lab 4 | Introduction to SAP BW – tutorial | 4 |
| Lab 5 | Data warehouse project – concept | 2 |

| Lab 6 | Data warehouse project – data model | 2 |
|---|---|---|
| Lab 7 | Data warehouse project – ETL processes | 2 |
| Lab 8 | Data warehouse project – reporting | 2 |
| | Total hours | 18 |

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

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

| TEACHING TOOLS USED |
|---|
| N1. Lecture<br>N2. Individual consultations<br>N3. The course web page with references to literature<br>N4. Software development tools<br>N5. SAP BW  System |

**EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT**

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| F1 | PEK_U01-03, PEK_K01 | Evaluation of the inception phase of project [20 points] (Lab1-3) |
| F2 | PEK_U01-03, PEK_K01 | Evaluation of the concept [20 points] (Lab5) |
| F3 | PEK_U01-03, PEK_K01 | Evaluation of the data model[20 points] (Lab6) |
| F4 | PEK_U01-03, PEK_K01 | Evaluation of the ETL processes[20 points] (Lab7) |
| F5 | PEK_U01-03, | Evaluation of the reporting [20 points] (Lab8) |

| | PEK_K01 | |
|---|---|---|
| P1 | PEK_U01-03, PEK_K01 | P1 is based on the sum of the points from F1…F5. At least 50% of points is required. |
| P2 | PEK_W01-02 | P2 is based on the result of a written test covering material presented during lectures. At least 50% of points is required to pass the test. |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[1] Kevin McDonald, et al., Mastering the SAP Business Information Warehouse, Wiley Publishing, Inc., 2002
[2] Peter Jones, SAP Business Information Warehouse Reporting, McGraw-Hill, 2008
[3] Biao Fu, Henry Fu, SAP BW: A Step-by-Step Guide, Addison Wesley, 2002

**SECONDARY LITERATURE:**

[1] Naeem Hashmi, Business Information Warehouse for SAP, Premier Press, 2000

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

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

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
*SAP data warehouses*
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) | K1INF_W04 | C1 – C3 | Lec1-Lec7 | N1-N3 |
| PEK_W02 | K1INF_W04 | C1 – C3 | Lec1-Lec7 | N1-N3 |
| PEK_U01 (skills) | K1INF_U06, K1INF_U07, K1INF_U13 | C1 | Lec3, Lab2-Lab8 | N1-N5 |
| PEK_U02 | K1INF_U06, K1INF_U07, K1INF_U13 | C2 | Lec4, Lab2-Lab8 | N1-N5 |
| PEK_U03 | K1INF_U06, K1INF_U07, K1INF_U13 | C3 | Lec5, Lab2-Lab8 | N1-N5 |
| PEK_K01 (competences) | | C1 – C3 | Lab2-Lab8 | N1-N5 |

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

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FACULTY W-8 / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish** Informatyczne systemy sterowania
**Name in English** Process control computer systems
**Main field of study (if applicable):** Informatyka
**Specialization (if applicable):** ……~~……………~~…..
**Level and form of studies: 1st/ ~~2nd~~* level, ~~full-time~~ / part-time***
**Kind of subject: obligatory / ~~optional / university-wide~~***
**Subject code INZ001657**
**Group of courses ~~YES~~ / NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 9 | | 18 | 9 | |
| Number of hours of total student workload (CNPS) | 60 | | 60 | 60 | |
| Form of crediting | Examination / ~~crediting with grade~~* | Examination / crediting with grade* | ~~Examination~~ / crediting with grade* | ~~Examination~~ / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | | 2 | 2 | |

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

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Knowledge on functions of computer's main components and registers.

2. Knowledge on functions of operating systems and on structure and operation principles of PC computers operating systems.

3. Knowledge on Ethernet local area network communication protocol.
4. Knowledge on how process dynamics can be modeled using a differential equation or a transfer function.

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**SUBJECT OBJECTIVES**

C1 Acquiring basic knowledge on problems, methods and technologies of industrial process control – as a main implementation area for real-time computer systems.

C2 Acquiring skills in developing computer systems supporting simple control tasks, in particular – skills in setting up and configuring equipment as well as in designing and implementing control algorithms, user's interfaces and communication procedures in distributed environments.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

PEK_W01  Student can characterize typical structures of control systems.

PEK_W02  Student can formulate a stabilization problem and present a selected stabilization algorithm in a closed-loop system.

PEK_W03  Student knows definitions and examples of real-time systems, and the SFC method for modeling transitions in event systems, is able to present architecture and operation principles of a selected real-time operating system.

PEK_W04 Student can characterize equipment of computer control systems, in particular – can describe architecture, operation principle and programming languages of PLCs as well as describe PLCs' properties specific to real-time systems.

PEK_W05 Student is able to describe a selected communication mechanism of distributed computer control systems and explain its important real-time properties in comparison to a selected communication mechanism of distributed computer systems with no real-time requirements.

relating to skills:

PEK_U01  Student follows rules for using laboratory equipment.

PEK_U02   Student is capable of applying a dedicated software to perform simulation of a control algorithm and analyze the results.

PEK_U03   Student is capable of implementing interface to a control system, in a form of synoptic table/operator's panel, and implement it using SCADA software.

PEK_U04  Student is capable of configuring and programming PLC, and of calculating its cycle time.

PEK_U05  Student is able to connect and configure component devices of a distributed computer control system and implement communication between them over an industrial network.

PEK_U06   Student is able to specify control tasks, to select components of a computer control system, to recommend control algorithms as well as technologies for process data collection and visualization – based on user's requirements expressed verbally.

relating to social competences:

PEK_K01   Student is familiar with current trends in technological development of computer control systems, understands the need for learning new solutions and minimizing costs.

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - lecture** | | **Number of hours** |
| Lec1 | Introduction. Control problem, control system, typical structures of control systems. Closed-loop control. Stability. Closed-loop control algorithms. | 2 |
| Lec2 | Real-time systems and control systems. Real-time operating systems. | 2 |
| Lec3 | Hierarchical structure of a distributed computer control system. Programmable controllers PLC. | 2 |
| Lec4 | Industrial computer networks. | 2 |
| Lec5 | Sensors and A/C, C/A converters. | 1 |
| | Total hours | 9 |
| **Form of classes - class** | | **Number of hours** |
| Cl 1 | | |
| Cl 2 | | |
| Cl 3 | | |
| Cl 4 | | |
| .. | | |
| | Total hours | |
| **Form of classes - laboratory** | | **Number of hours** |
| Lab1 | Explaining safety rules (BHP training). Introduction. | 1 |
| Lab1 – Lab4 | Using SCADA software – defining variables, downloading process data, data visualization and manual control with operators panel. | 6 |
| Lab4 – Lab7 | Using MATLAB/Simulink software for simulation, analysis and design of control algorithms. | 6 |
| Lab7 – Lab9 | Data exchange technologies in control systems. Linking SCADA and Matlab software environments. Using OPC software tools. | 5 |
| | Total hours | 18 |
| **Form of classes - project** | | **Number of hours** |
| Proj1 | Introduction. Familiarization with PLC structure and software development packages for Windows. | 1 |
| Proj1, Proj2 | Implementing LOGO! PLC control programs and S7-200 PLC control programs for control tasks specified by a teacher. Setting up and putting in operation the corresponding control systems developed by individual students. | 3 |
| Proj3, | Design, implementation, setting up and putting in operation of distributed | 4 |

| | | | |
|---|---|---|---|
| Proj4 | control systems developed by student teams. | | |
| Proj5 | Presentations of the developed control systems. | | 1 |
| | Total hours | | 9 |

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

## TEACHING TOOLS USED

N1. Traditional lecture.
N2. Students individual work – solving computational exercises.
N3. Group work – discussion, conversation with an individual student.
N4. Students individual work – programming.
N5. Students individual work – performing computer simulations.
N6. Students individual work – studying literature.
N7. Students individual work – analyzing, designing.
N8. Students individual work – presenting.
N9. Students individual work – setting up and configuring devices.

## EVALUATION 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 – F4 | PEK_U01, PEK_U03 | Watching students actions. Short (ca. 3 min) conversations with individual students concerning current laboratory exercises (incl. presentation of computer programs, computed results and conclusions), a report. |
| F5 – F8 | PEK_U01, PEK_U02 | Watching students actions Short (ca. 3 min) conversations with individual students concerning current laboratory exercises (incl. presentation of computer programs, computed results and conclusions), a report. |
| F9 – F10 | PEK_U01, PEK_U02, PEK_U03 | Watching students actions. Short (ca. 3 min) conversations with individual students concerning current laboratory exercises (incl. presentation of computer programs, computed results and conclusions), a report. |
| F11, F12 | PEK_U01, PEK_U04 | Watching students actions. Short (ca. 3 min) conversations with individual students concerning current laboratory exercises (incl. presentation of computer programs, computed results and conclusions), a report. |
| F13 | PEK_U05, PEK_U06 | On the basis of: conversations on current effects of project works, a report, a presentation. |
| P1 (Lec) | PEK_W01 – PEK_W05 | Written examination. |
| P2 (Lab) | PEK_U01, | F1 – F10 |

| | PEK_U02, PEK_U03 | | |
|---|---|---|---|
| P3 (Proj) | PEK_U01, PEK_U04, PEK_U05, PEK_U06 | F11 – F13 | |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[4]    Users' manuals and programmers' guides for PLC LOGO! and PLC S7-200 (available on-line)
[5]    Wonderware InTouch - users' manual (available on-line)

**SECONDARY LITERATURE:**

[1]     Bubnicki Z.: *Modern control theory*, Springer Verlag, Heidelberg-Oxford-N. York, 2005.

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

**Jerzy Józefczyk, jerzy.jozefczyk@pwr.wroc.pl**

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Process control computer systems**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatyka
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) | K1INF_W15 | C1 | Lec1 | N1, N6 |
| PEK_W02 | K1INF_W15, K1INF_W21 K1INF_U05 | C1 | Lec1 | N1, N6 |
| PEK_W03 | K1INF_W10, K1INF_W21 K1INF_U05 | C1 | Lec2 | N1, N6 |
| PEK_W04 | K1INF_W08, K1INF_W21 K1INF_U05 | C1 | Lec3, Lec5 | N1, N6 |
| PEK_W05 | K1INF_W11, K1INF_W21 | C1 | Lec4 | N1, N6 |
| PEK_U01 (skills) | K1INF_U14 | C2 | Lab1 – Lab9, Proj1 – Proj5 | N1, N3, N9 |
| PEK_U02 | K1INF_U05, K1INF_U14, K1INF_U15 | C2 | Lab4 – Lab9 | N3, N4, N5, N6, N7 |
| PEK_U03 | K1INF_U05, K1INF_U06, K1INF_U14, K1INF_U15, K1INF_U18 | C2 | Lab1 – Lab4, Lab7 – Lab9 Proj3 – Proj5 | N3, N4, N6, N7 |
| PEK_U04 | K1INF_U05, K1INF_U14, K1INF_U18 | C2 | Lec3, Proj1 – Proj5 | N1, N2, N3, N4, N6, N9 |
| PEK_U05 | K1INF_U05, K1INF_U08, K1INF_U14, K1INF_U18 | C2 | Lec3, Lec4, Proj1 – Proj5 | N1, N3, N4, N6, N9 |
| PEK_U06 | K1INF_U05, K1INF_U06, K1INF_U13, K1INF_U15, K1INF_U18 | C2 | Lec1, Lec3 – Lec5, Lab1 – Lab4, Proj3 – Proj5 | N1, N3, N4, N6, N7, N8, N9 |
| PEK_K01 (competences) | K1INF_K01, K1INF_K02 | C1, C2 | Lec1 – Lec5, Proj3 – Proj5 | N1, N3, N6, N7 |

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

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish** *Interakcja człowiek-komputer*
**Name in English** *Human Computer Interaction*
**Main field of study (if applicable):** *Computer Science*
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1ˢᵗ level, part-time**
**Kind of subject: optional**
**Subject code INZ007653**

| Group of courses NO* | | | | | |
|---|---|---|---|---|---|
| | Lecture | Classes | Laboratory | Project | Seminar |
| Number of hours of organized classes in University (ZZU) | 18 | | 18 | | |
| Number of hours of total student workload (CNPS) | 60 | | 60 | | |
| Form of crediting | Crediting with grade | Examination / crediting with grade* | Crediting with grade | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | | 2 | | |
| including number of ECTS points for practical (P) classes | | | 2 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 1 | | 1 | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Introduction to computer system design
2. Ability to read with understanding scientific and technical texts in English.

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**SUBJECT OBJECTIVES**

C1 To familiarise students with basic knowledge from the area of Cognitive Psychology, that is necessary for the understanding of human-computer interaction.

C2 To make students aware of the importance of the software system usability and the key role of usability for the overall quality of the computer system.

C3 To familiarise students with the overall process of software system development in a way focused on achieving high quality with respect to its usability.

C4 To present methods and techniques of performing complex usability evaluation.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

PEK_W01 A student knows basic notions of Cognitive Psychology relevant to Human Computer Interaction.

PEK_W02 A student is familiar with best practices in user interface design.

PEK_W03 A student knows basic models of the processes of interactive system design and methods of the usability evaluation.

relating to skills:

PEK_U01 A student is able to perform a context of use analysis for a software system.

PEK_U02 A student has basic skills in planning and monitoring of the user interface development

process.

PEK_U03 A student is able to design user interface.

PEK_U04 A student knows how to plan a usability evaluation process, perform it and draw conclusions concerning necessary changes in the system under development.


relating to social competences:
PEK_K01 A student is able to cooperate with a group building a software system, such that roles of members responsible for the system usability have been appointed.

PEK_K02 A student is aware of the influence of the software system on the environment of its use and the life of users; a students understand importance of the usability as perceived in this context.

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - lecture** | | **Number of hours** |
| Lec 1 | Basic notions and elements of Congnitive Psychology applied in Human Computer Interaction and Usability notion. | 3 |
| Lec 2 | Context of use: description and analysis | 3 |
| Lec 3 | Software system design process focused on sers and their tasks. | 1 |
| Lec 4 | Standards in Human Computer Interaction and their applications in the user interface development process. | 2 |
| Lec 5 | Usability evaluation of the constructed user interface. | 2 |
| Lec 6 | Designing the structure and content of a Web page, service or portal. | 1 |
| Lec 7 | Overview of the most important guidelines for graphic screens design and utilisation of interaction tools in GUI. | 3 |
| Lec 8 | Analysis of the selected use cases in the are of GUI design. | 2 |
| Lec 9 | Usability specification and the issueof usability in software project management. | 1 |
| | Total hours | **18** |
| **Form of classes - class** | | **Number of hours** |
| Cl 1 | | |
| Cl 2 | | |
| Cl 3 | | |
| Cl 4 | | |

| | | |
|---|---|---|
| .. | | |
| | Total hours | |

| **Form of classes – laboratory** | | Number of hours |
|---|---|---|
| Lab 1 | Experimental task: teaching a person with very limited computer skills to use an application which has been jointly selected by him. | 2 |
| Lab 2 | Formulation of the general specification of the project (a mission and a preliminary, draft description of users and their tasks), that is to be used as a pivot for all following tasks. | 2 |
| Lab 3 | Preparing context of use description (on the basis of the collected data). | 2 |
| Lab 4 | Analysis of user tasks (on the basis of the context of use description). | 2 |
| Lab 5 | Conceptual design of the user interface. | 2 |
| Lab 6 | Formulating assumptions for the technical design and preparing an intinial paper prototype. | 2 |
| Lab 7 | Building an initial electronic prototype. | 4 |
| Lab 8 | Performing analytical usability evaluation with two methods: Cognitive Walkthrough and GOMS. | 2 |
| Lab 9 | Building an improved UI prototype and performing empirical usability evaluation for selected, most important user tasks. | 2 |
| | Total hours | 18 |

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

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

| | | |
|---|---|---|
| | Total hours | |

## TEACHING TOOLS USED

N1. Textbooks

N2. Electronic materials on selected Web pages and Internet portals.

N3. Electronic materials for the lecture and Project that are Publisher on the e-learning portal of the Faculty of Computer Science and Management.

## EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| F1 Evaluation of the phases: context of use and task analysis | PEK_W03, PEK_U01, PEK_U02, PEK_K01, PEK_K02 | A student presents a report, which is next evaluated and scored. |
| F2 Evaluation of the user interface design | PEK_W02, PEK_U02, PEK_U03, PEK_K01 | A student presents user interface design, which is next evaluated and scored. |
| F3 Evaluation of the prototype and usability assessment | PEK_W01, PEK_U02, PEK_U04<br><br>PEK_K01<br><br>PEK_K02 | A student presents user interface prototype, usability evaluation results and an improved version of the initial prototype – all are evaluated and scored. |
| C | | |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[5]  Barfield L. The User Interface Concepts & Design. Addison-Wesley 1993.
[6]  Hackos J., Redish J. User and Task Analysis for Interface Design, Wiley Comp. Pub. 1998.
[7]  Newman W., Lamming M. Interactive System Design. Addison-Wesley 1995.
[8]  Hnatkowska Bogumiła, Piasecki Maciej.  Modelowanie konceptualne interfejsu użytkownika w metodykach obiektowych. W: Inżynieria oprogramowania. Nowe wyzwania. VI Krajowa Konferencja Inżynierii Oprogramowania. Red. J. Górski, A. Wardziński. Warszawa: WNT 2004.
[9]  International Standard ISO 9241 (1,2,10-17) Ergonomic requirements for office work with visual display terminals (VDTs), szczególnie: Part 11 Guidance on Usability.
[10]  Galitz W.O. Essential Guide to User Interface Design. Wiley Comp. Pub. 2007.
[11]  Nielsen J. Projektowanie funkcjonalnych serwisów internetowych. Helion, 2003.
[12]  Human-Computer Interaction: Design Issues, Solutions, and Applications. Ed. Andrew Sears i Julie A. Jacko. CRC Press/Taylor & Francis Group, 2009

**SECONDARY LITERATURE:**

[6]  Maruszewski T. Psychologia poznania. Gdańskie Wyd. Psychologiczne, 2001.
[7]  Nielsen J., Tahir M. Funkcjonalność stron WWW 50 witryn bez sekretów. Helion, 2005.
[8]  Spool J. M., Scanlon T., Schroeder W., Snyder C., DeAngelon T. Web Site Usability. Morgan Kaufman, 1999.
[9]  Marti A. Hearst. Search User Interfaces.

| SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS) |
|---|
| **Maciej Piasecki, maciej.piasecki@pwr.wroc.pl** |

## MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
### Human Computer Interaction
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
### *Computer Science* (1st level, full-time)
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) | K1INF_W20 | C1 | Wy1, Wy3 | N1-N3 |
| PEK_W02 | K1INF_W05 | C2, C3 | Wy3, Wy7, Wy8, Wy9 | N1-N3 |
| PEK_W03 | K1INF_W07 | C3, C4 | Wy2, Wy4, Wy5, Wy6, Wy10 | N1-N3 |
| PEK_U01 (skills) | K1INF_U10 | C1, C2, C3 | La1, La2 | N1-N3 |
| PEK_U02 | K1INF_U10 | C3 | La3-La5 | N1-N3 |
| PEK_U03 | K1INF_U10 | C3 | La6-La8 | N1-N3 |
| PEK_U04 | K1INF_U10 | C2, C4 | La9, La10 | N1-N3 |
| PEK_K01 (competences) | K1INF_K03 | C3 | La3-La10 | N1-N3 |
| PEK_K02 | K1INF_K02 | C2 | La1, La2, La4, La10 | N1-N3 |

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

*** - from table above

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FACULTY W-8 / DEPARTMENT………………
### SUBJECT CARD
**Name in Polish Inżynieria bezpieczeństwa systemów**
**Name in English Network and Internet Systems Security Engineering**
**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 INZ007656**
**Group of courses YES / NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | | 18 | | |

| Number of hours of total student workload (CNPS) | 60 | | 60 | | |
|---|---|---|---|---|---|
| Form of crediting | crediting with grade* | | crediting with grade* | | |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | | 2 | | |
| including number of ECTS points for practical (P) classes | 0 | | 2 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 | | 0,8 | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Basic knowledge of computer networks
2. Basic knowledge of modern cryptography

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**SUBJECT OBJECTIVES**

C1 Skills and knowledge of security analysis and design of secure computer systems
C2 Skills of selecting strategy and technical solutions for appropriate security architecture design.
C3. Social competence and skills in organizational leadership, management and collaboration. Ability to work well in teams, self-motivate and understand conflict management. Understanding of organizational mission, governance and administrative systems. Understanding how to use decision making to support mission.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:
PEK_W01 Has a knowledge of methods allowing to obtain the planned security level
PEK_W02 Has a knowledge about a security plan
relating to skills:
PEK_U01 Able to characterize elements of security plan
PEK_U02 Able to select appropriate methods and mechanisms for obtaining the security plan goals
PEK_U03 Able to use the security testing and preserving tools
relating to social competences:
PEK_K01 Understands the need to improve continuously the knowledge about security problems
PEK_K02 Understands the role of the security plan in the process of security level protection

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**PROGRAMME CONTENT**

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Introduction to security plan | 2 |
| Lec 2 | Security level inspection and protection | 2 |
| Lec 3 | Detection, reaction and rebuilding security level | 2 |
| Lec 4 | Vulnerabilities of communication protocols | 2 |
| Lec 5 | SSL/TLS and IPsec | 2 |
| Lec 6 | Public key infrastructure | 2 |
| Lec 7 | Anomaly detection | 2 |
| Lec 8 | Applications security | 2 |

| Lec 9 | Final test | 2 |
|---|---|---|
| | Total hours | 18 |

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

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab 1 | Introduction and configuration | 2 |
| Lab 2 | GnuPGP – e-mail security | 2 |
| Lab 3 | Steganography | 2 |
| Lab 4 | Password security | 2 |
| Lab 5 | Vulnerability scanning | 2 |
| Lab 6 | Attacking network protocols | 2 |
| Lab 7 | Privacy in public networks  - TOR | 2 |
| Lab 8 | VPN | 2 |
| Lab 9 | Public Key Infrastructure | 2 |
| | Total hours | 18 |

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

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

| TEACHING TOOLS USED |
|---|
| N1. Tradnitional and multimedia lectures<br>N2. Sudent's own work – project preparation<br>N3. Project  – methods of security related project preparation |

| N4. Tutorials |
|---|
| N5. Student's own work – literature study. |

## EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| F1 | PEK_W01- PEK_W03, PEK_U01- PEK_U03, PEK_K01- PEK_K02, | Oral presentations and mid semestral reports of work progress |
| P  PEK_W01- PEK_W02- Final test | | |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[1] Bishop, Matt.   Computer security :  art and science /   Boston :  Addison-Wesley,  cop. 2003
[2] Pipkin, D., Information Security: Protecting the Global Enterprise
[3] Sean Boran, IT Security Cookbook
[4]

**SECONDARY LITERATURE:**

[1] Metasploit :  the penetration tester's guide /   San Francisco :  No Starch Press,  cop. 2011.
[2] Dan Boneh, Dawn Song and John C Mitchell, Computer Security
[3] Barbara Endicott-Popovsky, Information Security and Risk Management in Context

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

**Grzegorz Kołaczek,  Grzegorz.Kolaczek@pwr.wroc.pl**

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Network and Internet Systems Security Engineering**
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)** | K1INF_W04 | C1 | Lec4-Lec9<br><br>Lab5-Lab9 | N1,N4-N5 |
| **PEK_W02** | K1INF_W04 | C1 | Lec1-Lec3 | N1,N5 |
| **PEK_U01 (skills** | K1INF_W04, K1INF_U06, K1INF_U13 | C2 | Lec1-Lec3 | N2-N4 |
| **PEK_U02** | K1INF_W04, K1INF_U06, K1INF_U13 | C2,C3 | Lab1-Lab9 | N2-N4 |
| **PEK_U03** | K1INF_W04, K1INF_U06, K1INF_U07, K1INF_U13 | C2,C3 | Lec4,Lec8,Lec9,Lab7-Lab8 | N2-N4 |
| **PEK_K01 (competences)** | K1INF_U06 | C1,C3 | Lec1-Lec9<br><br>Lab1-Lab9 | N1,N4,N5 |
| **PEK_K02** | K1INF_U13 | C1,C2,C3 | Lec1-Lec3 | N1,N4,N5 |

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

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management** / DEPARTMENT **Computer Science SUBJECT CARD**
**Name in Polish** *Inżynieria systemów baz danych*
**Name in English** *Engineering database systems*
**Main field of study (if applicable): Computer Science**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd* level, full-time / part-time***
**Kind of subject: obligatory / optional / university-wide***
**Subject code INZ007630**
**Group of courses YES / NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 9 | | | 18 | |
| Number of hours of total student workload (CNPS) | 30 | | | 90 | |

9

| Form of crediting | ~~Examination~~ / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | ~~Examination~~ / crediting with grade* | Examination / crediting with grade* |
|---|---|---|---|---|---|
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 1 | | | 3 | |
| including number of ECTS points for practical (P) classes | | | | 3 | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,4 | | | 1,2 | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Knowledge of databases is an advantage
2. Ability to design a dedicated database is an advantage
3. Competencies: communication skills, the ability to locate errors and correct them

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**SUBJECT OBJECTIVES**

C1. Getting familiar with a selected database management system.

C2. Development of skills related to data modeling and designing a relational database.
C3. Designing ergonomic forms, menus and reports.
C4. Creating database queries in SQL.
C5. Implementation of database transactions.
C6. Design, implementation and documentation of a dedicated database system.

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**SUBJECT EDUCATIONAL EFFECTS**

**related to knowledge:**

PEK_W01 – knows a chosen methodology of designing databases and database systems

PEK_W02 – has knowledge of the capabilities of database management systems

PEK_W03 – knows the principles of designing ergonomic forms, menus and reports

PEK_W04 – is knowledgeable about database transactions and their implementation in a selected environment

PEK_W05 – knows the syntax of basic SQL commands

PEK_W06 – knows a chosen relational database management system

PEK_W07 – is knowledgeable about creating macros

PEK_W08 – is knowledgeable about the types of tests and the methods of testing

PEK_W09 – knows the issues of database security

PEK_W10 – has knowledge about documentation of a database project

PEK_W11 – has knowledge of the assessment of the usability and functional quality of a database system

PEK_W12 – has knowledge of legal aspects of the implementation and operation of a database system

**related to skills:**

PEK_U01 – can correctly use the terminology related to database systems

PEK_U02 – can identify an area for which there is a need to design a database system

PEK_U03 – is able to design a database for a selected piece of reality

PEK_U04 – is able to design a database application for a selected domain

PEK_U05 – can implement a designed database

PEK_U06 – can implement a simple database application

PEK_U07 – can implement ergonomic forms and application menus

PEK_U08 – is able to prepare clear reports

PEK_U09 – understands the need for the use of transactions and can implement them

PEK_U10 – has the ability to create necessary macros

PEK_U11 – can test a system in a systematic and planned manner

PEK_U12 – in accordance with the requirements can prepare technical and functional documentation
of the system

PEK_U13 – can formulate a query in SQL

PEK_U14 – can create and manage user accounts

PEK_U15 – can provide secure access to the database

| PROGRAMME CONTENT | |
|---|---|
| **Form of classes - lecture** | **Number of hours** |
| Lec 1 | Basic concepts and terminology related to database systems. Design and creation of databases. | 1 |
| Lec 2 | Sorting and indexing. Data search. Advanced queries. SQL. | 1 |
| Lec 3 | Deleting and updating data. Transaction processing. Forms. | 1 |
| Lec 4 | Macros. Reports. Communication with the user. Menus, toolbars. | 1 |
| Lec 5 | Security of data in database systems. | 1 |
| Lec 6 | Testing and documenting a database system. | 1 |
| Lec 7 | Evaluation of usability and functional quality of a database system. Legal aspects of the implementation and operation of database systems. | 1 |
| Lec 8 | Final test. | 1 |
| Lec 9 | Retake. | 1 |
| | Total hours | 9 |
| **Form of classes - class** | **Number of hours** |
| Cl 1 | | |
| Cl 2 | | |
| Cl 3 | | |
| Cl 4 | | |
| .. | | |
| | Total hours | |
| **Form of classes - laboratory** | **Number of hours** |
| Lab 1 | | |
| Lab 2 | | |
| Lab 3 | | |
| Lab 4 | | |
| Lab 5 | | |
| ... | | |

| | Total hours | |
|---|---|---|
| **Form of classes - project** | | **Number of hours** |
| Proj 1 | Occupational Safety and Health Training. Presentation of Relational Database Management System | 1 |
| Proj 2 | Business modeling. Identification of the functionality of the proposed database application, database modeling in a selected design environment, the choice of database system architecture and implementation environment | 1 |
| Proj 3 | Proper database design for a selected piece of reality. | 2 |
| Proj 4 | Implementation of a database schema project in DBMS and filling with sample data. The integrity of a database. | 1 |
| Proj 5 | Design and implementation of advanced forms. | 2 |
| Proj 6 | Design and implementation of the application's main menu. | 1 |
| Proj 7 | Design of ergonomic user interface, implementation of the application using graphical tools, macros and database languages. Procedures, stored functions, triggers. | 2 |
| Proj 8 | Implementation of advanced queries. Query optimization. | 1 |
| Proj 9 | Transaction processing. Transaction management. | 1 |
| Proj 10 | Design and implementation of advanced reports. | 1 |
| Proj 11 | Security of data in a database application, user accounts, granting privileges and authorizing access to data. | 1 |
| Proj 12 | Testing a database application, the assessment of usability and functional quality of a database system, the legal aspects of the implementation and operation of database systems. | 1 |
| Proj 13 | Preparation of the final documentation of a database system. | 1 |
| Proj 14 | Presentation of database applications | 1 |
| Proj 15 | Assessment of the project | 1 |
| | Total hours | **18** |
| **Form of classes - seminar** | | **Number of hours** |
| Sem 1 | | |
| Sem 2 | | |
| Sem 3 | | |
| … | | |
| | Total hours | |
| **TEACHING TOOLS USED** | | |
| N1. Demo examples of correct and incorrect database systems<br>N2. Examples of systems documentation | | |

**EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT**

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

| | | |
|---|---|---|
| end) | | |
| F1 – attendance | PEK_K09 | Control of following the work schedule |
| F2 – evaluation for class participation | from PEK_U01 to PEK_U15 and from PEK_K01 to PEK_K09 | Logging of being active |
| F3 – rating for the database system | from PEK_U01 to PEK_U15 | rating for the database system |
| F4 – rating for system documentation | from PEK_U01 to PEK_U15 | rating for system documentation |
| F5 – evaluation of the test | from PEK_W01 to PEK_W12 | evaluation of the test |
| P1 – the credit rating of the lecture – evaluation of the test (F5) | | |
| P2 – the credit rating project – weighted average of F1, F2, F3, F4 | | |

**PRIMARY AND SECONDARY LITERATURE**

**PRIMARY LITERATURE:**

[1] Mazur H., Mazur Z.: Projektowanie relacyjnych baz danych. Oficyna Wydawnicza Politechniki Wrocławskiej, 2004.
[2] Date C.J.: Wprowadzenie do systemów baz danych. WNT, Warszawa, 2000.
[3] Date C.J., Darwen H.: SQL. Omówienie standardu języka. WNT, Warszawa, 2000
[4] Ullman J, D.: Podstawowy wykład z systemów baz danych. WNT, Warszawa, 2004
[5] Garcia-Molina H., Ullman J.D., Widom J.: Systemy baz danych. Pełny wykład. WNT, Warszawa, 2006.

**SECONDARY LITERATURE:**

[1] Pelikant A.: Bazy danych – pierwsze starcie. Helion, 2009.
[2] Jakubowski A.: Podstawy SQL – ćwiczenia praktyczne. Helion, 2001.
[3] Allen S.: Modelowanie danych. Helion, 2006

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

dr hab. Zygmunt Mazur, prof. PWr., zygmunt.mazur@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
*Engineering database systems*
MAIN FIELD OF STUDY
**computer science**
AND SPECIALIZATION …………………………….

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 | K1INF_W07 | C2 | Lec1 | N2 |
| PEK_W02 | K1INF_W22 | C1 | Lec1 | N1 |
| PEK_W03 | K1INF_W07 | C3 | Lec3, Lec4 | N1 |
| PEK_W04 | K1INF_W22 | C5 | Lec3 | N1 |
| PEK_W05 | K1INF_W07 | C4 | Lec2 | N1 |
| PEK_W06 | K1INF_W16 | C1 | Lec1 | N1 |
| PEK_W07 | K1INF_W16 | C3 | Lec4 | N1 |
| PEK_W08 | K1INF_W07 | C6 | Lec6 | N1 |
| PEK_W09 | K1INF_W16 | C1 | Lec5 | N1 |
| PEK_W10 | K1INF_W07 | C6 | Lec6 | N2 |
| PEK_W11 | K1INF_W07 | C6 | Lec6 | N1 |
| PEK_W12 | K1INF_W07 | C6 | Lec6 | N1 |
| PEK_U01 | K1INF_U03 | C1 | Proj1 | N1 |
| PEK_U02 | K1INF_U03 | C2 | Proj2, Proj14 | N1 |
| PEK_U03 | K1INF_U03 | C2 | Proj3 | N1 |
| PEK_U04 | K1INF_U03 | C6 | Proj4 | N1 |
| PEK_U05 | K1INF_U04 | C6 | Proj4 | N1 |
| PEK_U06 | K1INF_U19 | C3 | Proj4 | N1 |
| PEK_U07 | K1INF_U19 | C3 | Proj5, Proj6 | N1 |
| PEK_U08 | K1INF_U16 | C3 | Proj10 | N1 |

| PEK_U09 | K1INF_U04 | C5 | Proj9 | N1 |
|---------|-----------|-----|--------|-----|
| PEK_U10 | K1INF_U04 | C6 | Proj7 | N1 |
| PEK_U11 | K1INF_U04 | C6 | Proj12 | N1 |
| PEK_U12 | K1INF_U03 | C6 | Proj13 | N2 |
| PEK_U13 | K1INF_U16 | C4 | Proj8 | N1 |
| PEK_U14 | K1INF_U09 | C6 | Proj11 | N1 |
| PEK_U15 | K1INF_U09 | C6 | Proj11 | N1 |

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

*** - from table above

FACULTY W-8 / DEPARTMENT………………

**SUBJECT CARD**

**Name in Polish:** *Języki modelowania i wymiany informacji*
**Name in English:** *The languages for information modeling and exchange*
**Main field of study (if applicable): Computer Science**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code INZ007642**
**Group of courses YES / NO\***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---------|---------|-----------|---------|---------|
| Number of hours of organized classes in University (ZZU) | 9 | | 18 | | |
| Number of hours of total student workload (CNPS) | 30 | | 60 | | |
| Form of crediting | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 1 | | 2 | | |
| including number of ECTS points for practical (P) classes | 0 | | 2 | | |
| including number of ECTS points for direct | 0,4 | | 0,8 | | |

| teacher-student contact (BK) classes | | | | | |
|---|---|---|---|---|---|

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Knowledge of elementary data structures

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**SUBJECT OBJECTIVES**

C1 Obtaining by students the ability of using semi-structural languages
C2 Getting knowledge about XML language
C3 To obtain by students the ability of designing XML documents structures.
C4 To obtain by students the ability of using XML documents in databases and in EAI tasks.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:
PEK_W01 Has a basic knowledge about XML language.
PEK_W02 Has a basic knowledge about methods of structure design and processing of XML
      documents.

relating to skills:
PEK_U01 Is able to design structures of  XML documents.
PEK_U02 Is able to design and develop software processing XML documents.

relating to social competences:
PEK_K01 Is able to work in and manager a small software development team

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**PROGRAMME CONTENT**

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Introduction, Semi-structural data | 1 |
| Lec 2 | Introduction to XML Language | 1 |
| Lec 3 | XML documents | 1 |
| Lec 4 | Definition of XML document structure | 1 |
| Lec 5 | Document object model | 1 |
| Lec 6 | X* technologies (XPath, XPointer, XLink, XSL) | 1 |
| Lec 7 | XML Schema | 1 |
| Lec 8 | XML Documents and databases | 1 |
| Lec 9 | Test | 1 |
| | Total hours | 9 |

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

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab 1 | Introduction, Building of project teams | 1 |
| Lab 2 | Brainstorming | 1 |
| Lab 3 | Presentation of self prepared or chosen idea of application | 2 |
| Lab 4 | XML documents processing with DOM | 2 |
| Lab 5 | XML documents processing with SAX | 2 |
| Lab 6 | Project of application processing XML documents – concept | 2 |
| Lab 7 | Project of application processing XML documents – XML schemas | 2 |
| Lab 8 | Project of application processing XML documents – design | 2 |
| Lab 9 | Project of application processing XML documents – development | 2 |
| Lab 10 | Evaluation of project results | 2 |
| | Total hours | 18 |
| Form of classes - project | | Number of hours |
| Proj 1 | | |
| Proj 2 | | |
| Proj 3 | | |
| Proj 4 | | |
| … | | |
| | Total hours | |
| Form of classes - seminar | | Number of hours |
| Sem 1 | | |
| Sem 2 | | |
| Sem 3 | | |
| … | | |
| | Total hours | |
| TEACHING TOOLS USED | | |

N1. Lecture
N2. Individual consultations
N3. The course web page with references to literature
N4. Software development tools
N5. ESB
N6. DBMS supporting XML
N7. Object programming language

**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_U01-03, PEK_K01 | Evaluation of the inception phase of project [20 points] (Lab1-3) |
| F2 | PEK_U01-03, PEK_K01 | Evaluation of the concept [20 points] (Lab6) |
| F3 | PEK_U01-03, PEK_K01 | Evaluation of the XML structuring [20 points] (Lab7) |
| F4 | PEK_U01-03, PEK_K01 | Evaluation of the design [20 points] (Lab8) |
| F5 | PEK_U01-03, PEK_K01 | Evaluation of the development [20 points] (Lab9) |
| P1 | PEK_U01-03, PEK_K01 | P1 is based on the sum of the points from F1…F5. At least 50% of points is required. |
| P2 | PEK_W01-02 | P2 is based on the result of a written test covering material presented during lectures. At least 50% of points is required to pass the test. |

| PRIMARY AND SECONDARY LITERATURE |
|---|

**PRIMARY LITERATURE:**

[1] Elliotte Rusty Harold, XML Bible, IDG Books Worldwide, Inc., 1999
[2] Eric van der Vlist, XML Schema, O'Reilly, 2002

**SECONDARY LITERATURE:**

[1] Jim Melton, Stephen Buxton, Querying XML XQuery, XPath, and SQUXML in Context, Morgan Kaufmann, 2006

[2] Akmal B.Chaudhri, Awais Rashid, Roberto Zicari, XML Data Management: Native XML and XML-Enabled Database Systems, Addison Wesley, 2003

| SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS) |
|---|
| Artur Wilczek, Artur.wilczek@pwr.wroc.pl |

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
*The languages for information modeling and exchange*
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) | K1INF_W05, K1INF_W06 | C1 – C3 | Lec1-Lec9 | N1-N3 |
| PEK_W02 | K1INF_W05, K1INF_W06 | C1 – C3 | Lec1-Lec9 | N1-N3 |
| PEK_U01 (skills) | K1INF_U04, K1INF_U09, K1INF_U11,K1INF_U12, K1INF_U14 | C1 – C3 | Lec1-Lec9, Lab2-Lab10 | N1-N6 |
| PEK_U02 | K1INF_U04, K1INF_U09, K1INF_U11,K1INF_U12, K1INF_U14 | C1 – C4 | Lec1-Lec9, Lab2-Lab10 | N1-N6 |
| PEK_K01 (competences) | | C1 – C3 | Lab2-Lab5 | N1-N6 |

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

FACULTY: Informatics and Management
**SUBJECT CARD**
**Name in Polish: Logika dla informatyków**
**Name in English: Logic for computer scientists**
**Main field of study (if applicable): Informatics**
**Specialization (if applicable):**
**Level and form of studies: 1st/ 2nd* level, full-time / part-time***
**Kind of subject: obligatory / optional / university-wide***
**Subject code INZ001668**
**Group of courses YES / NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 18 | | | |
| Number of hours of total student workload (CNPS) | 90 | 60 | | | |
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | 2 | | | |
| including number of ECTS points for practical | 0 | 2 | | | |

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

*delete as applicable

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**
Knowledge of mathematics at the high school level in the expanded school.
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**SUBJECT OBJECTIVES**
C1.  Gaining knowledge of the set theory and the classical propositional and predicate calculi.
C2. Gaining knowledge about the usage of classical logic to formally define some elements of
    programming languages.

**SUBJECT EDUCATIONAL EFFECTS**
Relating to knowledge:
PEK_W01: Students know and understand the concept of a set and operations on sets, the concept of
            relations and functions.
PEK_W02: Students know and understand the concept of logical syntax and semantics of propositional
            logic and predicate calculus, and selected proving systems.
PEK_W03: Students know and understand the concept of mathematical induction and structural
            definition of recursive sets and functions, graphs and methods of their representation.

Relating to skills:
PEK_U01: Students can apply propositional and predicate calculi.
PEK_U02: Students can conduct a simple and moderately difficult proofs by mathematical and
            structural induction.
PEK_U03: Students can use language of set theory interpreting problems in different areas of
            mathematics and science.

Relating to social competences:
PEK_K01: Students can precisely formulate questions to deepen their understanding of the topic and
            find the missing pieces of reasoning.
PEK_K02: Students can independently search the bibliographic databases and study the literature
            available there.
PEK_K03: Students know the limits of their own knowledge and understand the need for further
            education

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - lecture** | | **Number of hours** |
| Lec 1 | Basic logical notions: truth and false, simple and compound propositions. Basic set-theoretical notions: a set, definitions of sets, operations on sets. | 2 |
| Lec 2 | Cartesian product, relations and their properties, equivalence and ordering relations. | 2 |
| Lec 3 | Functions, composition of functions. Equinumerosity of sets, cardinal numbers. | 2 |

| | Sequences and operations on sequences. | |
|---|---|---|
| Lec 4 | Graphs, formal languages, free-context grammars. | 2 |
| Lec 5 | Syntax and semantics of propositional calculus. | 2 |
| Lec 6 | Zero-one method of formulas proving. Proving system based on semantic equivalence of formulas. Proving system for the propositional calculus based on Gentzen's sequents. | 2 |
| Lec 7 | Complete sets of logical connectives. Meta-logical properties of the propositional calculus – decidability, consistency and completeness of proving systems. | 2 |
| Lec 8 | Syntax of the predicate calculus. | 2 |
| Lec 9 | Semantics of the predicate calculus. Proving system for the predicate calculus based on Gentzen's sequents – its consistency and completeness. | 2 |
| | Total hours | 18 |

| | Form of classes - class | Number of hours |
|---|---|---|
| Cl 1 | Basic logical notions: truth and false, simple and compound propositions. Methods of definitions of sets, operations on sets. | 2 |
| Cl 2 | Cartesian product, relations defining and checking their properties. | 2 |
| Cl 3 | Proving properties of equivalence and ordering relations. | 2 |
| Cl 4 | Checking equinumerosity of sets. Operations on sequences. | 2 |
| Cl 5 | Defining of exemplary formal languages. Test 1. | 2 |
| Cl 6 | Application of zero-one method and transformational method for formulas proving. Application of Gentzen system for proposition formulas proving | 2 |
| Cl 7 | Application of Gentzen system for predicate formulas proving. | 2 |
| Cl 8 | Predicate formulas in programming languages. Test 2. | 2 |
| Cl 9 | Canonical forms of predicate formulas. Corrective test. | 2 |
| | Total hours | 18 |

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

### EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

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

| | | |
|---|---|---|
| end) | | |
| F1 | PEK_W01<br>PEK_W02<br>PEK_U01<br>PEK_U02<br>PEK_K01 | During each class students are awarded 1 or 2 points for an individual solution of a task from the announced list of tasks. |
| F2 | PEK_W02<br>PEK_W03<br>PEK_U02<br>PEK_U03<br>PEK_K01 | Students are oblige to participate in two tests at the middle and at the end of a semester.<br>During each test students are awarded up to 10 points. |
| F3 | PEK_W01<br>PEK_W02<br>PEK_W03<br>PEK_U01<br>PEK_U02<br>PEK_U03 | Final mark for the classes is determined on the base of total number of points resulted from activity during classes (F1) and points for the tests (F2).<br>Detailed rules for final mark evaluation are as follows:<br>Let<br>$c_i$ the number of points scored for activity during classes in the i-th part of semester, for $i = 1, 2$;<br><br>$t_i$ the number of points scored during the i-th test, for $i = 1, 2$;<br><br>$t_{popr}$ the number of points scored during corrective test;<br><br>$P_i = min(10, c_i + t_i)$ for $i = 1, 2$;<br><br>$P = P_1 + P_2$.<br><br>For passing classes without corrective test the following condition should be satisfied:<br><br>$P \geq 10$ and ($P_i \geq 4$ for $i = 1, 2$).<br><br>If the condition is satisfied the mark is calculated according to the table:<br><br>$$\begin{array}{\|c\|c\|c\|c\|c\|c\|} \hline P & 10 & 12 & 14 & 16 & 18 \\ \hline \textbf{Mark} & 3.0 & 3.5 & 4.0 & 4.5 & 5.0 \\ \hline \end{array}$$<br><br>The students which have passed the classes without corrective test and have got at least mark 4 are exempted from examination with the same mark. |

C: The final evaluation of the course is determined based on the results of the examination. The examination lasts two hours and consists of a set of tasks, with the total number of 20 points. The condition for a positive assessment of the final exam is to get 10 points and a positive final evaluation of the exercise.
The final evaluation of the examination is determined in accordance with the following table:

| Points | 10 | 12 | 14 | 16 | 18 |
|---|---|---|---|---|---|
| Mark | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 |

| PRIMARY AND SECONDARY LITERATURE |
|---|

**PRIMARY LITERATURE:**

[13]  HUZAR Z., Elementy logiki i teorii mnogości dla informatyków, Oficyna Wydawnicza Politechniki Wrocławskiej, 2007.

[14]  BEN-ARI M., *Logika matematyczna w informatyce*, WNT, 2005.

[15]  MAREK W., ONYSZKIEWICZ J., *Elementy logiki i teorii mnogości w zadaniach*, PWN, 2001.

**SECONDARY LITERATURE:**

[10]  RASIOWA H., Wstęp do matematyki współczesnej, PWN, 1998.

[11]  ŁAWROW I. A., MAKSIMOWA Ł. L., 2004, *Zadania z teorii mnogości, logiki matematycznej i teorii algorytmów*, PWN, 2004.

STANOSZ B., *Ćwiczenia z logiki*, PWN, 2002.

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

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

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

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K_W02, K_W03, K_W06 | C1, C2 | Lec1-Lec6 | N1, N2, N3, N4 |
| PEK_W02 | K_W02, K_W03, K_W04, K_W05, K_W06 | C1, C2 | Lec5-Lec12 | N1, N2, N3, N4 |
| PEK_W03 | K_W02, K_W03, K_W04, K_W05, K_W06 | C1, C2 | Lec11-Lec15 | N1, N2, N3, N4 |
| PEK_U01 (skills) | K_U01, K_U02, K_U06, K_U07 | C1, C2 | Cl1-Cl8 | N1, N2, N3, N4 |
| PEK_U02 | K_U01, K_U02, K_U03, K_U05 | C1, C2 | Cl9-Cl14 | N1, N2, N3, N4 |
| PEK_U03 | K_U01, K_U02, K_U03, K_U04, K_U05, K_U06, K_U07 | C1, C2 | Cl1-Cl15 | N1, N2, N3, N4 |
| PEK_K01 (competences) | K_K02 | C1, C2 | Lec1-Lec15 Cl1-Cl15 | N1, N2, N3, N4 |
| PEK_K02 | K_K06 | C1, C2 | Lec1-Lec15 Cl1-Cl15 | N1, N2, N3, N4 |
| PEK_K03 | K_K01 | C1, C2 | Lec1-Lec15 Cl1-Cl15 | N1, N2, N3, N4 |

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

*** - from the table above

FACULTY …W8…… / DEPARTMENT…I 32…
**SUBJECT CARD**
**Name in Polish ……… Matematyka dyskretna I**
**Name in English ………Discrete Mathematics I**
**Main field of study (if applicable): … Informatics**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code … MAZ001511**
**Group of courses YES / NO\***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 9 | 0 | 0 | 0 |

| Number of hours of total student workload (CNPS) | 60 | 30 | | | |
|---|---|---|---|---|---|
| Form of crediting | ~~Examination~~ / crediting with grade* | ~~Examination~~ / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | 1 | | | |
| including number of ECTS points for practical (P) classes | | | | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 | 0,4 | | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. The course „Logics for informaticiens"
2. The course „Mathematical analysis"

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**SUBJECT OBJECTIVES**

The science of computers, computer systems and their applications (often called in short "computer science" or also "theoretical and applied informatics") is a very young discipline starting together with the development of the first electronic computers. The problem-solving emphasis of computer science borrows heavily from the areas of mathematics and logic. Faced with a problem, computer scientists must first formulate a solution. This method of solution, or algorithm as it is often called in computer science, must be thoroughly understood before the computer scientists make any attempt to implement the solution on the computer. Discrete mathematical structures, in particular such as mathematical logic and set theory, algebraic systems, graphs and so on, underpin a large amount of modern computer science. The main purpose of this course is representation of some selected topics of the discrete mathematical structures now having a large application in the computer science theory. This is a fundamental course. The lectures are predestined at first for the computer science students, however it can also be useful in other areas, e.g. such as: system techniques and control, technical cybernetics, telecommunication, managing etc.

Discrete Mathematics I (in short: MD I) is the first part of the general course of Discrete Mathematics (full-time studies). MD I includes the first nine themes of the last course, i.e. Lec 1 – 9.. The main objectives are as follows:

C1: Thorough knowledge of the sense of using natural deduction methods in computer science.

C2: A possibility of obtaining a knowledge for the purpose of efficient bibliographic search in this field of application and also with respect to future scientific investigations and/or practical applications.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

PEK_W01    A good knowledge of the used methods (i.e. the corresponding instrumentarium) in discrete mathematics

PEK_W02    A good knowledge of the assumptional system style techniques.

…

relating to skills:

PEK_U01    A communication ability in senso stricto

PEK_U02    Practical implementations of different projects using the obtained skills

…

relating to social competences:

PEK_K01    Computer science competency

PEK_K02    Further investigation-competency related to new research and developments

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**PROGRAMME CONTENT**

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Introduction: Discrete mathematics and informatics. Natural deduction in logical calculi and sets | 2 |
| Lec 2 | Propositional calculus | 2 |
| Lec 3 | First order predicate logic | 2 |
| Lec 4 | Set theory | 2 |
| Lec 5 | Relations and functions. Applications: k-dense ordered sets | 2 |
| Lec 6 | Multisets and multirelations | 2 |
| Lec 7 | T- and S-norms, fuzzy sets and fuzzy relations, t-equivalence, interval type-2 fuzzy sets | 2 |
| Lec 8 | Some non-standard logics: many-valued and fuzzy logics, modal, deontic and temporal logics | 2 |
| Lec 9 | Approximative space and rough sets. Fuzzy rough sets. Near sets | 2 |
| | Total hours | 18 |

| Form of classes - class | | Number of hours |
|---|---|---|
| Cl 1 | Lec 1 | 1 |
| Cl 2 | Lec 2, Lec 3 | 2 |
| Cl 3 | Lec 4, Lec 5 | 2 |
| Cl 4 | Lec 6, Lec 7 | 2 |
| Cl 5 | Lec 8, Lec 9 | 2 |
| | Total hours | 9 |

The considered exercises are a methodical illustration and/or extension of the above presented lectures.

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab1 | | |
| Lab2 | | |
| Lab3 | | |
| Lab4 | | |
| Lab5 | | |
| … | | |
| | Total hours | |

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

| Form of classes - seminar | | Number of hours |
|---|---|---|
| Sem1 | | |
| Sem2 | | |
| Sem3 | | |
| … | | |

| Total hours | |
|---|---|

## TEACHING TOOLS USED

N1. Accurately defined problems
N2. A logical sequential way of solving problems
N3. An analysis of the obtained results

## 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_W01 | On-line, real-time problem solving method |
| F2 | PEK_W02 | |
| F3 | | |
| C   PEK_W01,   PEK_W02 | | |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[1] BALAKRISHNAN V.K., *Introductory Discrete Mathematics*. Prentice Hall Int. 1991.

[2] BRONSTEIN I.N., SEMENDJAJEW K.A., MUSIOL G., MÜHLIG H*., Taschenbuch der Mathematik*. Verlag Harri Deutsch (2001) (w j. pol.: *Nowoczesne kompendium matematyki*. PWN Warszawa 2004).

[3] DE COCK M., CORNELIS C.,KERRE E.E., *Fuzzy rough sets: the forgotten step*. IEEE Trans. on Fuzzy Systems, vol. 15, no.1 (2007) 121 – 130.

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**SECONDARY LITERATURE:**

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

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# MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
………Discrete Mathematics…………
## AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ………Informatics…..
### AND SPECIALIZATION …………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | x | x | x | N1 |
| PEK_W02 | x | x | x | N2,N3 |
| PEK_U01 (skills) | x | x | x | N1 |

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY …W8…… / DEPARTMENT…I 32…

**SUBJECT CARD**

**Name in Polish ……… Matematyka dyskretna II**
**Name in English ………Discrete Mathematics II**
**Main field of study (if applicable): … Informatics**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd* level, full-time / part-time***
**Kind of subject: obligatory / optional / university-wide***
**Subject code … MAZ002517**
**Group of courses YES / NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 9 | 0 | 0 | 0 |
| Number of hours of total student workload (CNPS) | 60 | 30 | | | |
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | 1 | | | |
| including number of ECTS points for practical (P) classes | | | | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 | 0,4 | | | |

*delete as applicable

1

**SUBJECT OBJECTIVES**

The science of computers, computer systems and their applications (often called in short "computer science" or also "theoretical and applied informatics") is a very young discipline starting together with the development of the first electronic computers. The problem-solving emphasis of computer science borrows heavily from the areas of mathematics and logic. Faced with a problem, computer scientists must first formulate a solution. This method of solution, or algorithm as it is often called in computer science, must be thoroughly understood before the computer scientists make any attempt to implement the solution on the computer. Discrete mathematical structures, in particular such as mathematical logic and set theory, algebraic systems, graphs and so on, underpin a large amount of modern computer science. The main purpose of this course is representation of some selected topics of the discrete mathematical structures now having a large application in the computer science theory. This is a fundamental course. The lectures are predestined at first for the computer science students, however it can also be useful in other areas, e.g. such as: system techniques and control, technical cybernetics, telecommunication, managing etc.

Discrete Mathematics II (in short: MD II) is the second part of the general course of Discrete Mathematics (full-time studies). MD II includes the second nine themes of the last course, i.e. Lec 10 – 18.. The main objectives are as follows:

C1: Thorough knowledge of the sense of using natural deduction methods in computer science.

C2: A possibility of obtaining a knowledge for the purpose of efficient bibliographic search in this field of application and also with respect to future scientific investigations and/or practical applications.

**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

PEK_W01   A good knowledge of the used methods (i.e. the corresponding instrumentarium) in discrete mathematics

PEK_W02   A good knowledge of the assumptional system style techniques.

relating to skills:

PEK_U01   A communication ability in senso stricto

PEK_U02   Practical implementations of different projects using the obtained skills

relating to social competences:

PEK_K01   Computer science competency

PEK_K02   Further investigation-competency related to new research and developments

**PROGRAMME CONTENT**

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Elements of theory of information systems. Decision tables | 2 |
| Lec 2 | Operations and algebraic systems | 2 |
| Lec 3 | Lattices, Boolean, multiple valued and fuzzy algebras | 2 |
| Lec 4 | Homomorphisms of algebraic systems | 2 |
| Lec 5 | Congruencies, quotient systems, direct products and free algebraic systems | 2 |
| Lec 6 | Grammars and sequential machines | 2 |
| Lec 7 | Algorithms, computability, induction and recursion | 2 |
| Lec 8 | Elements of graph theory. Hypergraphs | 2 |
| Lec 9 | Combinatorics and elements of combinatorial analysis | 2 |

| | Total hours | 18 |
|---|---|---|

| **Form of classes - class** | | **Number of hours** |
|---|---|---|
| Cl 1 | Lec 1 | 1 |
| Cl 2 | Lec 2, Lec 3 | 2 |
| Cl 3 | Lec 4, Lec 5 | 2 |
| Cl 4 | Lec 6, Lec 7 | 2 |
| Cl 5 | Lec 8, Lec 9 | 2 |
| | Total hours | 9 |

The considered exercises are a methodical illustration and/or extension of the above presented lectures.

| **Form of classes - laboratory** | | **Number of hours** |
|---|---|---|
| Lab1 | | |
| Lab2 | | |
| Lab3 | | |
| Lab4 | | |
| Lab5 | | |
| … | | |
| | Total hours | |

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

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

| **TEACHING TOOLS USED** |
|---|
| N1.  Accurately defined problems |
| N2.  A logical sequential way of solving problems |
| N3.  An analysis of the obtained results |

**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_W01 | On-line, real-time problem solving method |
| F2 | PEK_W02 | |
| F3 | PEK_U01 | |

| C  PEK_W01,  PEK_W02 ,  PEK_U01 |
| --- |

**PRIMARY AND SECONDARY LITERATURE**

**PRIMARY LITERATURE:**
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[3] BERGE C., *Graphes et hypergraphes*. Dunod Paris 1973 (*Graphs and Hypergraphs*. Amsterdam, North-Holland Publ. Co. 1976).
[4] BRONSTEIN I.N., SEMENDJAJEW K.A., MUSIOL G., MÜHLIG H*., Taschenbuch der Mathematik*. Verlag Harri Deutsch (2001) (w j. pol.: *Nowoczesne kompendium matematyki*. PWN Warszawa 2004).
[5] COPPEL W.A., *Number theory: an introduction to mathematics*. Part A. New York, Springer 2006.
[6] CUTLAND N., *Computability. An introduction to recursive function theory*. Cambridge, Cambridge University Press  1980.
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[8] GRAHAM R.L.,KNUTH D.E., PATASHNIK O., *Concrete Mathematics: A Fundation for Computer Science.* Reading, Addison-Wesley Publ. Co. 1989.
[9] HALL C., O'DONNELL J., *Discrete mathematics using a computer*. Springer Verlag 2000.
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[11] KOLMAN B., BUSBY R.C.,  *Discrete mathematical structures for computer science*. Prentice Hall 1987.
[12] LIPSKI W., *Kombinatorika dla programistów*. Warszawa, WNT 2007.
[13] LIPSKI W., MAREK W., *Analiza kombinatoryczna*. Warszawa, PWN 1986.
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[16] ODIFREDDI P., *Classical recursion theory: the theory of functions and sets of natural numbers*. Amsterdam, North-Holand 1989.
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[18] PEMMARAJU S., SKIENA S.S., *Computational discrete mathematics: combinatorics and graph theory with Mathematica*. Cambridge, Cambridge University Press 2003.
[19] RAYWARD-SMITH V.J., *Teoria formalnych jazykov: Vvodnyj kurs.*(tłum ang.).Moskva, Radio i Svjaz 1988.
[20] ROSEN K.H., *Discrete mathematics and its applications*. McGraw-Hill 3rd.ed.1995.
[21] ROSENTHAL J.S., *A first look at rigorous probability theory*. Singapor, World Scientific 2005.
[22] ROSS K.A., WRIGHT C.R.B., *Discrete mathematics*. Prentice Hall (1988) (w j. pol.: Matematyka dyskretna. PWN Warszawa 2003,899pp.).
[23] STANAT D.F., McALLISTER D.F., *Discrete mathematics in computer science*. Prentice Hall 1986.
[24] VINCE A.J.,MORRIS C.A.N., *Discrete mathematics for computing*. Prentice Hall 1990.
**SECONDARY LITERATURE:**
 [1] BAUER F.L., *Decrypted secrets. Methods and maxims of cryptology*. Berlin, Springer-Verlag 1997.
[2] GERSTENKORN T., SRÓDKA T., *Kombinatorika i rachunek prawdopodobieństwa*. Warszawa, PWN 1974.
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[16] TABAKOW I.G., *Using place and transition fault net models for sequential diagnosis time assessment in discrete event systems*. The Twenty First International Conference on Industrial, Engineering & Other Applications of Applied Intelligent Systems. June 18-20, 2008 Wroclaw (Poland). In: LNCS, New Frontiers in Applied Artificial Intelligence, Springer-Verlag, Berlin / Heidelberg vol. 5027, Proceedings, N.T. Nguyen et al. Eds. (2008). 677 – 686.

[17]  WILSON R.J. ed., *Applications of graph theory*. London, Accademic Press 1979.

[18]  WILSON R.J.,*Wstęp do teorii grafów*. (tł.ang.). Warszawa, PWN 1998.

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# MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
………Discrete Mathematics…………
## AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ………Informatics…..
### AND SPECIALIZATION ……………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | x | x | x | N1 |
| PEK_W02 | x | x | x | N2,N3 |
| PEK_U01 (skills) | x | x | x | N1 |
| PEK_U02 | x | x | x | N1,N2,N3 |
| PEK_K01 (competences) | x | x | x | N1 |
| PEK_K02 | x | x | x | N1,N2 |
| PEK_K03 | x | x | x | N1,N2,N3 |

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

\*\*\* - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish Metaheurystyki w rozwiązywaniu problemów.**
**Name in English Problem solving using metaheuristics.**
**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 INZ0007650.**
**Group of courses YES / NO\***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | | 18 | | |
| Number of hours of total student workload (CNPS) | 60 | | 60 | | |
| Form of crediting | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* |

| For group of courses mark (X) final course | - | - | - | - | - |
|---|---|---|---|---|---|
| Number of ECTS points | 2 | | 2 | | |
| including number of ECTS points for practical (P) classes | - | | 2 | - | - |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 | | 0,8 | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. K1INF_W15 Has basic knowledge about modelling, and knows methods and techniques used in decision supporting systems
2. K1INF_U16 Can effectively use methods and tools of information storing, information processing, information searching and knowledge aquisttion

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**SUBJECT OBJECTIVES**

C1 To teach students about various approaches and metaheristics used in machine learning tasks
C2 To get a skill of metaheuristics selection suitable to given task
C3 To get a skill of validation of metaheuristics in real world applications

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:
PEK_W02: Has knowledge of approaches and methods used in machine learning

PEK_W02: Has knowledge of various metaheurictics applications

PEK_W03: Has knowledge of selected data preprocessing techniques

PEK_W04: Has knowledge of metaheuristics results validation

PEK_W05: Has knowledge of effective implementation of metaheuristics

relating to skills:
PEK_U01: Can select a proper metaheuristic for given task

PEK_U02: Can design and implement application

PEK_U03: Can prepare and do an empirical experiments to examine metaheuristics effectiveny and usability

PEK_U04: Can prepare results analysis and do raport of done experiments

relating to social competences:
PEK_K01

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - lecture** | **Number of hours** | |
| L1 | Introduction to metaheuristics | **2** |
| L2 | Introduction to Evolutionary Algorithms (EA); Solving problems and tasks by metaheuristics – research methodology | **2** |
| L3 | Other metaheuristics: HillClimbing (HC), Tabus Search (TS), Simulated Annealing (SA) | **2** |
| L4 | Specialisation of EA: reprezentation, fitness finction and gentic operators | **2** |
| L5 | Types and extensions of EA; Hybrid metaheuristics | **2** |
| L6 | Selected swarm-based metaheuristics: Ant Colony Optimisations, Bee Colony Optimisation, Particle Swarm Optimisation | **4** |
| L7 | Summary and recent directions | **2** |
| | Total hours | **18** |

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

| **Form of classes - laboratory** | **Number of hours** | |
|---|---|---|
| Lab 1 | Organization issues | 2 |
| Lab 2 | L1. Application of Evolutionary Algorithms to given problem A | 4 |
| Lab 3 | L2 Tabu Search (TS) usage to selected problem A | 2 |
| Lab 4 | L3 Simulated Annealing (SA) application to selected problem A | 2 |
| Lab 5 | L4 Comparision of EA, TS and SA implementation effectivency for selected problem A | 2 |
| Lab 6 | L5 Hybrids EA+SA and EA+TS used for A problem solving | 2 |

| Lab 7 | L6 Selected metaheuristics implementation, e.g. Ant Colony Optimisation solving A problem | 4 |
|---|---|---|
| | Total hours | 18 |

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

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

| TEACHING TOOLS USED |
|---|
| N1. Multimedia powerpoint presentation<br>N2. Laboratory excersises description<br>N3. e-learning system |

**EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT**

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| F1 – L1 realisation | PEK_W01;<br><br>PEK_U01;<br><br>PEK_U03;<br><br>PEK_U04; | L1 realisation is worth 10 points. For each working week delay penatly -20% is used. In each laboratory student can present only one excercise realisation. The exercise realisation is: exercise specification reading, given method analysis and implementation, application verification and effectivency research. The whole process is described in raport. There are included implementation details, research metodology, summary results and emerged problems. Such raport is uploaded to e-learing |

| | | |
|---|---|---|
| | | portal. It is suggested implementation in non-interpret programming language – such language usage deacrease points -20%. The C/C++ usage is preffered. |
| F2 – L2 realisation | PEK_W01; PEK_U02; PEK_U03; PEK_U04; | Like F1 |
| F3 – L3 realisation | PEK_W01; PEK_U02; PEK_U03; PEK_U04; | Like F1 |
| F3 – L4 realisation | PEK_W01; PEK_U02; PEK_U03; PEK_U04; | Like F1 |
| F3 – L5 realisation | PEK_W01; PEK_U02; PEK_U03; PEK_U04; | Like F1 |
| F3 – L6 realisation | PEK_W01; PEK_U02; PEK_U03; PEK_U04; | Like F1 |
| C - summay | PEK_U01; PEK_U02; PEK_U03; PEK_U04; PEK_U01; | The final mark is given as follows: 0 – 29 points gives ndst 30 - 34 points gives dst 35 - 40 points gives dst+ 41 - 45 points gives db 45 - 50 points gives db+ 51 - 60 points gives bdb No more than 2 absences are allowed. More fails the course. |

**PRIMARY AND SECONDARY LITERATURE**

**PRIMARY LITERATURE:**

7.    Goldberg D. "Algorytmy genetyczne i ich zastosowanie", WNT 1998.

8.  Kwaśnicka H. "Obliczenia ewolucyjne w sztucznej inteligencji", Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 1999.

9.  Michalewicz Z. "Algorytmy genetyczne + struktury danych = programy ewolucyjne", WNT 2010.

10.  Michalewicz Z., Fogel D.B. "Jak to rozwiązać, czyli nowoczesna heurystyka", WNT 2006

**SECONDARY LITERATURE:**

[1] Arabas J. "Wykłady z algorytmów ewolucyjnych", WNT, Warszawa 2004.

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# MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**…………………………**
## AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ………………………..
## AND SPECIALIZATION ……………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K2INF_W06_S2ISI_W01 K2INF_W06_S2ISI_W02 | C1, C3 | W2 - W13 | N1, N3 |
| PEK_W02 | K2INF_W06_S2ISI_W01 K2INF_W06_S2ISI_W02 | C1, C2 | W2 - W13 | N1, N3 |
| PEK_W03 | K2INF_W06_S2ISI_W01 K2INF_W06_S2ISI_W02 | C1, C2, C3 | W2 - W13 | N1, N3 |
| PEK_W04 | K2INF_W06_S2ISI_W01 K2INF_W06_S2ISI_W02 | C1, C2, C3 | W2 - W13 | N1, N3 |
| PEK_W05 | K2INF_W06_S2ISI_W01 K2INF_W06_S2ISI_W02 | C1, C2, C3 | W2 - W13 | N1, N3 |
| (skills) | | | | |
| PEK_U01 | K2INF_U08_S2ISI _U01 K2INF_U08_S2ISI _U02 K2INF_U08_S2ISI _U03 | C1, C2, C3 | L1-L6 | N2, N3 |
| PEK_U02 | K2INF_U08_S2ISI _U01 K2INF_U08_S2ISI _U02 K2INF_U08_S2ISI _U03 | C1, C2, C3 | L1-L6 | N2, N3 |
| PEK_U03 | K2INF_U08_S2ISI _U01 K2INF_U08_S2ISI _U02 K2INF_U08_S2ISI _U03 | C1, C2, C3 | L1-L6 | N2, N3 |
| PEK_U04 | K2INF_U08_S2ISI _U01 K2INF_U08_S2ISI _U02 K2INF_U08_S2ISI _U03 | C1, C2, C3 | L1-L6 | N2, N3 |

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

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT………………
**SUBJECT CARD**

**Name in Polish** Metody systemowe i decyzyjne w informatyce
**Name in English** Systems analysis and decision support methods in Computer Science
**Main field of study (if applicable):** Computer Science
**Specialization (if applicable):** ……………………..
**Level and form of studies:** 1st/ ~~2nd\* level, full-time~~ / part-time\*
**Kind of subject:** obligatory / ~~optional~~ / ~~university-wide~~\*
**Subject code INZ001655**
**Group of courses** ~~YES~~ / NO\*

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 9 | 9 | | |
| Number of hours of total student workload (CNPS) | 90 | 60 | 60 | | |
| Form of crediting | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 3 | 2 | 2 | | |
| including number of ECTS points for practical (P) classes | 0 | 0 | 2 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 1,2 | 0,8 | 0,8 | | |

\*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Knows basics of mathematical analysis and linear algebra.
2. Basic programming skills (variables, functions, loops, conditional statements).

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**SUBJECT OBJECTIVES**

C1 Knowledge about methods of modelling static and dynamic systems.

C2 Acquisition of skills necessary to develop computer models of technical and non-technical processes.

C3 Learning how to formulate typical decision making problems and how to solve them.

C4 Learning how to use computer engineering software to develop decision making support systems and solve optimization tasks.

| SUBJECT EDUCATIONAL EFFECTS |
|---|

related to knowledge:
PEK_W01 Knows basic ideas, problems and methods of systems modelling and identification.
PEK_W02 Knows typical decision making tasks and knows methods of solving optimization problems.

related to skills:
PEK_U01 Knows how to formulate decision making problems.
PEK_U02 Knows how to use MATLAB and SIMULINK for engineering computations, in particular for systems modelling and identification.
PEK_U03 Knows how to use computer engineering software to solve optimization tasks and to develop decision making support systems.

related to social competences:
PEK_K01 Knows how to make documentation of their own work, that is readable for other people.

| PROGRAMME CONTENT | |
|---|---|
| **Form of classes - lecture** | Number of hours |
| Lec 1 | Model in systems research. Introduction – basic concepts. Continuous signal, the Laplace transform. Discrete signal, the Z transforms. | 2 |
| Lec 2 | Typical plant models – relations between descriptions. Basic linear elements. Model building task based on experiment – identification problem. Identification of static plant. Deterministic problem – determination of the plant parameters. | 2 |
| Lec 3 | Noised measurements of the physical variables. Estimation of plant parameters with noisy measurements. Choice of the best model – probabilistic case. Regression functions. Determination of the regression functions based on the experimental data. | 2 |
| Lec 4 | Model based decision making (acceptable, satisfactory and optimal decisions). Analytical methods of  unconstrained optimization for multivariable functions. Analytical methods of constrained optimization for multivariable functions. | 2 |
| Lec 5 | Discrete optimization – the branch and bound algorithm. Linear programming. Numerical optimization methods -  basic concepts. Numerical optimization methods for one variable function. | 2 |
| Lec 6 | Gradient based optimization methods for multivariable functions without constraints. Pattern search optimization methods for multivariable functions without constraints. Numerical optimization methods for multivariable functions with constraints. | 2 |
| Lec 7 | Methods for probabilistic optimization problems: Monte Carlo method, evolutionary and genetic algorithms, simulating annealing. Multi-criteria optimization. Multi-stage decision making, dynamical programming. | 2 |
| Lec 8 | Decision making in uncertain conditions. Game theory in decision making. | 2 |
| Lec 9 | Multi-criteria optimization. Pattern recognition algorithms for decision making support. | 2 |
| | Total hours | **18** |
| **Form of classes - class** | Number of hours |
| Cl 1 | Examples of dynamical processes and their models. | 1 |
| Cl 2 | Differential equations, the Laplace's transform and transfer function. | 1 |
| Cl 3 | Solving differential equations with use of the Laplace transform. | 1 |

| Cl 4 | Discrete processes examples and their models. The Z Transform. | 1 |
|---|---|---|
| Cl 5 | Solving ordinary difference equations. | 1 |
| Cl 6 | Optimization problems formulations. Decision variables, performance index, constraints. | 1 |
| Cl 7 | Analytical methods for unconstrained and constrained optimization. Equality constraints and the Lagrange function. | 2 |
| Cl 8 | Analytical methods for unconstrained and constrained optimization. Inequality constraints and Kuhn-Tucker conditions. | 1 |
| | Total hours | **9** |

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab 1 | Instructions for OSH. Introduction for MATLAB. Basic commands, working with command window. | 1 |
| Lab 2 | Dynamical processes modeling in SIMULINK. Difference equations and transfer function. Solving difference equations. | 2 |
| Lab 3 | Simulation of a given dynamical process. Programming test. | 1 |
| Lab 4 | Optimization method for one variable function. Implementation of algorithms and graphical presentation of selected methods. | 2 |
| Lab 5 | Optimization method for multi variable function. Simulations study and report. | 2 |
| Lab 6 | Application of Matlab's toolbox for advanced problems of modeling and optimization. | 1 |
| | Total hours | **9** |

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

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

| TEACHING TOOLS USED |
|---|
| N1. Traditional lecture. Multimedia presentations.<br>N2. Student's own works – solving calculation tasks.<br>N3. Collective works – consultations with teacher.<br>N4. Student's own works – literature studies.<br>N5. Student's own works – computer programming.<br>N5. Student's own works – simulation studies.<br>N7. Student's own works – results 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_U02 | Observation of student's activity. Conversation with student about current laboratory exercises. Programming test. |
| F2 | PEKU03 PEK_K01 | Observation of student's activity. Conversation with student about current laboratory exercises. Report evaluation. |
| F3 | PEK_W01 PEK_W02 PEK_U01 | Observation of student's activity. Solving exercises. Test. |
| P1 (Lec) | PEK_W01 PEK_W02 | Examination. |
| P2 (Cl) | PEK_W01 PEK_W02 PEK_U01 | On the basis of F1. |
| P3 (La) | PEK_U02 PEK_U03 | On the basis of F1, F2. |

### PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

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

**SECONDARY LITERATURE:**

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

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

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

……………………………

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ………………………..
AND SPECIALIZATION ……………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W02 K1INF_W15 | C1 | Lec1 – Lec3 Cl1 – Cl 5 | N1, N2, N4 |
| PEK_W02 | K1INF_W01 K1INF_W15 | C3 | Lec4 – Lec9 Cl 6 – Cl 8 | N1, N2, N4 |
| PEK_U01 (skills) | K1INF_U15 | C3 | Lec4, Lec8, Lec9, Cl 6, Lab6 | N1, N2 |
| PEK_U02 | K1INF_U07 | C2 | Lab1 – Lab3 | N3, N5 – N7 |
| PEK_U03 | K1INF_U07 K1INF_U11 | C4 | Lab4 – Lab6 | N3, N5 – N7 |
| PEK_K01 (competences) | | | Lab5, Lab6 | N3, N7 |

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

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management**  / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish Organizacja systemów komputerowych**
**Name in English   *Computer Organization***
**Main field of study (if applicable): Informatics**
**Specialization (if applicable):**
**Level and form of studies: 1st/ 2nd* level, full-time /-part-time***
**Kind of subject: obligatory / optional / university-wide***
**Subject code INZ001726Cw**
**Group of courses YES / NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 9 | | | |
| 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 | | | | | |

1

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

*delete as applicable

## PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 lists and describes the basic components of a computer.
2 defines basic features of the computer.

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## SUBJECT OBJECTIVES

C1 familiarize students with the nature and properties of modern computers
C2 familiarize students with the basics of designing computers for achieving high performance, availability and performance solutions
C3 Knowing how to represent the numbers and do basic arithmetic for these numbers.
C4 Learning methods of reducing Boolean expressions.

## SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 lists and describes the elements of the modern computer
PEK_W02 describes the design requirements of efficient, reliable and environmentally computers
PEK_W03 Describes how to represent numbers in a more fixed systems, methods for converting numbers and how to implement arithmetic operations.
PEK_W04 knows the basic methods of reducing Boolean expressions

relating to skills:
relating to social competences:
PEK_K01 has awareness of the importance of non-technical aspects of engineering-science; understands the need to provide high quality and availability of information systems, taking into account the needs of different user groups.

## PROGRAMME CONTENT

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Introduction to the course. Description of the course, the organization of classes and examination. Introduction of the basic concepts. The structure and architecture of the computer. A brief history of computing - evolution, efficiency, environmental performance computers. Computer Arithmetic. Number Systems. Representation of integers and natural - NBC code, representation sign and magnitude, two's complement representation. Conversions of numbers. | 2 |
| Lec 2 | The arithmetic of integers - negation, addition and subtraction, multiplication, division. Floating-point representation. Standard IEEE 754 floating-point arithmetic | 2 |
| Lec 3 | The overall picture of the computer and its internal connections. Elements of computer. Execution of instructions. Instruction cycle. Interrupts and their support. | 2 |

1

| | The structure of internal connections. Magistrale computer. Arbitration and coordination time. PCI bus. | |
|---|---|---|
| Lec 4 | Organization of I/O – I/O modules, programmable input-output. Organization of input-output. Input-output controlled via interrupt, direct memory access, external interfaces: Ethernet | 2 |
| Lec 5 | Support the operating system - an overview of operating systems, scheduling, memory management, virtualisation | 2 |
| Lec 6 | List of instructions: properties and functions, addressing modes and formats | 2 |
| Lec 7 | Processors. The structure and operation of the processor. RISC and CISC processors. The organization of registers. Pipelining of instructions | 2 |
| Lec 8 | Discussion of sample CISC and RISC processors | 2 |
| Lec 9 | Test | 2 |
| | Total hours | 18 |

| Form of classes - class | | Number of hours |
|---|---|---|
| Cj 1 | Discussion of the organization and program of activities. Introduction to classes - basic arithmetic in positional numerical system. The methods of coding numbers. Binary codes, BCD and complement representation, | 1 |
| Cl 2 | Methods for converting numbers to different formats of fixed-number systems. | 2 |
| Cl 3 | The arithmetisc of binary numbers. Binary codes, BCD and complement representation. | 2 |
| Cl 4 | Fixed point arithmetic - multiply and divide of numbers. | 2 |
| Cl 5 | Fundamentals of Boolean algebra. Methods of reducing Boolean expressions. | 2 |
| | Total hours | 9 |

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

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

| Form of classes - seminar | | Number of hours |
|---|---|---|
| | | |

| TEACHING TOOLS USED |
|---|
| N1. Lecture supported by multimedia presentations |
| N2. Examples of documentation manufacturers of processors and computers |
| N3. E-learning system used for publication of teaching materials or announcements, collection and assessment of student work |
| N4 Own materials prepared for the classes. |
| N5 Classes at the blackboard.. |

## EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| P1 – concluding lectures | PEK_W01 | Test in e-learning system evaluating the knowledge acquisited at the lecture. In this test point is granted a positive rating if the student scores at least 50% of the maximum number of points. P1 is the number of points scored. |
| F1 – concluding classes 1-5 | PEK_W03 | Test in e-learning system checking the knowledge acquired at classes. Scoring. |
| F2 - concluding classes 6-7 | PEK_W04 | Test in e-learning system checking the knowledge acquired at classes. Scoring. |
| P2 – concluding classes | | Scoring:<br><br>- Total points ratings forming F1 and F2,<br><br>- Bonus points for the exercises at the blackboard  (up to 10% of the points for the test forming)<br><br>- Negative points for absences and unpreparedness for classes.<br><br>Scoring positive for winning at least 50% of the maximum possible total score ratings forming F1 and F2. |
| P3 – final grade | | Rating determined at a weighted average basis: P3 = P1 + 0.5 * 0.5 * P2 points P1 and P2 according to the formula:<br><br>[50%, 60%) – dst<br>[60%, 70%) – dst+ |

| | | [70%, 80%) – db |
| | | [80%, 90%) – db+ |
| | | [90%, 100%) – bdb |
| | | 100% – cel |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[12] W. Stallings, Organizacja i architektura systemu komputerowego, WNT, Warszawa 2004 lub nowsze.

[13] A. Skorupski: Podstawy techniki cyfrowej, WKŁ, Warszawa 2004,

[14] B. Pochopień: Arytmetyka systemów cyfrowych, WPŚ, Gliwice 2002.

**SECONDARY LITERATURE:**

[1]  L. Null, J. Lobur, Struktura organizacyjna i architektura systemów komputerowych, Helion 2004

[2]  A. Tanenbaumn, Strukturalna organizacja systemów komputerowych, Helion 2006

[3]  W. Komorowski, Krótki kurs architektury i organizacji komputerów, MIKOM 2004

[4]  Materiały przygotowane przez prowadzącego kurs.

[5]  B. Pochopień: Podstawy techniki cyfrowej, WSB, Dąbrowa Górnicza 2004,

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

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

Dr inż. Mariusz Fraś, Mariusz.fras@pwr.wroc.pl

## MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
### Computer Organization
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
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 | K1INF_W08 | C1 | Wy1, …, Wy15 | N1, N2, N3 |
| PEK_W02 | K1INF_W08 | C2 | Wy1, …, Wy15 | N1, N2, N3 |
| PEK_W03 | K1INF_W08 | C3 | Ćw1, …, Ćw6 | N3, N4, N5 |
| PEK_W04 | K1INF_W08 | C4 | Ćw7, Ćw8 | 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 Informatics and Management / DEPARTMENT………………
### SUBJECT CARD
**Name in Polish:  Paradygmaty programowania**
**Name in English:  Programming Paradigms**
**Main field of study (if applicable): Informatics**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code  INZ002613**
**Group of courses YES / NO\***

|  | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 9 | | | |
| Number of hours of total student workload (CNPS) | 70 | 50 | | | |
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | X | | | | |
| Number of ECTS points | 2,5 | 1,5 | | | |
| including number of ECTS points for practical (P) classes | | | | | |
| including number of ECTS points for direct teacher-student contact | 1 | 0,6 | | | |

| (BK) classes | | | | | |
|---|---|---|---|---|---|

*delete as applicable

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## PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of object-oriented programming and the ability to write simple programs in Java.
2. Knowledge of basic algorithms and data structures.

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## SUBJECT OBJECTIVES

C1 Basic understanding of fundamental programming paradigms and programming-language constructs.
C2 Ability to use programming techniques typical of chosen programming paradigm.
C3 Ability to merge constructs from different paradigms in one program.

## SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Enumerate and characterize the basic programming paradigms.
PEK_W02 Know which programming languages support these paradigms.
PEK_W03 Know typical for basic paradigms programming mechanisms.
PEK_W04 Know common abstractions and mechanisms that support those abstractions in programming languages.

relating to skills:
PEK_U01 Implement programs in accordance with the given specification.
PEK_U02 Select the programming paradigm that best suits the problem in hand.
PEK_U03 Choose appropriate constructs available in programming language depending on the problem to be solved.
PEK_U04 Use the standard documentation of programming languages.

## PROGRAMME CONTENT

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Introduction. Functional programming in interactive environment. | 2 |
| Lec 2 | Basics of functional programming: curried and uncurried form, tail recursion, pattern matching. Higher-order functions. | 2 |
| Lec 3 | Algebraic data types: definitions and usage. Eager and lazy evaluation. Streams. Parameter passing. | 2 |
| Lec 4 | Computational effects. Imperative programming. Abstract data types. | 2 |
| Lec 5 | Object-oriented programming I. Reminder of known programming constructs. | 2 |
| Lec 6 | Object-oriented programming II. New programming constructs: traits, mixins, case classes and others. | 2 |
| Lec 7 | Generic classes, variance properties and bounded polymprphism. | 2 |
| Lec 8 | Concurrent programming. Threads and shared memory. | 2 |
| Lec 9 | Concurrent programming. Actors and message passing. Handling events. | 2 |
| | Total hours | 18 |
| Form of classes - class | | Number of hours |

| Cl 1 | Grading policy. Basics of functional programming. | 1 |
|------|---------------------------------------------------|---|
| Cl 2 | Pattern matching. Higher-order functions. | 2 |
| Cl 3 | Algebraic data types. Eager and lazy evaluation. Computational effects. | 2 |
| Cl 4 | More advanced object-oriented mechanisms. Variance properties and bounded polymorphism. | 2 |
| Cl 5 | Concurrent programming. | 2 |
| | Total hours | 9 |

| TEACHING TOOLS USED |
|---------------------|
| N1. Lecture supported by multimedia presentations.<br>N2. E-learning system used to publish teaching materials and messages. |

## EVALUATION 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<br>PEK_W02<br>PEK_W03<br>PEK_W04<br>PEK_U01<br>PEK_U02<br>PEK_U03<br>PEK_U04 | Grading homework exercises solved at classes and declared as solved. |
| F2 | PEK_W01<br>PEK_W02<br>PEK_W03<br>PEK_W04 | Written examination. |
| C  The overall grade of the course is the grade for written exam, possibly modified  by 0,5 up or down depending on the activity during classes. |||

| PRIMARY AND SECONDARY LITERATURE |
|----------------------------------|

**PRIMARY LITERATURE:**

[1] Handouts provided by the teacher.
[2] M. Odersky, L.Spoon, B.Venners, Programming in Scala, Artima 2010.
[3] J. Hickey, Introduction to Objective Caml, Internet.
[4] P. Van Roy, S.Haridi, Concepts, Techniques, and Models of Computer Programming, MIT 2004.

**SECONDARY LITERATURE:**

[1] R. W.Sebesta, Concepts of Programming Languages, Addison-Wesley 2012.
[2] E. Chailloux, P.Manoury, B.Pagano, Developing Applications with Objective Caml, Internet.

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

Zdzisław Spławski, zdzislaw.splawski@pwr.wroc.pl

## MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Programming Languages and Paradigms**
### AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
### AND SPECIALIZATION …………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| **PEK_W01 (knowledge)** | K1INF_W06 | C1 | Lec1-3, Lec5-6, Lec8-9 | N1, N2 |
| **PEK_W02** | K1INF_W06 | C1 | Lec1, Lec5-6 | N1, N2 |
| **PEK_W03** | K1INF_W05, K1INF_W06 | C1 | Lec1-9 | N1, N2 |
| **PEK_W04** | K1INF_W05, K1INF_W06 | C1 | Lec2-9 | N1, N2 |
| **PEK_U01 (skills)** | K1INF_U02, K1INF_W05, K1INF_W06 | C2, C3 | Cl1-5 | N2 |
| **PEK_U02** | K1INF_U02, K1INF_W05, K1INF_W06 | C1, C2, C3 | Cl1-5 | N2 |
| **PEK_U03** | K1INF_U02, K1INF_W05, K1INF_W06 | C2, C3 | Cl1-5 | N2 |
| **PEK_U04** | K1INF_W06, K1INF_U02 | C1, C2 | Cl1-5 | N2 |

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

WYDZIAŁ Informatyki i Zarządzania / STUDIUM………………

### KARTA PRZEDMIOTU
**Nazwa w języku polskim: Paradygmaty programowania**
**Nazwa w języku angielskim: Programming Paradigms**
**Kierunek studiów (jeśli dotyczy): Informatyka**
**Specjalność (jeśli dotyczy): …………………….**
**Stopień studiów i forma:      I / ~~II~~ stopień*, ~~stacjonarna~~ / niestacjonarna***

**Rodzaj przedmiotu:       obowiązkowy / ~~wybieralny~~ / ~~ogólnouczelniany~~ ***

**Kod przedmiotu       INZ002614**

**Grupa kursów      ~~TAK~~ / NIE***

| | Wykład | Ćwiczenia | Laboratorium | Projekt | Seminarium |
|---|---|---|---|---|---|
| Liczba godzin zajęć zorganizowanych w Uczelni | | | 18 | | |

| (ZZU) | | | | | |
|---|---|---|---|---|---|
| Liczba godzin całkowitego nakładu pracy studenta (CNPS) | | | 90 | | |
| Forma zaliczenia | Egzamin / zaliczenie na ocenę* | Egzamin / zaliczenie na ocenę* | ~~Egzamin~~ / zaliczenie na ocenę* | Egzamin / zaliczenie na ocenę* | Egzamin / zaliczenie na ocenę* |
| Dla grupy kursów zaznaczyć kurs końcowy (X) | | | | | |
| Liczba punktów ECTS | | | 3 | | |
| w tym liczba punktów odpowiadająca zajęciom o charakterze praktycznym (P) | | | 3 | | |
| w tym liczba punktów ECTS odpowiadająca zajęciom wymagającym bezpośredniego kontaktu (BK) | | | 1,2 | | |

*niepotrzebne skreślić

**WYMAGANIA WSTĘPNE W ZAKRESIE WIEDZY, UMIEJĘTNOŚCI I INNYCH KOMPETENCJI**

11.    Znajomość podstaw programowania obiektowego i umiejętność programowania w języku Java.
12.    Znajomość podstawowych algorytmów i struktur danych.

\

**CELE PRZEDMIOTU**

C1  Zdobycie umiejętności wykorzystanie technik programistycznych, właściwych dla stosowanego paradygmatu programowania.

C2  Zdobycie umiejętności łączenia mechanizmów z różnych paradygmatów w jednym programie.

**PRZEDMIOTOWE EFEKTY KSZTAŁCENIA**

Z zakresu umiejętności:

PEK_U01 Implementuje programy zgodnie z podaną specyfikacją.

PEK_U02 Potrafi wybrać odpowiedni dla realizacji konkretnego celu paradygmat.

PEK_U03 Właściwie dobiera mechanizmy dostępne w języku programowania w zależności od problemu.

PEK_U04 Korzysta ze standardowej dokumentacji języka programowania.

PEK_U05 Wykorzystuje nowoczesne środowisko (np. Eclipse) oraz narzędzia programistyczne.

PEK_U06 Zna i stosuje zasady bezpieczeństwa i higieny pracy.

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**TREŚCI PROGRAMOWE**

| Forma zajęć - laboratorium | | Liczba godzin |
|---|---|---|
| La1 | Przedstawienie zasad oceny. Zapoznanie z zasadami BHP. Programowanie funkcyjne w środowisku interakcyjnym. | 2 |
| La2 | Proste funkcje z wykorzystaniem mechanizmu dopasowania wzorca. Funkcje wyższego rzędu. | 2 |
| La3 | Funkcje z algebraicznymi typami danych (np. drzewa). | 2 |
| La4 | Funkcje na listach i/lub drzewach leniwych. | 2 |
| La5 | Program obiektowy z hierarchią klas. | 2 |
| La6 | Program obiektowy, wykorzystujący cechy i domieszki. | 2 |
| La7 | Program obiektowy z hierarchią klas generycznych. Wariantność. | 2 |
| La8 | Program współbieżny z wątkami. | 2 |

| La9 | Programy wykorzystujące aktorów. | 2 |
|-----|----------------------------------|-----|
|     | Suma godzin                      | 18  |

## STOSOWANE NARZĘDZIA DYDAKTYCZNE

N1. Oprogramowanie do implementacji, dokumentacji, oceny oprogramowania.

N2. System e-learningowy używany do publikacji materiałów dydaktycznych, ogłoszeń i 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_U01- U06 | Oceny cząstkowe za programy pisane w czasie laboratorium. |
| P Ocena końcowa z laboratorium, wyliczana zgodnie z zasadami, podanymi przez prowadzącego na pierwszych zajęciach. | | |

## LITERATURA PODSTAWOWA I UZUPEŁNIAJĄCA

**LITERATURA PODSTAWOWA:**

[16]   Materiały, przygotowane przez prowadzącego kurs.
[17]   M.Odersky, L.Spoon, B.Venners, Programming in Scala, Artima 2010
[18]   J.Hickey, Introduction to Objective Caml, Internet
[19]   P.Van Roy, S.Haridi, Programowanie. Koncepcje, techniki i modele, Helion 2005

**LITERATURA UZUPEŁNIAJĄCA:**

[15]   R.W.Sebesta, Concepts of Programming Languages, Addison-Wesley 2012
[16]   E.Chailloux, P.Manoury, B.Pagano, Developing Applications with Objective Caml
[17]   Dokumentacje używanych języków programowania

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

Zdzisław Spławski, zdzislaw.splawski@pwr.wroc.pl

MACIERZ POWIĄZANIA EFEKTÓW KSZTAŁCENIA DLA PRZEDMIOTU
**Paradygmaty programowania**
Z EFEKTAMI KSZTAŁCENIA NA KIERUNKU Informatyka
I SPECJALNOŚCI ……………………………..

| 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 (umiejętności) | K1INF_U02, K1INF_W05 – W06 | C1, C2 | La1-9 | N1, N2 |
| PEK_U02 | K1INF_U02, K1INF_W05 – W06 | C1, C2 | La1-9 | N1, N2 |
| PEK_U03 | K1INF_U02, K1INF_W05 – W06 | C1, C2 | La1-9 | N1, N2 |
| PEK_U04 | K1INF_U02, K1INF_W06 | C1, C2 | La1-9 | N1, N2 |
| PEK_U05 | K1INF_U02 | C1, C2 | La1-9 | N1, N2 |
| PEK_U06 | K1INF_U14 | | La1-9 | |

** - wpisać symbole kierunkowych/specjalnościowych efektów kształcenia
*** - z tabeli powyżej

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FACULTY ……… / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish ……** Podstawy Inżynierii Oprogramowania **…….**
**Name in English ……** Foundations of Software Engineering **….**
**Main field of study (if applicable): …Informatics……….**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code INZ001654**
**Group of courses YES / NO\***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 9 | 9 | 9 | | |
| Number of hours of total student workload (CNPS) | 48 | 34 | 59 | | |
| 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 | | | | | |

1

| | | | | | |
|---|---|---|---|---|---|
| mark (X) final course | | | | | |
| Number of ECTS points | **2** | 1 | 2 | | |
| including number of ECTS points for practical (P) classes | | 1 | 2 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 | 0,4 | 0,8 | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**
1. Knowledge and experience in object-oriented programming language (eg. Java)
2.
3.

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**SUBJECT OBJECTIVES**

C1 obtain basic knowledge in the following areas of software engineering: processes and methodologies, software development life cycle models, requirements engineering and the software testing.

C2 Gaining practical skills in engineering and specifying requirements for software testing.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

PEK_W01 student knows the software life cycle models and systems specification languages PEK_W02 student understands the need for methodologies in the software development process

PEK_W03student understands the need for software testing, distinguishes between types of tests and test levels;

relating to skills:

PEK_U01 student is able analyze a provided description of the user's needs in order to formulate the requirements for the software

PEK_U02 student models the requirements for the software in the form of use cases and specifies the business constraints on the system

PEK_U03 student develops interface design and prepare documentation for it

PEK_U04 student specifies unit tests for a given program functions

PEK_U05 student formulates and develops test cases

relating to social competences:

……….

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**PROGRAMME CONTENT**

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Introduction to Software Engineering (SE): the basic concepts of software engineering. Presentation of the program of the course, the organization of classes and evaluation process. | 1 |
| Lec 2 | Software lifecycle processes. Models of the software life cycle. Methodologies of software development. Engineering of software requirements. Modeling the structure and behavior of software systems | 2 |

| Lec 3 | Human-computer interface, standards, technical designing. Software designing process and its artifacts. Software implementation process, style guides, code versioning. | 2 |
|---|---|---|
| Lec4 | The quality of software in the process of its development. Testing - tips, techniques, automated testing | 2 |
| Lec 5 | Issues on implementation of information systems. Organization of software project. Issues on configuration and change management in enterprise information systems. | 1 |
| Lec 6 | Test | 1 |
| | Total hours | **9** |
| **Form of classes - class** | | **Number of hours** |
| Cl 1 | Introduction. | 1 |
| Cl 2 | Developing a use case model. | 1 |
| Cl 3 | Specification of the use cases scenarios . | 2 |
| Cl 4 | Developing business rules of domain in consideration | 2 |
| Cl 5 | Specification of unit tests and acceptance tests | 2 |
| Cl 6 | Test | 1 |
| | **Total hours** | **9** |
| **Form of classes - laboratory** | | **Number of hours** |
| Lab 1 | Organizational activities. Presentation of the scope and principles of assessment. Familiarization the students with the principles of health and safety. Getting familiar with development environments (DE) used in the laboratory. | 1 |
| Lab 2 | Developing an use case model in DE. Defining the scenarios of use cases in DE. | 2 |
| Lab 3 | Prototyping of an application interface. | 2 |
| Lab 4 | Developing business rules of domain in consideration | 2 |
| Lab 5 | Developing an unit and acceptance tests | 2 |
| | Total hours | **9** |
| **Form of classes - project** | | **Number of hours** |
| Proj 1 | | |
| Proj 2 | | |
| Proj 3 | | |
| Proj 4 | | |
| … | | |
| | Total hours | |
| **Form of classes - seminar** | | **Number of hours** |
| Sem 1 | | |
| Sem 2 | | |
| Sem 3 | | |
| … | | |

| | | | |
|---|---|---|---|
| Total hours | | | |

| | |
|---|---|
| Total hours | |

**TEACHING TOOLS USED**

N1. Informative lecture, supported by multimedia presentations
N2. Examples of software models and software tests.
N3. Examples of technical documentation used in the software engineering area
N4. E-learning system used for the publication of teaching 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 | PEK_U01, PEK_U02, PEK_U05, | Evaluation of tasks solutions from the announced task lists. The solution is developed by the students partly during the teaching time, and partly - beyond. The subject leading teacher evaluates the solution drawn up by the student - usually during the classes in the University. Rating F1 is dependent on the scope, quality and level of expertise of the work. Students are informed of the assessment F1 directly. |
| F2 | PEK_U01, PEK_U02, PEK_U05, PEK_K02, | Colloquium - written work (tasks to solve) checking the trained skills. The work is given a positive evaluation, if the student scores at least 50% of the maximum number of points. |
| F3 – use case model, scenarios, interface prototype | PEK_U02, PEK_U03, PEK_K01 | Reviewing the requirements specification correctness. Verification of compliance with the principles of user interface design. Point scale (up to 50% of the total score) or traditional. |
| F4 – the unit testing | PEK_U04, PEK_K01 | Checking the accuracy and completeness of the model and its compliance with the requirements specification. Point scale (max. 30% of total score) or traditional. |
| F5 – the acceptance testing | PEK_U05, PEK_K01 | Verify the accuracy and completeness of unit and acceptance tests. Point scale (up to 20% of total points) or traditional. |
| F6 – 'checking' questions | | Test (at least one per semester). Scale: *passed /no passed* (four *no passed* is understood as no possibility to complete the course) |
| P1 – the final evaluation of lecture | PEK_W01, PEK_W02, PEK_W03, PEK_K02 | Colloquium - written test for evaluation of students' knowledge. The test is given a positive evaluation, if the student scores at least 50% of the maximum number of points. |
| P2 – the final evaluation of the class | PEK_U01, PEK_U02, PEK_U05, PEK_K02 | The final evaluation of the exercise is determined on the basis of total marks obtained by the student from the lists of tasks (F1). Praise P2 is awarded to a student who passed positive the all lists and has won a total of at least 50% of the total points available within the evaluation of F2 |
| P3 - – the final | PEK_U02, | Rate determined on the basis of the total points of ratings forming |

| evaluation of the laboratory | PEK_U03, PEK_U04, PEK_U05, PEK_K01 | F3 ... F5 according to the formula:<br><40% of the points ➔ not sufficient.<br><40%, 50%) ➔ sufficient<br><50%, 60%) ➔ sufficient +<br><60%, 70%) ➔good<br><70%, 80%) ➔ good +<br><80%, 90%) ➔ very good<br>> 90% ➔ excellent<br>or the weighted average:<br>F3 *0.5 +  0.2 * F4 + 0.3 * F5 |
|---|---|---|

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[20]    Pressman , Praktyczne podejście do inżynierii oprogramowania, WNT 2003
[21]    Hamlet, Maybee , Podstawy techniczne inżynierii oprogramowania, WNT 2003
[22]    K. Sacha, Inżynieria oprogramowania, PWN, Warszawa, 2010

**SECONDARY LITERATURE:**

[18]    M. Fowler – UML w kropelce, LTP Oficyna Wydawnicza, 2005

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

**Iwona Dubielewicz, iwona.dubielewicz@pwr.wroc.pl**

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**… Fundamentals of Software Engineering …**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**…..
AND SPECIALIZATION ………………………….

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 | K1INF_W07 | C1 | Lec1, …,Lec5, | N1, N2,N4 |
| PEK_W02 | K1INF_W07 | C2 | Lec2, ..,Lec5 | N1, N2, N4 |
| PEK_W03 | K1INF_W07 | C2 | Lec3,Lec4 | N1, N2,N4 |
| PEK_U01 | K1INF_U03 | C2 | CL1,CL2,Lab2 | N2, N3, N4 |
| PEK_U02 | K1INF_U03, K1INF_U14 | C2 | CL3, Lab2 | N2, N3, N4 |
| PEK_U03 | K1INF_U03, | C2 | CL3, CL4,Lab3 | N3, N4 |
| PEK_U04 | K1INF_U03 | C2 | CL4, Lab4, | N3, N4 |
| PEK_U05 | K1INF_U03, | C2 | CL5, Lab5, | N3, N4 |
| PEK_U06 | K1INF_U03, | C2 | CL5, Lab5 | N3, N4 |

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

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FACULTY W-8 / DEPARTMENT………………

**SUBJECT CARD**

**Name in Polish Podstawy Zarządzania**
**Name in English Management basics**
**Main field of study (if applicable): Informatics**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code INZ001669**
**Group of courses YES / NO\***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | | | | |
| Number of hours of total student workload (CNPS) | 60 | | | | |
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | | | | |
| including number of | 0 | | | | |

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

*delete as applicable

| PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES |
|---|
| none |

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| SUBJECT OBJECTIVES |
|---|
| C1 To transfer and causing understanding by students information about management of their present conceptions. Understanding stages of organisation management evolution with development of organisational forms of market subjects and public sector<br>C2 Discussion about organisational models and legal forms of subjects activity on local and global market<br>C3 Reengineering as a mean to build advantage competitive companies and organisations through the means of optimising BPMN (Business Process Management Notation)<br>C4 Representing method of monitoring effectiveness of tasks, motivation and organising work teams<br>C5 Acquiring the necessary knowledge about active definition of functionality's and choosing proper ICT support (Informatics Communication Technology) |

| SUBJECT EDUCATIONAL EFFECTS |
|---|
| relating to knowledge:<br>PEK_W01 – has basic knowledge about running a business including organisational models and legal forms of subjects activity on local and global market<br>PEK_W02 – has basic knowledge about creating business processes BPMN and using this knowledge to optimise business processes and building competitive advantage<br>PEK_W03 – has basic knowledge about project management and work task teams<br>PEK_W04 – knows basic possibilities of using ICT as a support for running business |

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - lecture** | | **Number of hours** |
| Lec 1 | Basic terms from management – precursors of management | 1 |
| Lec 2 | Theories, practices, schools of management | 2 |
| Lec 3 | Legal and organisational forms of market subjects and public sector | 2 |
| Lec 4 | Management of knowledge in organisation and information support systems for creating competence – HR (Human Resources) | 2 |
| Lec 5 | Resources management, motivation, Maslows theory, work tasks teams growing up phases | 2 |
| Lec 6 | Organisational and management models from perspective key processes by informational systems | 1 |
| Lec 7 | ICT globalisation factor in organisation, product, project, service life cycle | 1 |
| Lec 8 | Business process modelling in market subjects and organisations of public sector BPMN | 1 |
| Lec 9 | Changes management in organisation oriented on process reengineering and bringing new services on the market - Catalist | 2 |

| Lec 10 | Outsourcing and teleworking | 1 | |
|---|---|---|---|
| Lec 11 | Role and significance of PM (Project Management) in management – management by projects | 2 | |
| Lec 12 | Written test | 1 | |
| | Total hours | 18 | |

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

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

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

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

| TEACHING TOOLS USED |
|---|
| N1.<br>N2.<br>N3. |

# EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| P | PEK_W01 | Written test |
| P | PEK_W02 | Written test |
| P | PEK_W03 | Written test |
| P | PEK_W04 | Written test |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[23]  [Koźmiński, A.K. i Jemielniak, D. (2008) *Zarządzanie od podstaw*, Wydawnictwa Akademickie i Profesjonalne, Wa 2008

[24]  Frączkowski K., Zarządzanie projektem informatycznym, Wydawnictwo Oficyna PWr, 2002

**SECONDARY LITERATURE:**

[19]  Gryfin Ricky W. Podstawy zarządzania organizacjami. Wydawnictwo Naukowe PWN, 2005

[20]  Marcin W. Staniewski., Zarządzanie zasobami ludzkimi, a zarządzanie wiedzą w przedsiębiorstwie, Wyd. Vizja Pr ,2008

[21]  Opolski Krzysztof., Biznes plan. Jak go budować i analizować ? Wyd. CeDeWu, 2006

[22]  Frączkowski K ., Modele zarządzania zasobami projektu informatycznego i organizacji zespołów – telepraca. http informatyka.pl/wiki/Modele_zarz%C4%85dzania_zasobami_projektu_informatycznego_i_organizacja_zespo%C %B3w_-_telepraca

Frączkowski K., Model mapowania aktywności i kompetencji w projektach IKT. w. XXI Autumn Meeting of Polish Inform Processing Society ISBN 83-922646-0-6 Conference Proceedings, pp.59-71 © 2005 PIPS oraz : http://www.proceedings2005.imcsit.org/docs/73.pdf

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

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

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Management basics**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION ……………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 | K1INF_W18 | C1,C2 | Lec1,Lec2, Lec3,Lec4, | brak |
| PEK_W02 | K1INF_W18 | C3 | Lec7,Lec9, Lec12, Lec13 | brak |
| PEK_W03 | K1INF_W18 | C4 | Lec5, Lec6, Lec10,Lec11,Lec15 | brak |
| PEK_W04 | K1INF_W18 | C5 | Lec8, Lec14 | brak |

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

*** - from table above

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FACULTY ……… / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish …………… Podstawy Elektroniki i Miernictwa**
**Name in English …………Electronics and Metrology – basic principles …………**
**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 … INZ001647W, INZ001648L ………….**
**Group of courses YES / NO\***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | | 18 | | |
| Number of hours of total student workload (CNPS) | 60 | | 60 | | |
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | | 2 | | |
| including number of | | | 2 | | |

1

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

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Basic knowledge of the Mathematical Analysis and Physics

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**SUBJECT OBJECTIVES**

C1 Introducing the students to the principles of the work of semiconductor devices

C2 Take possession of the basic knowledge about the physical properties of the semiconductor materials, band theory of the materials and main properties of the bipolar and unipolar devices

C3 Presentation of the principles of the measurements of electrical quantities and the basics of the electronic circuits.

---

**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

PEK_W01 ma podstawową wiedzę związaną z prawami rządzącymi przepływem prądu elektrycznego w obwodzie elektrycznym

PEK_W02 zna budowę, zasadę działania i podstawowe zastosowania przyrządów półprzewodnikowych takich jak np. dioda, tranzystory bipolarne i unipolarne

PEK_W03 ma podstawową wiedzę z zakresu miernictwa elektrycznego

…

relating to skills:

PEK_U01 potrafi analizować i projektować proste, liniowe układy elektryczne

PEK_U02 potrafi analizować i projektować układ elektryczny z elementami nieliniowymi

PEK_U03 potrafi zaprojektować stabilizator oparty na diodzie Zenera

relating to social competences:

PEK_K01 potrafi wyszukiwać i korzystać z literatury zalecanej do kursu

PEK_K02 rozumie k identyfikuje zastosowania elektroniki różnych dziedzinach życia

PEK_K03 identyfikuje zastosowania elektroniki w różnych dziedzinach życia

---

**PROGRAMME CONTENT**

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Direct current, circuit, matches RLC | 2 |
| Lec 2 | Bases of the metrology | 2 |
| Lec 3 | Physical bases of the work of semiconductor devices | 2 |
| Lec 4 | p-n junction, principle of the operation, properties | |
| Lec 5 | Semiconductor diodes and their applications | 2 |
| Lec 6 | Bipolar transistors, principles of the operation, characteristics, applications in electronic circuits | 2 |
| Lec 7 | Field Effect Transistors, principles of the operation and applications in electronic circuits | 2 |

| Lec 8 | Optoelectronic | 2 |
|---|---|---|
| Lec 9 | Colloquy | 2 |
| | Total hours | 18 |

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

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab 1 | Organization time | 2 |
| Lab 2 | Real values of the resistance of resistors measurements, relative and unconditional errors calculations | 2 |
| Lab 3 | Serious and parallel connections of resistors | 2 |
| Lab 4 | I=f(U) semiconductor's diode measurement, dynamic and static resistance calculation | 2 |
| Lab 5 | Zener's diode, project of the stabilizer | 2 |
| Lab 6 | Static characteristics of the unipolar transistors | 2 |
| Lab 7 | Dynamic characteristics of the TTL logical | 2 |
| Lab 8 | Additional laboratory | 2 |
| Lab 9 | Inscribing of estimates | 2 |
| | Total hours | 18 |

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

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

| TEACHING TOOLS USED |
| --- |
| N1. Lecture –  use of multimedia<br>N2. Laboratory – traditional method<br>N3. Consultations<br>N4. Personal work of 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 |
| --- | --- | --- |
| F- laboratory | PEK_U01, PEK_U02, PEK_U03, PEK_K01 | reports |
| P- lecture | PEK_W01, PEK_W02, PEK_W03, PEK_K02, PEK_K03 | Final colloquy at the end of the semester |

| PRIMARY AND SECONDARY LITERATURE |
| --- |
| **PRIMARY LITERATURE:** |
| [1] A. Zatorski, Podstawy miernictwa elektrycznego, Kraków AGH, 2011<br>[2] J. Hennel, Podstawy elektroniki półprzewodnikowej, Warszawa, Wydawnictwo NT 2003 |
| **SECONDARY LITERATURE:** |
| [3] A.Świt, J. Pułtorak, Przyrządy Półprzewodnikowe, Warszawa, WTN 1979<br>[4] S. Lebson, Podstawy miernictwa elektrycznego, WNT, 1972 |
| **SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)** |
| **dr hab. inż. Janusz Martan prof. PWr,  janusz.martan@pwr.wroc.pl** |

# MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

……………………………

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ………………………..
AND SPECIALIZATION …………………………….

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF-W08 | C1 | Lec. 1 | 1,3,4 |
| PEK_W02 | K1INF-W08 | C2, C4 | Lec.3 – Lec.8 | 1,3,4 |
| PEK_W03 | K1INF-W08 | C3 | Lec. 2 | 1,3,4 |
| … | | | | |
| PEK_U01 (skills) | K1INF-W07, K1INF -U14 | C2, C3 | Lab.2, lab.3 | 2,3,4 |
| PEK_U02 | K1INF-W07, K1INF -U14 | C2, C4 | Lab.4, lab.6, lab.7 | 2,3,4 |
| PEK_U03 | K1INF-W07, K1INF -U14 | C2, C3 | Lab.4, lab.5 | 2,3,4 |
| | | | | |
| PEK_K01 (competences) | K1INF_K01, K1INF_K02, K1INF_K03 | C1-C4 | Lec.1-lec.8 Lab.2 – lab7 | 1-4 |
| PEK_K02 | K1INF_K01, K1INF_K02, K1INF_K03 | C1-C4 | Lec.1-lec.8 Lab.2-lab.7 | 1-4 |
| PEK_K03 | K1INF_K01, K1INF_K02, K1INF_K03 | C1-C4 | Lec.1-lec8 Lab2-lab7 | 1-4 |
| | | | | |
| | | | | |

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

\*\*\* - from table above

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FACULTY  W-8 / ~~DEPARTMENT~~……………

**SUBJECT CARD**

**Name in Polish**          **Podstawy Programowania**
**Name in English**         **Fundamentals of Progamming**
**Main field of study (if applicable):** **Informatics**
**Specialization (if applicable):**       ……………………..
**Level and form of studies:** 1st/ ~~2nd~~* level, full-time ~~/ part-time~~*
**Kind of subject:** obligatory ~~/ optional~~ / ~~university-wide~~*
**Subject code**            **INZ001643**
**Group of courses**        YES ~~/ NO~~*

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 18 | 9 | | |
| Number of hours of total student workload (CNPS) | 42 | 42 | 51 | | |

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

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Ability to work in Windows system.

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**SUBJECT OBJECTIVES**

C1 Knowledge of Java programming language basics.
C2 Knowledge of object programming basics.
C3 Gaining practical ability to create simple Java applications.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:
  PEK_W01 Knows basics of Java programming language.
  PEK_W02 Knows basics of object programming.
  PEK_W03 Knows the problem solution process.

relating to skills:
  PEK_U01 Knows how to run and test simple applications in Java programming language.
  PEK_U02 Knows how to formulate and write an algorithm.
  PEK_U03 Can implement Java algorithms.
  PEK_U04 Is able to define a class hierarchy.

relating to social competences:
  PEK_K01 Can describe development of own application in a communicative manner.

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**PROGRAMME CONTENT**

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Introductory information: task solution process, algorithm formulation and notation, simple Java application development | 2 |
| Lec 2 | Basic elements of Java programming language. Using of arrays | 2 |
| Lec 3 | Full definition of a simple class, class documenting | 2 |
| Lec4 | Inheritance, override of fields and methods, polymorphism. | 2 |
| Lec 5 | Abstract classes, interfaces. Working with object collections | 2 |

| Lec 6 | Handling of input/output streams. File processing | 2 |
|---|---|---|
| Lec7 | Error identification: exception handling, assertions. Basics of software testing | 2 |
| Lec 8 | Recurrence. Enumerations in Java | 2 |
| Lec 9 | Case study - application design | 2 |
| | Total hours | 18 |

| **Form of classes - class** | | **Number of hours** |
|---|---|---|
| Cl 1 | Formulating and notation of algorithms with branching. | 2 |
| Cl 2 | Iterative algorithms. | 2 |
| Cl 3 | Implementation of algorithms in form of methods. Full definition of simple classes. | 2 |
| Cl 4 | One-dimensional arrays. Multi-dimensional arrays. | 2 |
| Cl 5 | Defining a class hierarchy, abstract classes and interfaces. Polymorphism. | 2 |
| Cl 6 | Object collection processing. | 2 |
| Cl 7 | Input/output streams. File processing. | 2 |
| Cl 8 | Exception handling, assertions. Recurrence. | 2 |
| Cl 9 | Test | 2 |
| | Total hours | 18 |

| **Form of classes - laboratory** | | **Number of hours** |
|---|---|---|
| Lab 1 | BlueJ environment discovery. | 2 |
| Lab 2 | Simple class definition, class documentation. | 2 |
| Lab 3 | Classes with array fields. Class hierarchy building (inheritance). | 2 |
| Lab 4 | Object collection processing. Designing and implementation of full application (using input/output and files). | 3 |
| | Total hours | 9 |

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

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

| **TEACHING TOOLS USED** | | |
|---|---|---|
| N1. Informational lecture. | | |

N2. E-learning system used to publish educational materials.
N3. Environment for software implementation and 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 Algorithm notation, algorithm implementation, simple class definition. | PEK_W01,PEK_W03, PEK_U01,PEK_U02 | Test checking the knowledge and skills gained during the lectures and practical classes. At least 50% of the points are required for the pass. |
| F2 Table processing, collection type use, input/output handling. | PEK_W02, PEK_U02, PEK_U04 | Test checking the knowledge and skills gained during the lectures and practical classes. At least 50% of the points are required for the pass. |
| P1 Final score from laboratory. | PEK_W01,PEK_W02, PEK_U02,PEK_U03, PEK_U04 | Execution of tasks indicated by the lecturer. The final score is the average from the partial scores. |
| P2 Final score from the course group. | PEK_W01,PEK_W02,PEK_W03, PEK_U01,PEK_U02,PEK_U03 | The overall pass depends on passing two test (or retake test). The final score is calculated on the basis of test scores. |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[1] Lis M., Praktyczny kurs Java, Helion 2011
[2] Barnes D. J. , Kolling M. , Objects first with Java, Pearson Education Limited, 2006
[3] Eckel B., Thinking in Java edycja polska, Helion 2011

**SECONDARY LITERATURE:**

[1] http://www.bluej.org
[2] http://wazniak.mimuw.edu.pl/index.php?title=Programowanie_obiektowe

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

**Zbigniew Szpunar    zbigniew.szpunar@pwr.wroc.pl**

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Fundamentals of Progamming**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Informatics**
AND SPECIALIZATION ……………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W04 | C1 | Lec 1, Lec 2, Cl 3 | N1, N2 |
| PEK_W02 | K1INF_W04 | C2 | Lec 1- Lec 7, Cl 2- Cl 8, | N1, N2 |
| PEK_W03 | K1INF_W04 | C3 | Lec 1, Cl 1 | N1, N2 |
| PEK_U01 (skills) | K1INF_U01 | C3 | Lec 1, Cl 1 | N1, N2 |
| PEK_U02 | K1INF_U01, K1INF_U14 | C3 | Lec 3 – Lec 9, Cl 2 – Cl 8, Lab 1 – Lab 4 | N1, N2, N3 |
| PEK_U03 | K1INF_U01 | C3 | Lec 7, Lab 2 – Lab 4 | N1, N2, N3 |
| PEK_U04 | K1INF_U01 | C3 | Lec 4, Cl 5, Lab 3 | N1, N2, N3 |
| PEK_K01 (competences) | | | Lab 2 – Lab 4 | N22, N3 |

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

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FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

**SUBJECT CARD**

**Name in Polish: Podstawy teleinformatyki**

**Name in English: Basics of information and communication technologies**

**Main field of study (if applicable): computer science**
**Specialization (if applicable):**
**Level and form of studies: 1st level, part-time**
**Kind of subject: obligatory**
**Subject code INZ001649**
**Group of courses: NO**

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 18 | 0 | 0 | 0 |
| Number of hours of total student workload | 120 | 90 | | | |

| (CNPS) | | | | | |
|---|---|---|---|---|---|
| Form of crediting | Examination | Crediting with grade | | | |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 4 | 3 | | | |
| including number of ECTS points for practical (P) classes | | | | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 1,6 | 1,2 | | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Has a basic knowledge of linear algebra, analytic geometry and mathematical analysis, which is necessary to perform simple computing tasks on an engineering of technical and non-technical disciplines (K1INF_W01).
2. Has a basic knowledge of discrete mathematics, mathematical logic and mathematical statistics, the necessary information to solve simple engineering problems (K1INF_W02).
3. Has a basic knowledge of classical mechanics and wave motion (K1INF_W03).
4. Can be used as indicated analytical method and to plan and carry out a simple experiment engineering and computer simulation, to carry out tests and analyze results, particularly for the selected system components (K1INF_U09).
5. Understands the need and knows the possibility of lifelong learning and to improve their professional competence and social (K1INF_K01)

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**SUBJECT OBJECTIVES**

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

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

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

<table>
<tr><td colspan="2" align="center">**SUBJECT EDUCATIONAL EFFECTS**</td></tr>
<tr><td colspan="2">relating to knowledge:<br><br>K1INF_W11: Has basic knowledge of information systems and computer communication networks<br>K1INF_W16: Knows the basic methods and tools for collecting, processing and retrieval of information and knowledge extraction<br><br>relating to skills:<br><br>K1INF_U05: Has the ability to self-study, including in order to improve the professional competence<br>K1INF_U15: Can use the right tools to build a simple model of the process (the object), to formulate specific task analysis and decision making<br>K1INF_U16: Can effectively use methods and tools for collecting, processing and retrieval of information and knowledge extraction<br><br>relating to social competences:<br><br>K1INF_K01: Understands the need and knows the possibilities of lifelong learning and to improve their professional and social competences<br>K1INF_K03: Can interact and work in a group, taking the different roles</td></tr>
</table>

| PROGRAMME CONTENT | |
| :-- | :--: |
| **Form of classes - lecture** | Number of hours |
| Lec 1 | Information systems - basic concepts. Theories of information. Statistical information theory. Entropy as a measure of the amount of information in the statistical theory of information. | 2 |
| Lec 2 | Information processes and information transfer. Model of communication channel. | 2 |
| Lec 3 | Optimal discrete error free channel and noisy channel coding | 2 |
| Lec 4 | Optimal continuous error free and noisy channel coding | 2 |
| Lec 5 | Representation of signals and systems - Fourier transform. Fourier transform - properties | 2 |
| Lec 6 | Continuous amplitude modulation and continuous angle modulation | 2 |
| Lec 7 | Amplitude, frequency and phase kying | 2 |
| Lec 8 | Pulse Code Modulation | 2 |
| Lec 9 | Transmission coding. Error recovery – correction codes and automatic retransmission request | 2 |
| | Total hours | 18 |

| **Form of classes - class** | | Number of hours |
| :-- | :-- | :--: |
| Cl 1 | Fourier transform and Fourier series. Orthogonality - orthogonal signals sets | 2 |
| Cl 2 | Fourier transform of periodic and non-periodic signals. Fourier series – amplitude, trigonometric and exponential forms. | 2 |
| Cl 3 | Calculation of coefficients of Fourier series in amplitude, trigonometric and exponential forms. | 2 |
| Cl 4 | Fourier series properties – linearity, time delay, scale change and real signal frequency translation. | 2 |

| Cl 5 | Fourier series properties – integration, differentiation, multiplication, conjugation and duality. | 2 |
|---|---|---|
| Cl 6 | Rayleigh energy theorem. The inverse proportionality of the time and frequency - the interchangeability of the product of bandwidth and time. | 2 |
| Cl 7 | The Dirac delta function - sampling function and unit step function. | 2 |
| Cl 8 | Applications of sampling function and unit step function. Transmission of signals through linear systems. | 2 |
| Cl 9 | Fast Fourier Transform – algorithms. | 2 |
| | Total hours | 18 |

| **TEACHING TOOLS USED** |
|---|
| N1. Traditional lecture. Multimedia presentations. |
| N2. Student's own works – solving calculation tasks. |
| N3. N4. Student's own works – literature studies. |
| N5. Collective works during classes. |
| N5. Student's own works – oral presentations. |

| **EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT** | | |
|---|---|---|
| **Evaluation** (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
| F1 (lecture) | K1INF_W11 K1INF_W16 K1INF_U05 K1INF_U15 K1INF_U16 K1INF_K01 K1INF_K03 | Observation of student's activity. Solving exercises. Preparation and presentation delivery. |
| F1 – F9 (class) | K1INF_W11 K1INF_W16 K1INF_U05 K1INF_U15 K1INF_U16 K1INF_K03 | Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and evaluation of student independence. Analysis of reports of exercise. |
| P (lecture) | K1INF_W11 K1INF_W16 K1INF_U05 K1INF_U15 K1INF_U16 K1INF_K01 K1INF_K03 | Examination taking into account results of forming evaluation F1 (lecture) |
| P (class) | K1INF_W11 K1INF_W16 K1INF_U05 | Weighted sum of forming evaluations F1 – F9 (classes). |

| | K1INF_U15 | |
|---|---|---|
| | K1INF_U16 | |
| | K1INF_K03 | |

| **PRIMARY AND SECONDARY LITERATURE** |
|---|

PRIMARY LITERATURE:

[1]  G. Pujolle, D. Seret, D. Dromard, E. Horlait, „Integrated Digital Communication Networks", J. Wiley & Sons

[2]  S. Haykin, „Communication systems", J. Wiley & Sons

[3]  M. Roden, „Analog and digital communication systems", Prentice Hall

[4]  J. Seidler, „Nauka o informacji", WNT, Warszawa 1983.

[5]  J. Nowakowski, W. Sobczak, „Teoria informacji", WNT, Warszawa 1971.

[6]  W. Sobczak (red.), „Problemy teleinformatyki", WKŁ, Warszawa 1984.

[7]  S. Haykin, „Systemy telekomunikacyjne", WKŁ, Warszawa 2001,

[8]  A. Jajszczyk, „Podstawy telekomunikacji", WKŁ, Warszawa 2001.

[9]  B.P. Lathi, „Systemy telekomunikacyjne", WNT, Warszawa 1972

[10]  J. Izydorczyk, G. Płonka, G. Tyma, „Teoria sygnałów", Helion 1991.

SECONDARY LITERATURE:

[1]  MIT open cources:http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/

[2]  http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

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

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

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Basics of information and communication technologies**

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Program content*** | Teaching tool number*** |
|---|---|---|---|---|
| **PEK_W01 (knowledge)** | K1INF_W11 | C1, C2, C3 | Lec 1 – Lec 9 | N1, N2, N3 |
| **PEK_W02** | K1INF_W16 | C1, C2, C3 | Lec 1 – Lec 9 | N1, N2, N3 |
| **PEK_U01 (skills)** | K1INF_U05 | C2, C3 | Lec 1 – Lec 9 Cl 1 – Cl 9 | N1, N2, N4 |
| **PEK_U02** | K1INF_U15 | C2, C3 | Lec 1 – Lec 9 Cl 1 – Cl 9 | N1, N2, N4, N5 |
| **PEK_U03** | K1INF_U16 | C2, C3 | Lec 1 – Lec 9 Cl 1 – Cl 9 | N1, N2, N3, N4 |
| **PEK_K01 (competences** | K1INF_K01 | C1, C2, C3 | Cl 1 – Cl 9 | N4, N5 |

| | | | | |
|---|---|---|---|---|
| **)** | | | | |
| **PEK_K02** | K1INF_K03 | C1, C2, C3 | Lec 1 – Lec 9 Cl 1 – Cl 9 | N1, N2, N3, N4 |

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

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

**Name in Polish** Praca dyplomowa
**Name in English** Diploma Thesis
**Main field of study (if applicable): Informatics**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd* level, full-time / part-time***
**Kind of subject: obligatory / optional / university-wide***
**Subject code INZ005221D**
**Group of courses YES / NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | | | | 18 | |
| Number of hours of total student workload (CNPS) | | | | 390 | |
| 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 | | | | 13 | |
| including number of ECTS points for practical (P) classes | | | | 13 | |
| including number of ECTS points for direct teacher-student contact (BK) classes | | | | 5.3 | |

*delete as applicable

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**
1. Knowledge, skills and competences acquired at Informatics field of study until 7th semester
\

**SUBJECT OBJECTIVES**
C1 Preparation of engineering thesis according the internal requirements of Faculty of Computer Science and Management, Wrocław University of Technology

## SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01

relating to skills:

PEK_U01 He is able to acquire information from literature, databases and other sources for the purpose of preparation of engineering thesis, can integrate the information obtained, interprets them, and also draw conclusions and formulate and justify opinions.

PEK_U02 He is able to work and communicate using different information and communication techniques in order to present the results of his work.

PEK_U03 He is able to prepare and present a report about results of his work.

relating to social competences:

PEK_K01 Understands the need and knows the possibilities of lifelong learning and improving his professional and social competences

PEK_K02 Is aware of the importance and understanding of non-technical aspects and impacts of solving IT engineering problems

PEK_K03 He is able to work individually and cooperate with others on the preparation of diploma thesis

PEK_K04 He is able to determine the appropriate choice of topics to be presented within a specified scope of diploma thesis

## PROGRAMME CONTENT

| Form of classes - lecture | Number of hours |
|---|---|
| Lec 1 | |
| Lec 2 | |
| …. | |
| Total hours | |

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

| Form of classes - laboratory | Number of hours |
|---|---|
| Lab 1 | |
| Lab 2 | |
| … | |
| Total hours | |

| Form of classes - project | Number of hours |
|---|---|
| Proj 1 | Subject is the main component of the process of realization the engineering dissertation and involves the preparation by the student of engineering thesis. Engineering dissertation is done under the direction of promoter, with whom student defines its scope, goals, tasks and timetable for implementation. | 30 |

| | Total hours | 30 |
|---|---|---|
| **Form of classes - seminar** | | **Number of hours** |
| Sem 1 | | |
| Sem 2 | | |
| … | | |
| | Total hours | |

| **TEACHING TOOLS USED** |
|---|

N1. Preparation of diploma thesis

N2. The text of the diploma thesis

N3. Thesis review prepared by the supervisor

N4. Students consultation with supervisor

**EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT**

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| P | PEK_U01, PEK_U02, PEK_U03, PEK_K01, PEK_K02, PEK_K03, PEK_K04 | The student chooses a subject of thesis and thesis supervisor in accordance to local regulations. The supervisor is responsible for continuous monitoring of the progress of thesis realization. Assessed is the final text of the diploma thesis. The assessment is carried out in the form of a review done by the promoter. The condition to pass the course is delivering the final text of diploma thesis before the defined deadline. The second review, which does not, however the condition for pass the course is done by the reviewer appointed be the Faculty Dean. Reviews are made according to the standard format. The student is admitted to the defense (final exam) if both reviews are positive |

| **PRIMARY AND SECONDARY LITERATURE** |
|---|

**PRIMARY LITERATURE:**

[25] Literature related to the scope of realized thesis selected by student and recommended by supervisor.

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

**SECONDARY LITERATURE:**

| SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS) |
|---|
| Dr hab. inż. Leszek Borzemski, leszek.borzemski@pwr.wroc.pl |

# MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Diploma Thesis**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY  **Informatics**
AND SPECIALIZATION ……………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | | | | |
| PEK_U01 (skills) | K1INF_U11 | C1 | Proj1 | N1, N2, N3, N4 |
| PEK_U02 | K1INF_U12 | C1 | Proj1 | N1, N2, N3, N4 |
| PEK_U03 | K1INF_U13 | C1 | Proj1 | N1, N2, N3, N4 |
| PEK_K01 (competences) | K1INF_K01 | C1 | Proj1 | N1, N2, N3, N4 |
| PEK_K02 | K1INF_K02 | C1 | Proj1 | N1, N2, N3, N4 |
| PEK_K03 | K1INF_K03 | C1 | Proj1 | N1, N2, N3, N4 |
| PEK_K04 | K1INF_K04, K1INF_K05 | C1 | Proj1 | N1, N2, N3, N4 |

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

Zał. nr 4 do ZW 64/2012

FACULTY ……… / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish Problemy społeczne i zawodowe informatyki**
**Name in English Social and Professional Problems of Computer Science**
**Main field of study (if applicable):   Computer Science**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code INZ001667**
**Group of courses YES / NO\***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | | | | |
| Number of hours of total student workload (CNPS) | 60 | | | | |
| Form of crediting | Examination / crediting with | Examination / crediting with | Examination / crediting with | Examination / crediting with | Examination / crediting with |

| | grade* | grade* | grade* | grade* | grade* |
|---|---|---|---|---|---|
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | | | | |
| including number of ECTS points for practical (P) classes | 0 | | | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0.8 | | | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Competence from the scope of using computer, computer network and software.
2. Knowledge from the scope of bases of designing and manufacturing the software.
3. Skills in collecting and analysis of the information.

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**SUBJECT OBJECTIVES**

C1 Educating the abilities of understanding problems associated with the profession of the computer specialist. Acquiring the knowledge of solving problems related to Computer Science profession.

C2 Educating the abilities of Acquiring competence in the scope of the assessment of the copyright connected with the about computer science profession.

C3 Educating the ability of the evaluation of the copyright of technical structures associated with components and the building blocks associated with the process of coming into existence and works about computer character or associated with the computer science.

C4 Acquiring the knowledge of both the ability in collecting and analysis of documents about standard character and practical competence in the extent of protection of the industrial property.

C5 Providing practical abilities in methods of the assessment of the effects of the break of the law and violating ethics in the profession of the computer specialist.

C6 Acquiring the knowledge in the scope of computer ethics.

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

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

PEK_W01 Student has an acquaintance of the problems associated with the practising a profession of the computer specialist, is conscious of problems associated with the copyright and the protection law of the industrial property.

PEK_W02 Student has competence in analysis of patent specifications and preparing documentation associated with the registration of the invention.

PEK_W03 Student has an acquaintance knowledge in the copyright and applying it with reference to works about computer character.

PEK_W04 Student has a knowledge in the scope of the assessment of the connected occupational hazard from completion of undertakings about computer character.

PEK_W05 Student knows principles of protection of works about computer character individual and team.

PEK_W06 Student has an acquaintance of processes of the transfer operation of the property of works about computer character.

PEK_W07 Student is possessing the acquaintance of codes of ethics and a skill of applying them in

practice.

relating to skills:

PEK_U01 Student is possessing skills of the evaluation of a situation and risks in the working life of the computer specialist.

PEK_U02 Student is possessing skills of noticing and appreciating the social context of the computer science.

PEK_U03 Student is possessing a skill of analysis of patent documentation and the registration of the invention and the work about computer character.

PEK_U04 Student is able to assess issues of law associated with the source materials associated with the completion of a project about computer character and associated with the computer science.

PEK_U05 Student is able to apply principles arising from the copyright in practice.

relating to social competences:

PEK_K01 Student has competence in the practising a profession ethical, in accordance with the law in force of the computer specialist.

PEK_K02 Student is able to notice public aspects of the completion of computer undertakings.

PEK_K03 He is possessing a skill of the independent and creative thinking with the respect for the law and of professional ethics.

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - lecture** | | Number of |
| Lec 1 | The specificity of the environment of the professional computer scientist. The ethics and the social meaning of the computer scientist occupation (l.c.). Ethical codes and codes of practice. | 1 |
| Lec 2 | The formation, the projection, the production and the exploitation of the software and hardware products in the social context (l.c.). The interaction and the correlation of ethics and laws. | 1 |
| Lec 3 | The intellectual property, definitions, legal settlements, examples (l.c.). | 1 |
| Lec 4 | The object and the person of author's law (l.c.). Computer programmes and databases. | 1 |
| Lec 5 | The authorship of the composition, dependent rights. Personal rights and property - in the context of compositions about the computer science character. | 2 |
| Lec 6 | The spread of compositions. The protection of compositions about the computer science character and related compositions (l.c.). The protection of the privacy. | 1 |
| Lec 7 | The delivery and the sale of copyrights to compositions about the computer science character. The exercise of compositions in frames of the relation of the work inframes of the activity didactic and scientific (l.c.). Licensing. Passing of copyrights as result of the succession. | 1 |
| Lec 8 | The criminal responsibility for the violation of copyrights. The computer crimes. Computer forensic (l.c.). | 1 |
| Lec 9 | The industrial right properties. | 1 |
| Lec 10 | Useful examples. Trademarks. Patents (l.c.). Notifying and the protection. | 1 |
| Lec 11 | The industrial rights protection in Poland and regulations of the European Union. The intellectual property in the context of the inquiry society. | 2 |
| Lec 12 | Examples of the use of the copyrights. | 1 |

| | | |
|---|---|---|
| Lec 13 | The copyright and teamworks. The reliability of the software and hardware products (l.c.). The responsibility for defects. | 1 |
| Lec 14 | The risk in-service of the computer scientist. The valuation of the risk. The minimization of the risk (l.c.). | 1 |
| Lec 15 | Final test. | 1 |
| | Total hours | 30 |

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

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

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

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

| TEACHING TOOLS USED |
|---|
| N1. Lecture with using the multimedia slide projector. N2. Consultation. |

N3. Own work of the student.
N4. Electronic using educational platforms.

## EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| **Evaluation** (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| F1 | PEK_U01÷PEK_U05 PEK_K01÷PEK_K03 | an oral answers, written short tests |
| F2 | PEK_W01÷PEK_W06 PEK_U01÷PEK_U05 PEK_K01÷PEK_K03 | final test |
| C=F1+F2 | | |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[1] Cohen J. E.: Copyright in a global information economy. Aspen Publishers 2010.
[2] Okediji C. L. & Orourke: Copyright Law. Aspen Publishers 2010.
[3] Thies Ch.: Computer Law and Ethics. Mercury Learning & Information 2013.

**SECONDARY LITERATURE:**

[1] McJohn S. M.: Examples & Explanantions: Copyright. Aspen Publishers 2012.

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

**Arkadiusz Liber, PhD**

**Arkadiusz . Liber / at / pwr . wroc . pl**

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

…………………………

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ………………………..

AND SPECIALIZATION ……………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives *** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01, PEK_W02 | K1INF_W19, K1INF_K03 | C1, C2,C6 | Lec1,Lec2,Lec3,Lec4 | N1,N2,N3,N4 |
| PEK_W03, PEK_W04 | K1INF_K03, K1INF_K05 | C1,C2 | Lec5,Lec6,Lec7, Lec8,Lec9 | N1,N2 |
| PEK_W05, PEK_W06, PEK_W07 | K1INF_W19, K1INF_K03, K1INF_K05 | C1,C3,C4,C5 | Lec10,Lec11,Lec12,Lec13,Lec14,Lec15 | N1,N2,N3,N4 |
| PEK_U01, PEK_U02 | K1INF_K01, K1INF_K01 | C1,C6 | Lec1,Lec2,Lec3, ,Lec5,Lec6,Lec7, Lec8,Lec9,Lec10,Lec11,Lec12,Lec13,Lec14 | N1,N2,N3 |
| PEK_U03, PEK_U04 | K1INF_K03 | C1,C3,C4,C5 | Lec1,Lec4, ,Lec5,Lec6,Lec7, Lec8,Lec9,Lec10,Lec11,Lec12,Lec13,Lec14 | N1,N2,N3,N4 |
| PEK_U05 | K1INF_W19, K1INF_K03, K1INF_K05 | C1,C3,C4,C5 | Lec1,Lec2,Lec3,Lec4,Lec7, Lec8,Lec9Lec10,Lec11,Lec12,Lec13,Lec14 | N1,N2,N3,N4 |
| PEK_K01 | K1INF_W19, K1INF_K03, K1INF_K05 | | Lec1,Lec4,Lec7, Lec8,Lec9Lec10,Lec11,Lec12,Lec13,Lec14 | N1,N2,N3,N4 |
| PEK_K02, PEK_K02 | K1INF_K03 | C1,C2,C6 | Lec1,Lec4,Lec7, Lec8,Lec9Lec10,Lec11,Lec12,Lec13,Lec14 | N1,N2,N3,N4 |
| PEK_W01, PEK_W02 | K1INF_W19, K1INF_K03 | C1, C2,C6 | Lec1,Lec2,Lec3,Lec4 | N1,N2,N3,N4 |
| PEK_W03, PEK_W04 | K1INF_K03, K1INF_K05 | C1,C2 | Lec5,Lec6,Lec7, Lec8,Lec9 | N1,N2 |
| PEK_W05, PEK_W06, PEK_W07 | K1INF_W19, K1INF_K03, K1INF_K05 | C1,C3,C4,C5 | Lec10,Lec11,Lec12,Lec13,Lec14 | N1,N2,N3,N4 |

| PEK_U01, PEK_U02 | K1INF_K01, K1INF_K01 | C1,C6,C7 | Wy1,Wy2,Wy3, ,Wy5,Wy6,Wy7, Wy8,Wy9,Wy10,Wy11,Wy12,Wy13,Wy14,Wy15 | N1,N2,N3 |
|---|---|---|---|---|

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

\*\*\* - from table above

FACULTY …W-8… / DEPARTMENT………………

## SUBJECT CARD

**Name in Polish  Procesowe Zarzadzanie Projektem Informacyjnym - DIP**
**Name in English  Project Management Information Process - DIP**
**Main field of study (if applicable): …Informatics…….**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code INZ 007635**
**Group of courses YES / NO\***

|  | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 15 |  | 30 |  |  |
| Number of hours of total student workload (CNPS) | 30 |  | 60 |  |  |
| Form of crediting | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* | Examination / crediting with grade\* |
| For group of courses mark (X) final course |  |  |  |  |  |
| Number of ECTS points | 1 |  | 2 |  |  |
| including number of ECTS points for practical (P) classes | 0 |  | 2 |  |  |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,4 |  | 0,8 |  |  |

\*delete as applicable

## PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1.
2.
3.
\

## SUBJECT OBJECTIVES

C1 Knowledge of the roles and responsibilities of key members of the project. .

| C2 Knowledge of the principles and the extent of creating a basic project management document |
| :--- |
| C3 Knowledge of selected tools and methods used in project management |

## SUBJECT EDUCATIONAL EFFECTS

With a range of knowledge:

PEK_W01 - generally assigns roles and responsibilities of key members of project and their required competencies

PEK_W02 - lists the rules for the preparation of documents project initiating t

K1INF_W18 has a basic knowledge of management , including the product IT quality management and business ; familiar with the general rules for the creation and development of individual entrepreneurship using knowledge specific to informatics

K1INF_W07 knows the basic models of the software life cycle , carried out in the framework of processes and methodologies used , notations and tools supporting

PEK_W03 - lists the project life cycle models and their phase

PEK_W04 - indicates the principles and criteria for the selection methodology , depending on the nature of the project

With a range of skills :

PEK_U01 - can be used to formulate projects known methods of planning , scheduling , defining objectives, roles and responsibilities

PEK_U02 - can monitor the progress of the project and manage change

K1INF_U10 able to plan and implement a process for producing a simple system, a rough estimate of its cost and select the appropriate components of the system and / or technologies ; develop and implement a work schedule , and estimate the time needed for the commissioned task

With a range of social competence :

PEK_K01 - is aware of the importance and understand the non-technical aspects and consequences of driving businessman and the associated responsibility for decisions

K1INF_K02 is aware of the importance and understanding of non-technical aspects and impacts of engineering - science , including its impact on the environment, and the related responsibility for decisions

PEK_K02 - Able to work together as a team

K1INF_K03 Able to interact and work in a group, taking different roles

Can K1INF_K04 adequately define priorities for implementation specified by you or other tasks

PEK_K03 - can define project stakeholders and their impact on project

## PROGRAMME CONTENT

| Form of classes - lecture | Number of |
| :--- | :--- |
| Lec 1    Introduction to the Project Manager (PM)areas of competence expected from the recommended by the International Project Management Association (IPMA) - IPMAStudent | 2 |
| Lec 2    Process project management phases and steps of creating documented in | 1 |

| | management in the Cycle Life Project (CLP) | |
|---|---|---|
| Lec 3 | Project Brief | 2 |
| Lec 4 | Project Initiation Documentation | 3 |
| Lec 5 | Behavioral competence PM | 2 |
| Lec 6 | Project Team – processes | 1 |
| Lec 7 | Project management metodology  PMI-PMBok, Prince2,  Scrum, TenStep Project – similarities and differences, what it means to adapt the methodology to the project | 1 |
| Lec 8 | Wirtual Project - teleworking | 2 |
| Lec 9 | Written test | 1 |
| | | |
| | Total hours | **15** |

| Form of classes - class | Number of hours |
|---|---|
| CI 1 | |
| .. | |
| Total hours | |

| Form of classes - laboratory | Number of hours |
|---|---|
| Lab 1 | Introdukctions, credit rules, BHP | 2 |
| Lab 2 | Case study – work in team | 4 |
| Lab 3 | Order and prepare Project Brief | 4 |
| Lab 4 | Intervieve gols, scope and business justification | 4 |
| Lab 5 | Prepare comunication plan and impact matrix | 2 |
| Lab 6 | Risk analysis – point methods | 2 |
| Lab 7 | Estimation of workload, allocation of resources based on WBS and schedule | 4 |
| Lab 8 | The projects eligibility for implementation - a review of the Public Procurement and approving implementation of the project | 4 |
| Lab 9 | The review document management and final evaluation | 4 |
| | Total hours | 30 |

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

| Form of classes - seminar | Number of hours |
|---|---|
| Sem 1 | |

| Sem 2 | | |
|---|---|---|
| Sem 3 | | |
| … | | |
| | Total hours | |

**TEACHING TOOLS USED**

N1. Multimedia presentation
N2. Case Study
N3. Tools to make the document management project (eg text editors, spreadsheets, tools for modeling processes)
N3. Grey A0 paper, pens, adhesive tape

**EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT**

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement: Colloquium open questions and test and task + criteria. > 50% of the maximum number of points ◊ 3.0, from 60% to 65% Rating 3.5,> 65% to 70% rating 4.0,> 70% to 80% was 4.5, > 80% 5 Rating |
|---|---|---|
| F01 | PEK_U01 | Step 1 Lab-4 - rating |
| F02 | PEK_K03 | Step 2 Lab-6 –rating |
| F03 | PEK_K01 | Step 3 Lab-9 -rating |
| P02 | | The arithmetic average F01, F02, F03 |

**PRIMARY AND SECONDARY LITERATURE**

**PRIMARY LITERATURE:**

[27]  Cadle J., Yeates D., Zarządzanie procesem tworzenia systemów informacyjnych, WNT 2004
[28]  PMBok-Project Management Body of Knowlage, wyd.5 PMI. 2013 r ,
[29]  Prince2 – Skuteczne Zarzadzanie Projektami, wyd.2010, OGC
[30]  Frączkowski K., Zarządzanie projektem informatycznym, Wydawnictwo Oficyna PWr 2002

**SECONDARY LITERATURE:**

[23]  [Gryfin Ricky W. Podstawy zarządzania organizacjami. Wydawnictwo Naukowe PWN, 2005
[24]  Marcin W. Staniewski., Zarządzanie zasobami ludzkimi, a zarządzanie wiedzą w przedsiębiorstwie, Wyd. Vizja Pr
[25]  Opolski Krzysztof., Biznes plan. Jak go budować i analizować ? Wyd. CeDeWu, 2006
[26]  Frączkowski K ., Modele zarządzania zasobami projektu informatycznego i organizacji zespołów – telepraca. http informatyka.pl/wiki/Modele_zarz%C4%85dzania_zasobami_projektu_informatycznego_i_organizacja_zespo%C _telepraca
[27]  Frączkowski K., Model mapowania aktywności i kompetencji w projektach IKT. w. XXI Autumn Meeting of Polish Society ISBN 83-922646-0-6 Conference Proceedings, pp.59-71 © 2005 PIPS oraz : http://www.proceedings200
[28]  www.pmresearch.pl
[29]  http://ipma-student.pl/mod/book/view.php?id=44

**Dr inż. Kazimierz Frączkowski, mail: Kazimierz.fraczkowski@pwr.edu.pl**

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ...........................
AND SPECIALIZATION .................................

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 | K1INF_W18 | C1 | Wy1, Wy3, Wy5, Wy7 | N1, N2,N3 |
| PEK_W02 | K1INF_W18, K1NF_U10 | C2 | Wy4, | N1,N2, N3 |
| PEK_W03 | K1INF_W07 | C2 | Wy2, Wy6 | N1 |
| PEK_W04 | K1INF_W07 | C3 | Wy8 | N1 |
| PEK_U01 | K1INF_W07 | C1 | W2 | N1 |
|  |  |  |  |  |

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

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT....................
**SUBJECT CARD**
**Name in Polish** *Programowanie urządzeń mobilnych w C#*
**Name in English** *Programming of mobile devices in C#*
**Main field of study (if applicable):** *Computer Science*
**Specialization (if applicable):** ...........................
**Level and form of studies:** 1st~~/ 2nd* level, full-time /~~ part-time*
**Kind of subject:** ~~obligatory /~~ optional ~~/ university-wide*~~
**Subject code INZ007641**
**Group of courses** ~~YES /~~ NO*

|  | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 9 |  | 18 |  |  |
| Number of hours of total student workload (CNPS) | 30 |  | 60 |  |  |
| Form of crediting | Examination / ~~crediting with grade*~~ | Examination / crediting with grade* | ~~Examination /~~ crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course |  |  |  |  |  |
| Number of ECTS points | 1 |  | 2 |  |  |
| including number of | 0 |  | 2 |  |  |

| | | | | | |
|---|---|---|---|---|---|
| ECTS points for practical (P) classes | | | | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,4 | | 0,8 | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. A student knows java or c# language.

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**SUBJECT OBJECTIVES**

C1 To gain skills in software implementation for mobile devices using C # and the mechanisms available at .NET platform

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

PEK_W01 A student calls and describes the behavior of basic components used in the implementation of mobile applications for . NET platform.

PEK_W02 A student lists and describes .NET mechanisms, addressing the problems of security, data persistency, localization, network communication

relating to skills:

PEK_U01 A student implements a simple applications for mobile devices, including requiring data persistency

PEK_U02 A student applies appropriate security techniques for mobile applications

PEK_U03 A student obtains information from various sources on how to create mobile applications and solve problems in this area

PEK_U04 A student communicates with a teacher using available hardware and software infrastructure.

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| **Form of classes – lecture** | | **Number of hours** |
|---|---|---|
| Lec 1 | Introduction. Basic controls. Construction of the page. Navigation between pages. | 2 |
| Lec 2 | Data binding. Support for gestures. Transformations and animations. | 2 |
| Lec 3 | MVVM pattern. Selected advanced controls. Media. | 2 |
| Lec 4 | Internationalization. Storing application state. Communication with sensors. | 2 |
| Lec 5 | Client-server applications. Application security. | 1 |
| | Total hours | 9 |

| **Form of classes – laboratory** | | **Number of hours** |
|---|---|---|
| La1 | Introduction. Course description, course organization. First program. | 2 |
| La2 | Basic controls. (ex. 1) | 2 |
| La3 | Data binding.  (ex. 2) | 2 |
| La4 | Gestures. Transformations and animations (ex. 3) | 2 |

| La5 | MVVM pattern (ex. 4) | 2 |
|---|---|---|
| La6 | User controls. Media. (ex. 5) | 2 |
| La7 | Internationalization. Data storage. (ex. 6) | 2 |
| La8 | Communication with sensors (ex. 7) | 2 |
| La9 | Client-server applications. Security. (ex. 8) | 2 |
| | Total hours | 18 |

| **TEACHING TOOLS USED** |
|---|
| N1. Informative lecture with elements of problem lecture, supported by multimedia presentations<br>N2. Software for implementation of mobile applications.<br>N3. E-learning system used for the publication of teaching materials, collection and assessment of students 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 – ex. 1 | PEK_U01<br>PEK_U04 | Assessment of ex. 1. Scale 0..1 or traditional. |
| F2 – ex. 2 | PEK_U01<br>PEK_U04 | Assessment of ex. 2. Scale 0..1 or traditional. |
| F3 – ex. 3 | PEK_U01<br>PEK_U04 | Assessment of ex. 3. Scale 0..1 or traditional. |
| F4 – ex. 4 | PEK_U01<br>PEK_U04 | Assessment of ex. 4. Scale 0..1 or traditional. |
| F5 – ex. 5 | PEK_U01, PEK_U03<br>PEK_U04 | Assessment of ex. 5. Scale 0..1 or traditional. |
| F6 – ex. 6 | PEK_U01<br>PEK_U04 | Assessment of ex. 6. Scale 0..1 or traditional. |
| F7 – ex. 7 | PEK_U01, PEK_U03,<br>PEK_U04 | Assessment of ex. 7. Scale 0..1 or traditional. |
| F8 – ex. 8 | PEK_U01<br>PEK_U04 | Assessment of ex. 8. Scale 0..1 or traditional. |
| F9 – ex. 9 | PEK_U01<br>PEK_U04 | Assessment of ex. 9. Scale 0..1 or traditional. |
| P2 – final grade (lecture) | PEK_W01, PEK_W02 | Examination – written test containing open and closed questions. A student will pass the exam if he/she receives at least 50% of points. Next, the grade is increased every 10% |
| P1 – final grade (laboratory) | PEK_U01,…,PEK_U04 | Final grade calculated as an average of F1..F9 (traditional scale) or according to the formula (scale 0..1):<br>< 4   →   2.0<br>4 p.   →   3.0<br>5 p.   →   3.5 |

| | | 6 p. → 4.0 |
| | | 7 p. → 4.5 |
| | | 8 p. → 5.0 |
| | | > 8 p. → 5.5 (additional tasks) |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[31]    Henry Lee, Eugene Chuvyrov, Windows Phone 7. Tworzenie efektownych aplikacji, Helion 2011

[32]    Boryana Miloshevska, Windows Phone Toolkit in Depth, II edition, www.winsoqaphonegeek.com, free e-book

[33]    Pete Brown, Silverlight 4 w działaniu: Silverlight 4, MVVM i usługi WCF RIA Services. Warszawa: APN 2011

**SECONDARY LITERATURE:**

[30]    Materiały przygotowane przez prowadzącego kurs.

[31]    Rob S. Miles, Microsoft XNA Game Studio 4.0: projektuj i buduj gry dla konsoli Xbox 360, urządzeń z systemem Windows Phone 7 i własnego PC, Helion 2012

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

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

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
***Programming of mobile devices in C#***
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION …………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| **PEK_W01** | K1INF_W05 | C1 | Lec1, Lec2, Lec3 | N1 |
| **PEK_W02** | K1INF_W06 | C1 | Lec4, Lec5, Lec6, Lec7, Lec8 | N1 |
| **PEK_U01** | K1INF_U04 | C1 | La1, …, La14 | N2, N3 |
| **PEK_U02** | K1INF_U09 | C1 | La15 | N2, N3 |
| **PEK_U03** | K1INF_U11 | C1 | La7, La12 | N2, N3 |
| **PEK_U04** | K1INF_U12 | C1 | La1, …, La15 | N2, N3 |

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

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FACULTY  W-8 / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish Programowanie w systemie Linux……………………….**
**Name in English Programming in Linux………………………………………………….**
**Main field of study (if applicable): Informatics………………………….**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st level, part-time**
**Kind of subject: optional**
**Subject code INZ007643**
**Group of courses YES**

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 9 | | 18 | | |
| 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 | | | | | |
| Number of ECTS points | 1 | | 2 | | |
| including number of ECTS points for practical (P) classes | | | 2 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,4 | | 0,8 | | |

*delete as applicable

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| PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES |
|---|
| 1. General knowledge of programming |
| 2. General knowledge of operating systems |

\

| SUBJECT OBJECTIVES |
|---|
| C1 Students understand the programming problems in Linux |
| C2 Students acquire practical skills for system programming in Linux operating system |

| SUBJECT EDUCATIONAL EFFECTS |
|---|
| relating to knowledge: |
| PEK_W01 Students know basic programming rules in Linux operating system |
| PEK_W02 Students know commands  used to operate in operating system |
| PEK_W03 Students have knowledge of structure and working of operating systems |
| PEK_W04 Students know the basic system functions of operating system, which enable creating system software in C language |
| … |
| relating to skills: |
| PEK_U01 Students have the skills of self-learning |
| PEK_U02 Students are able to gain information from various sources |
| PEK_U03 Students are able to define problems and then find solution |
| PEK_U04 Students are able to work individually and in the team |
| … |
| relating to social competences: |
|  |
| PEK_K01 Students understand the need of continous education |

### PROGRAMME CONTENT

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | General structure of Linux operating system | 1 |
| Lec 2 | File system organisation | 1 |
| Lec 3 | Processes in Linux, command operating on processes | 1 |
| Lec 4 | Selected system commands | 2 |
| Lec 5 | Programming in Bash command interpreter | 2 |
| Lec 6 | Kernel of Linux operating system | 1 |
| Lec 7 | Selected system functions | 1 |
| | Total hours | 9 |

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

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab1 | Introduction to work in operating system Linux | 2 |
| Lab2 | Working user environment | 2 |

| Lab3 | Operation on files and directories | 2 |
|------|-----------------------------------|---|
| Lab4 | Bash command interpreter, preparing and running scripts | 2 |
| Lab5 | Signals in Linux operating system | 2 |
| Lab6 | Using system functions | 2 |
| Lab7 | Text data processing (grep, awk) | 2 |
| Lab8 | Detailed characteristic of file, use i-node structure | 2 |
| Lab_9 | Processes in operations system, processes communications | 2 |
| | Total hours | 18 |

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

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

| TEACHING TOOLS USED |
|---|
| N1. Lecture – traditional method<br>N2. Consultations<br>N3. Practical exercises at computer laboratory |

**EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT**

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| F1 Laboratory | PEK_W01-03<br>PEK_U01-03 | Presentation of programming work, oral explanation |
| P Lecture | PEK_W01-03 | Final test |
| | | |

| PRIMARY AND SECONDARY LITERATURE |
|---|

**PRIMARY LITERATURE:**

[1]  Beginning Linux Programming, Matthew N.,1999, Wrox Press Ltd.
[2]  Linux Programming by Example, Wall K., 2000, Que Corporation
[3]  Advanced Unix Programming, Rockind J., 2004, Pearson Education Inc.
[4]

**SECONDARY LITERATURE:**

[1]  Unix Network Programming, Stevens M., 1998, Pearson Education
[2]
[3]

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

Dr inż. Sławomir Skowroński   slawomir.skowronski@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**…Informatics…………………………**
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) | K1INF_W04, K1INF_W05 | C1,C2 | Wy1-6 | N1-3 |
| PEK_W02 | K1INF_W05 | C1, C2 | Wy04 | N1-3 |
| PEK_W03… | K1INF_W10 | C1,C2 | Wy01, Wy01 | N1, N2 |
| PEK_W04… | K1INF_W10 | C2 | Wy06 | N1-3 |
| PEK_U01 (skills) | K1INF_U05, K1INF_U06 | C2 | Wy1-7 | N1-2 |
| PEK_U02 | K1INF_U05, K1INF_U11 | C1,C2 | Wy1-7 | N1-3 |
| PEK_U03 | K1INF_U12, K1INF_U14 | C1, C2 | Wy1-7 | N1-3 |
| PEK_U04 | K1INF_U14 | C1, C2 | Wy1-7 | N1-3 |
| PEK_K01 (competences) | K1INF_K01, K1INF_K05 | C1, C2 | Wy1-7 | N1-3 |
| … | | | | |

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

*** - from table above

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FACULTY W-8 / DEPARTMENT………………

**SUBJECT CARD**

**Name in Polish Projektowanie baz danych**
**Name in English Database System Design**
**Main field of study (if applicable): computer science**
**Specialization (if applicable): ….**
**Level and form of studies: 1ˢᵗ level, part-time ***
**Kind of subject: optional**
**Subject code INZ007633**

**Group of courses NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 9 | | 18 | | |
| Number of hours of total student workload (CNPS) | 30 | | 90 | | |
| Form of crediting | crediting with grade* | | crediting with grade* | | |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 1 | | 3 | | |

| including number of ECTS points for practical (P) classes | 0 | | 3 | | |
|---|---|---|---|---|---|
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,4 | | 1,2 | | |

*delete as applicable

## PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
1. Completed the „Databases" course.

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## SUBJECT OBJECTIVES
C1 Introduce the methods of  databases design and implementation to students
C2 Gather knowledge of available databases design and implementation tools
C3 Applying the acquired knowledge during the design of relational and object databases

## SUBJECT EDUCATIONAL EFFECTS
relating to knowledge:
PEK_W01 Student has a basic knowledge of methods and available tools for databases design
PEK_W02 Student is able to present all phases of databases design

relating to skills:
PEK_U01 Student is able to prepare all phases of databases design
PEK_U02 Student is able to implement a database
PEK_U03 Student is able to choose proper tools for databases design

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

## PROGRAMME CONTENT

| Form of classes - lecture | Number of hours |
|---|---|
| Lec 1 Introduction to database system design methodology, Selected elements of UML | 1 |
| Lec 2 Entity-relationship schemas design | 1 |
| Lec 3 Relational schemas design | 1 |
| Lec 4 Conceptual model of a database | 1 |
| Lec 5 Logical model of a database | 1 |
| Lec 6 Physical model of a database | 1 |
| Lec 7 An overview of available tools for database design | 1 |
| Lec 8 Types and specification methods of integrity constraints | 1 |
| Lec 9 Test | 1 |
| Total hours | **9** |

| Form of classes - class | Number of hours |
|---|---|

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

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

| Form of classes - project | | Number of hours |
|---|---|---|
| Proj 1 | Introduction to database design (Power Designer, Visio) | 1 |
| Proj 2 | Relational model: conceptual model of a database | 1 |
| Proj 3 | Relational model: logical model of database | 1 |
| Proj 4 | Relational model: physical model of database | 1 |
| Proj 5 | Relational model: integrity constraints | 1 |
| Proj 6 | Relational model: interface and report design, constraints | 1 |
| Proj 7 | Object model: class diagrams | 1 |
| Proj 8 | Object model: description of methods | 1 |
| Proj 9 | Implementation of a database schema | 3 |
| Proj 10 | Implementation of integrity constraints | 3 |
| Proj 11 | Implementation of an interface | 3 |
| Proj 12 | Implementation of reports, evaluation of projects | 1 |
| | Total hours | **18** |

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

| TEACHING TOOLS USED |
|---|
| N1. Traditional lecture<br>N2. Labs<br>N3. One-to-one consultancy during stuff hours |

| N4. Student self-study |
|---|

## EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| **Evaluation** (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| P- project | PEK_U01-PEK_U03, PEK_K01-PEK_K02 | Evaluation of the prepared tasks during labs, oral test |
| P- lecture | PEK_W01-PEK_W02<br><br>PEK_K01-PEK_K02 | Test |

| PRIMARY AND SECONDARY LITERATURE |
|---|

**PRIMARY LITERATURE:**

**LITERATURA PODSTAWOWA:**

[34]   Beynon-Davies P., *Systemy baz danych*. WNT, W-wa, 2003
[2]   Connolly T., Begg C., *Systemy baz danych*. RM 2004. T2

[3]   Date C.J., *Wprowadzenie do baz danych*. WNT, W-wa, 2000.

[4]   Szeląg A., *PHP, Microsoft IIS, SQL Server : projektowanie i programowanie baz danych*. Helion 2008
[5]   Ullman J.D., *Systemy baz danych*. WNT, W-wa,  2003.

[6]   Wrembel R., *Oracle : projektowanie rozproszonych baz danych : wiedza niezbędna do projektowania oraz zarządzania bazami danych*. Helion 2003.


**SECONDARY LITERATURE:**

[1]
[2]
[3]

| SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS) |
|---|
| Prof. dr hab. inż  Ngoc Thanh Nguyen, Ngoc-Thanh.Nguyen@pwr.wroc.pl |

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Database System Design**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION ……………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 | K2INF_W22 | C2 | Lec18 Pr1-12 | N1-4 |
| PEK_W02 | K2INF_W22 | C1 | Lec2-6,8 | N1-4 |
| PEK_U01 | K2INF_W22, K1INF_U03, K1INF_U11 | C1, C3 | Lec2-6,8 Pr2-8 | N1-4 |
| PEK_U02 | K2INF_W22, K1INF_U04, K1INF_U11, K1INF_U19 | C1, C3 | Pr9-12 | N1-4 |
| PEK_U03 | K2INF_W22, K1INF_U03, K1INF_U11 | C2, C3 | Lec7 Pr1-12 | N1-4 |
| PEK_K01 | | C1, C2, C3 | Lec1-9 Pr1-12 | N1-4 |
| PEK_K02 | | C1, C2, C3 | Lec1-9 Pr1-12 | N1-4 |

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

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish** *Projektowanie Oprogramowania*
**Name in English** *Software Design*
**Main field of study (if applicable):** *Computer Science*
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| **Subject code INZ003561** <br> **Group of courses** ~~YES /~~ NO* | | | | | |
| Number of hours of organized classes in University (ZZU) | 18 | | 18 | | |
| Number of hours of total student workload (CNPS) | 90 | | 60 | | |
| Form of crediting | Examination / ~~crediting with grade*~~ | Examination / crediting with grade* | ~~Examination /~~ crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | | 3 | | |
| including number of ECTS points for practical (P) classes | 0 | | 3 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 | | 1,2 | | |

*delete as applicable

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### PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. A student knows properties of object-oriented programming paradigm.
2. A student lists and describes basic models of the software life cycle.
3. A student uses a high-level programming language to solve programming problems. He/she is able to implement a graphical user in the selected programming language and tool.

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### SUBJECT OBJECTIVES

C1. Students are familiarized with tasks performed in basic processes of software life-cycle according to ISO/IEC 12207, good design practices (including design patterns) and are prepared for team engineering project (for software projects).
C2. Students are familiarized with development of software design documents, practical usage of UML and supporting tools.

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### SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 A student lists and describes processes of the software life cycle
PEK_W02 A student identifies and describes basic elements of the UML diagrams used for modeling and software specification
PEK_W03 A student lists, and classifies design patterns and selects appropriate to solve a specified problem
PEK_W04 A students points out the tools used for modeling, specification, implementation and testing of software

relating to skills:
PEK_U01A student uses UML for requirements specification and domain modeling
PEK_U02 A student prepares graphical user interface

PEK_U03 A student adapts basic architectural and design patterns to engineering problem
PEK_U04 A student implements selected functional requirements of an application in a high level
       programming language
PEK_U05 A student plans and specifies tests, and performs functional testing

relating to social competences:
PEK_K01 A student is aware of the importance of non-technical aspects of computer science engineer,
       understands need of high quality and availability of information systems, takes into account
       needs of different user groups.

| Form of classes – lecture | | Number of hours |
|---|---|---|
| Lec 1 | Course description, course organization, examination. Definition of basic concepts. Definition of stakeholders' requirements. Techniques of requirements elicitation. Domain model and glossary. | 2 |
| Lec 2 | Process of system requirements analysis. Requirements classification. Process of software requirements analysis. How to write effective use-cases. | 2 |
| Lec 3 | Graphical user interface. GUI design rules. | 2 |
| Lec 4 | Process of system and software architecture design. Architectural perspectives. Architectural patterns. | 2 |
| Lec 5 | Design patterns – application examples, and discussion. | 2 |
| Lec 6 | Design techniques: Test Driven Design, Domain Driven Development. | 2 |
| Lec 7 | Database design. Use-case realizations. Architectural mechanisms. | 2 |
| Lec 8 | Process of detailed design.  Software construction process. Software testing. Testing levels and testing techniques. | 2 |
| Lec 9 | Integration processes. Process of qualifying testing and system delivery. Repetition. Exam preparation. | 2 |
| | Total hours | 18 |

| Form of classes – laboratory | | Number of hours |
|---|---|---|
| La1 | Introduction. Course description, course organization. | 2 |
| La2 | System vision. Glossary. Domain model. | 2 |
| La3 | Specification of functional and non-functional requirements. Use-case model. Use-case specifications. | 2 |
| La4 | User interface prototype. | 2 |
| La5 | Software logical architecture. Conceptual data model. | 2 |
| La6 | Use-case realizations. | 2 |
| La7 | Implementation of user interface according to the prototype. | 2 |
| La8 | Implementation of business logic and data access layer. Unit tests. | 2 |
| La9 | Course assessment. Students assessment. | 2 |
| | Total hours | 18 |

## TEACHING TOOLS USED

N1. Informative lecture with elements of problem lecture, supported by multimedia presentations
N2. Examples of project documentation, prepared in accordance with shared document templates.
N3. Software for modeling, implementation and testing of software.
N4. E-learning system used for the publication of teaching materials, collection and assessment of students 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 – system conception | PEK_U01 | Evaluation of internal and external consistency, completeness of prepared documents (1-st part: system vision, domain model, glossary)<br>14% of final grade |
| F2 – requirement specification | PEK_U01. PEK_U02, PEK_K01 | Evaluation of internal consistency and external consistency, completeness of prepared documents (2-nd part: requirement specification, user interface prototype)<br>22% of final grade |
| F3 – architectural design | PEK_U01, PEK_U03 | Evaluation of internal consistency and external consistency, completeness of prepared documents (3-nd part: software architecture, use-case realizations)<br>32% of final grade |
| F4 – implementation and tests | PEK_U04, PEK_U05 | Evaluation of internal consistency and external consistency, completeness of prepared documents (4-rd part: source code, tests cases)<br>32% of final grade |
| P1 – final grade (lecture) | PEK_W01, PEK_W02, PEK_W03, PEK_W04 | Examination - written test. The test is given a positive evaluation, if the student scores at least 50% of the maximum number of points. |
| P2 – final grade (laboratory) | PEK_U01,…, PEK_U05 | Final grade calculated on the base of F1-F4 according to formula:<br>< 40% → 2.0<br><40%, 50%) → 3.0<br><50%, 60%) → 3.5<br><60%, 70%) → 4.0<br><70%, 80%) → 4.5<br><80%, 90%) → 5.0<br>>90% → 5.5<br>or:<br>0,15 * F1 + 0,25 * F2 + 0,3 * F3 + 0,4 * F4 |

| PRIMARY AND SECONDARY LITERATURE |
|---|

**PRIMARY LITERATURE:**

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

[36]    K. Sacha, Inżynieria oprogramowania, PWN, Warszawa, 2010.

[37]    S. Wrycza, B. Marcinkowski, K. Wyrzykowski. Język UML 2.0 w modelowaniu systemów informatycznych. Helion 2006.

[38]    M. Śmiałek. Zrozumieć UML 2.0. Metody modelowania obiektowego. Helion 2005.

**SECONDARY LITERATURE:**

[32]    M. Fowler – UML w kropelce, LTP Oficyna Wydawnicza, 2005.

[33]    A. Shalloway, J. R. Trott – Projektowanie zorientowane obiektowo. Wzorce projektowe. Helion 2005.

[34]    Materials prepared by lecturer.

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

**Dr inż. Bogumiła Hnatkowska,** Bogumila.Hnatkowska@pwr.wroc.pl
**Mgr Urszula Staszak,** Urszula.Staszak@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
***Team Engineering Project***
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION …………………………….

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 | K1INF_W07 | C1 | Lec1, Lec2, Lec4, Lec8, Lec9 | N1, N4 |
| PEK_W02 | K1INF_W07 | C2 | Lec1, Lec2, Lec4, Lec5, Lec7 | N1, N2, N4 |
| PEK_W03 | K1INF_W05 | C1 | Lec4, Lec5 | N1, N4 |
| PEK_W04 | K1INF_W07 | C2 | Lec1, Lec3, Lec6, Lec8 | N1, N4 |
| PEK_U01 | K1INF_U03, K1INF_U13 | C2 | La2, La3 | N2, N3, N4 |
| PEK_U02 | K1INF_U03, K1INF_U14 | C1 | La4 | N2, N3, N4 |
| PEK_U03 | K1INF_U03, K1INF_U04 | C1, C2 | La5, La6 | N3, N4 |
| PEK_U04 | K1INF_U02, K1INF_U04 | C1 | La7, La8 | N3, N4 |
| PEK_U05 | K1INF_U04 | C1 | La8 | N3, N4 |
| PEK_K01 | K1INF_K02 | C1 | La4 | N3, N4 |

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management**   / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish Proseminarium inżynierskie**
**Name in English   Proseminar**
**Main field of study (if applicable): Informatics**
**Specialization (if applicable):**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code INZ0141S**
**Group of courses YES / NO\***

|  | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) |  |  |  |  | 18 |

| Number of hours of total student workload (CNPS) | | | | | 60 |
|---|---|---|---|---|---|
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | ~~Examination~~ / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | | | | | 2 |
| including number of ECTS points for practical (P) classes | | | | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | | | | | 0.4 |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1 Knowledge, skills and competences acquired at Informatics field at second level of study until 6th semester

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**SUBJECT OBJECTIVES**

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

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

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

…

relating to skills:

PEK_U01 He is able to acquire information from literature, databases and other sources, for the purpose of preparation a presentation on a selected topic, is able to integrate the information obtained, interpret them and also draw conclusions and formulate and justify opinions.

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

relating to social competences:

PEK_K01-Understands the need and knows the possibilities of lifelong learning and improving their professional and social competences

PEK_K02-is aware of the importance and understanding of non-technical aspects and impacts of engineering solving IT problems

PEK_K03-Able to interact and work in a group on the preparation and execution of presentation

PEK_K04-Able to properly determine the choice of subjects to set presentations and correctly determines its structure and means of expression

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**PROGRAMME CONTENT**

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

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

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

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

| | Form of classes - seminar | Number of hours |
|---|---|---|
| Se1 | Presentation of the principles and feasibility of diploma theses majoring in computer engineering. Discussion of the principles of preparing a presentation for students. Establishing a schedule delivering by students following the presentation. | 2 |
| Se2 | Types of qualification and their demands. The formulation of the problem of engineering, development and research. Form and structure of engineering thesis. The thesis work, the purpose of work. The study of literature. Some methodological and practical part. Presentation of the results and their analysis. | 2 |
| Se3 | Overview of research and development carried out at the Institute of Computer Science - Part 1 | 2 |
| Se4 | Overview of research and development carried out at the Institute of Computer Science - Part 2 | 2 |
| Se6-15 | Students are divided into teams of 2-3 people (with assumptions other than ZPI groups). Each team member prepares and conducts personalized multimedia presentation in the Polish language in the framework of a common theme for the group - selected or indicated - for engineering tasks, development or research in the field of computer science. The task is to be divided into subtasks - division of desire and individual presentations make students themselves. One of the team members prepare a breakdown of tasks into subtasks and plan for further presentation. Individual presentations have included: the presentation agenda, aim, the formulation of subtasks, subtasks and discuss the characteristics, scope of work to be done, an overview of the state of the | 12 |

| | literature, the concept and the method of solution and discuss the non-technical aspects of this task. Presentations are prepared also as a printed report and are presented in accordance with a predetermined schedule. | |
|---|---|---|
| | Total hours | 18 |

## TEACHING TOOLS USED

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

## EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| P | PEK_U01<br><br>PEK_U02,<br>PEK_U03,<br><br>PEK_K01,<br>PEK_K02,<br>PEK_K03,<br>PEK_K04 | Evaluation of the presentation of the work at the seminar and prepared documentation from the presentation. The evaluation shall be subject to the fulfillment of the requirements for the presentation, including its substantive scope, structure and organization of presentation, techniques of conversation, a form of presentation, compactness of presentation and conclusions reached. Participation in the discussions after presentation is also evaluated. In addition, the seminar leader is able to control the cooperation between supervisors and graduate students. |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[39]     Literature related to the scope of realized project selected by student and recommended by the teacher.
[40]     Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

**SECONDARY LITERATURE:**

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

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

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Proseminar**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
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_U01, (skills)** | K1INF_U11 | C1, C2 | Se1-15 | N1, N2, N3 |
| **PEK_U02** | K1INF_U12 | C1, C2 | Se1-15 | N1, N2, N3 |
| **PEK_U03** | K1INF_U13 | C1, C2 | Se1-15 | N1, N2, N3 |
| **PEK_K01 (competences)** | K1INF_K01 | C1, C2 | Se1-15 | N1, N2, N3 |
| **PEK_K02** | K1INF_K02 | C1, C2 | Se1-15 | N1, N2, N3 |
| **PEK_K03** | K1INF_K03 | C1, C2 | Se1-15 | N1, N2, N3 |
| **PEK_K04** | K1INF_K04, K1INF_K05 | C1, C2 | Se1-15 | N1, N2, N3 |

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY Department of Computer Science and Management / DEPARTMENT……………
**SUBJECT CARD**
**Name in Polish: Rachunek prawdopodobieństwa**
**Name in English: Probability**
**Main field of study (if applicable): Informatics**
**Specialization (if applicable): ………………………….**
**Level and form of studies: 1st/ 2nd* level, full-time / part-time***
**Kind of subject: obligatory / optional / university-wide***
**Subject code MAZ002521**
**Group of courses YES / NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 18 | | | |
| Number of hours of total student workload (CNPS) | 30 | 90 | | | |
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses | | | | | |

| mark (X) final course | | | | | |
|---|---|---|---|---|---|
| Number of ECTS points | 1 | 2 | | | |
| including number of ECTS points for practical (P) classes | 0 | 1,5 | | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,4 | 0,8 | | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Passed the subject: Algebra and Analytic Geometry. Knowledge of the subject.
2. Passed the subject: Mathematical analysis. Knowledge of the subject.
3. Passed the subject: Discrete Mathematics. Knowledge of the subject.

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**SUBJECT OBJECTIVES**

C1 Acquisition of basic knowledge of probability and improved knowledge of selected aspects of probability.

C2 Acquisition of basic knowledge of the reliability of circuits and systems.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

PEK_W01 – has knowledge of the nature and properties of probability and probability space, and has knowledge of the calculation of the probability and the conditional probability of events.

PEK_W02 – knows the total probability theorem and Bayes' formula events and also has knowledge of the reliability of circuits.

PEK_W03 – has knowledge of random variables, probability distribution, distribution function of a random variable, has knowledge of the basic parameters of random variable and their interpretations.

PEK_W04 – knows the limit theorems and their interpretation, and knows no equal probability, and knows how to pre-analyze the data for probabilistic analysis.

relating to skills:

PEK_U01 – can calculate the occurrence of events, conditional probability and the probability of the occurrence of complete overlap of events.

PEK_U02 – can calculate the reliability of connections.

PEK_U03 – is able to calculate the distribution and the cumulative distribution function of the random variable and the basic parameters of the random variables, can analyze the distributions of random variables and calculate their parameters, can perform calculations based on limit theorems and their applications.

relating to social competences:

PEK_K01 – understands the importance of probability and statistics in the processes of social, economic, and technology.

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**PROGRAMME CONTENT**

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | The essence of a random experiment. Definition and properties of probability. | 2 |

| Lec 2 | Calculating the probability of events. The definition of the probability space. | 2 |
|---|---|---|
| Lec 3 | Conditional probability. Bayesian model. Theorem of total probability events. | 2 |
| Lec 4 | Independence of events. Circuits' reliability. Random variable. The probability distribution. | 2 |
| Lec 5 | Random variable. The probability distribution. Distribution function of a random variable. | 2 |
| Lec 6 | Applications of random variables to describe the problem. | 2 |
| Lec 7 | The most important continuous random variables and their applications. | 2 |
| Lec 8 | The most important continuous random variables and their applications. Important inequalities of probability theory. | |
| Lec 9 | Limit theorems and their interpretation. Applications of limit theorems of probability. Repertory lecture. | 2 |
| | Total hours | 18 |

| Form of classes - class | | Number of hours |
|---|---|---|
| Cl 1 | Determination and calculation of probabilities - accounting exercises. | 2 |
| Cl 2 | Conditional probability - accounting exercises. Theorem of total probability events – accounting exercises. Independence of events – accounting exercises. | 2 |
| Cl 3 | Reliability of connections - accounting exercises. | 2 |
| Cl 4 | Random variable. The probability distribution – accounting exercises. Distribution function of a random variable – accounting exercises. | 2 |
| Cl 5 | Review of discrete random variables – accounting examples and exercises. The use of random variables to describe problems in a variety of disciplines. Tutorials. Accounting exercises. | 2 |
| Cl 6 | The most important continuous random variables and their applications. Examples and formulation of conclusions. | 2 |
| Cl 7 | The analysis of the properties of distributions of random variables. Examples of phenomena of a given distribution. Basic parameters of random variable. Interpretation of parameters. | 2 |
| Cl 8 | Calculation of distribution parameters – tutorials and accounting exercises. | 2 |
| Cl 9 | Important inequalities in probability theory, limit theorems and their interpretation - accounting exercise. | 2 |
| | Total hours | 18 |

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

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

| | | |
|---|---|---|
| Proj 3 | | |
| Proj 4 | | |
| … | | |
| | Total hours | |

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

## TEACHING TOOLS USED

N1. Traditional lecture-based multimedia presentations.
N2. Tutorials and discussion of solutions of the foundations of probability and reliability of the system. Discussing and presenting solutions do lists. Final test of the exercise.
N3. Consultations for students.
N4. Self-study problems of lecture. Solving task lists.
N5. Studying the issues discussed during the lecture.

## EVALUATION 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 | Examples and exercises account. Solving task lists. Analysis of the problems of reliability of systems. Final test. |
| C | PEK_W01-PEKW_04, PEK_K01 | Final test. |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[1] J. Bartos, W. Dyczka, W. Krysicki, *Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach*, PWN, Warszawa 2008.
[2] D. Bobrowski, *Probabilistyka w zastosowaniach technicznych*, WNT, Warszawa 1986.
[3] J. Jakubowski, R. Sztencel, *Rachunek prawdopodobieństwa dla prawie każdego,* Script, Warszawa, 2009.
[4] A. Plucińska, E. Pluciński, *Rachunek prawdopodobieństwa*, WNT, Warszawa 1999.
[5] R. Zieliński, *Tablice statystyczne*, WNT, Warszawa 2006.

**SECONDARY LITERATURE:**

W. Feller, *Wstęp do rachunku prawdopodobieństwa*, tom I.II, PWN, Warszawa 2009.

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

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

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

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W02 | C1-C2 | Lec1-Lec3 | N1, N3, N5 |
| PEK_W02 | K1INF_W02 | C1-C2 | Lec4 | N1, N3, N5 |
| PEK_W03 | K1INF_W02 | C1-C2 | Lec5- Lec8 | N1, N3, N5 |
| PEK_W04 | K1INF_W02 | C1-C2 | Lec8- Lec9 | N1, N3, N5 |
| PEK_U01 (skills) | K1INF_W02 | C1-C2 | Cl 1-Cl 2 | N2, N3, N4 |
| PEK_U02 | K1INF_W02 | C1-C2 | Cl 3 | N2, N3, N4 |
| PEK_U03 | K1INF_W02 | C1-C2 | Cl 4-Cl 9 | N2, N3, N4 |
| PEK_K01 (competences) | K1INF_W02 | C1-C2 | Lec1-Lec9 | N1, N3, N5 |

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

**SUBJECT CARD**

**Name in Polish: Ruting i przełączanie w sieciach**

**Name in English: Routing and switching in networks**

**Main field of study (if applicable): Computer science**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1ˢᵗ level, part-time**
**Kind of subject: obligatory**
**Subject code INZ007647**
**Group of courses NO**

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 9 | 0 | 18 | 0 | 0 |
| 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 | | | | | |
| Number of ECTS points | 1 | | 2 | | |
| including number of ECTS points for practical (P) classes | | | 2 | | |

| including number of ECTS points for direct teacher-student contact (BK) classes | 0,4 | | 0,8 | | |
|---|---|---|---|---|---|

## PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Has a basic knowledge of linear algebra, analytic geometry and mathematical analysis, which is necessary to perform simple computing tasks on an engineering of technical and non-technical disciplines (K1INF_W01).
2. Has a basic knowledge of discrete mathematics, mathematical logic and mathematical statistics, the necessary information to solve simple engineering problems (K1INF_W02).
3. Has a basic knowledge of computer organization and architecture (K1INF_W08).
4. Has a basic knowledge of the structure and operation of an operating systems (K1INF_W10).
5. Has a basic knowledge of IT systems and computer networks (K1INF_W11).
6. Has a basic knowledge of the Internet architecture and Web-based systems (K1INF_W14).
7. Knows the basic methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_W16).
8. Can choose the hardware and software components of a computer system for specific applications (K1INF_U06).
9. Can be used as indicated analytical method and to plan and carry out a simple experiment engineering and computer simulation, to carry out tests and analyze results, particularly for the selected system components (K1INF_U09).
10. Can configure basic networking hardware and software in computer networks (K1INF_U08).
11. Can use the right tools to build a simple model of the process (the object), to formulate specific task analysis and decision making (K1INF_U15).
12. Has the ability to self-education, including in order to improve professional competence (K1INF_U05).
13. Understands the need and knows the possibility of lifelong learning and improving their skills and social (K1INF_K01).

## SUBJECT OBJECTIVES

C1. Ordered, underpinned by theoretical knowledge in the field of information and communication aggregation methods in different - fundamental for modern data transmission systems - concepts of reproduction for the purposes of efficient use of resources of analog and digital systems and the pros and cons practically applied frequency and digital hierarchy.

C2. Ordered, underpinned by theoretical knowledge in methods of switching and traffic management (access control, flow control, anti-overload) in ICT networks for the provision of quality services in ICT networks and to formulate and solve problems for optimal use of distributed IT systems.

C3. Skills for the analysis, comparison, configuration and design of networked devices and software network devices using a model of nodes and networks and standards, the task of formulating the design and analysis of network solutions and evaluate the suitability of different networking solutions for the implementation of various qualitative and quantitative requirements for distributed services communication systems.

C4. Skills for the selection of appropriate methods, algorithms, standards, tools (software and hardware) and network solutions to design and network services that meet the qualitative and quantitative requirements of the users of distributed ICT systems.

| SUBJECT EDUCATIONAL EFFECTS |
|---|
| relating to knowledge: |
|   K1INF_W11:  Has basic knowledge of IT systems and networks |
|   K1INF_W12:  Has basic knowledge of the architecture of distributed systems and methods for multiprocessor and distributed computing |
|   |
| relating to skills: |
|   K1INF_U05:  He has the ability to self-study, including in order to improve the professional competence |
|   K1INF_U08:  Can configure basic networking hardware and software in computer networks |
|   K1INF_U11:  Can obtain information from literature, databases and other sources, also in English, including for the purposes of self-education and professional skills development, can integrate the information, make their interpretation, and to draw conclusions and formulate and justify opinions. |
|   |
| relating to social competences: |
|   K1INF_K01:  Understands the need and knows the possibilities of lifelong learning and to improve their professional competence and social |
|   K1INF_K04:  Can properly set priorities for implementation specified by you or other tasks |

| PROGRAMME CONTENT | |
|---|---|
| **Form of classes - lecture** | **Number of hours** |
| Lec 1   Multiplexing methods - FDMA (Frequency Division Multiplexing), TDMA (Time Division Multiplexing), CDMA (Code Division Multiplexing) i WDMA (Wavelength Division Multiplexing) | 1 |
| Lec 2   Digital hierarchies – PDH (Plesiochronous Digital Hierarchy) i SDH (Synchronous Digital Hierarchy). Analysis of multiplexed traffic – queuing systems. | 2 |
| Lec 3   Space-domain and time-domain switching. Quality of service and quality of experience in routing and switching tasks. | 2 |
| Lec 4   Access control, switching, routing, flow control and congestion control tasks in circuit-switched and packet-switched computer communication networks. Queuing systems. Kleinrock approximation. | 2 |
| Lec 5   Virtualization of network and its application in the task of separation of network traffic and provide quality of service. New concepts in teletraffic management - Content Aware Network, Context Aware Network, Software Defined Network), New Generation Network, Next Generation Network, etc. | 2 |
| Total hours | 9 |

| PROGRAMME CONTENT | |
|---|---|
| **Form of classes - laboratory** | **Number of hours** |
| Lab 1   Organizational activities. Safety in the laboratory. | 2 |
| Lab 2   The basic configuration of a Cisco router. Static Routing. | 2 |

| Lab 3 | Dynamic Routing - RIP (Routing Information Protocol) version 1 and version 2 | 2 |
|---|---|---|
| Lab 4 | Dynamic routing - EIGRP (Enhanced Interior Gateway Routing Protocol) | 2 |
| Lab 5 | Dynamic routing - OSPF (Open Shortest Path First) Part 1 and Part 2 | 2 |
| Lab 6 | Setting up a PPP connection (Point-to-Point Protocol) and configuring Frame Relay | 2 |
| Lab 7 | Securing your network and network resources. Securing access to the devices and traffic control (access lists). | 2 |
| Lab 8 | Services in an IP network. Dynamic configuration DHCP (Dynamic Host Configuration Protocol). Network Address Translation - NAT (Network Address Translation) and PAT (Port Address of Translation). | 2 |
| Lab 9 | Solving problems in the network configuration. Final examination based on four semester CCNA (Cisco Certified Network Associate) Exploration. | 2 |
| | Total hours | 18 |

| TEACHING TOOLS USED |
|---|
| N1. Traditional lecture. Multimedia presentations. |
| N2. Student's own works – solving experiments and tasks in laboratory. |
| N3. Student's own works – literature studies. |
| N5. Collective works in laboratory |
| N5. Student's own works – preparation of presentations and technical documentations. |

| EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT | | |
|---|---|---|
| **Evaluation** (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
| F1 (lecture) | K1INF_W11 K1INF_W12 K1INF_U05 K1INF_U08 K1INF_U11 K1INF_K01 K1INF_K04 | Observation of student's activity. Solving exercises. Preparation and presentation delivery. |
| F1 – F9 (laboratory) | K1INF_U05 K1INF_U08 K1INF_U11 K1INF_K01 K1INF_K04 | Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and evaluation of student independence. Analysis of reports of exercise. |
| P (lecture) | K1INF_W11 K1INF_W12 K1INF_U05 K1INF_U08 K1INF_U11 | Examination taking into account results of forming evaluation F1 (lecture) |

| | K1INF_K01 | |
| | K1INF_K04 | |
| P (laboratory) | K1INF_U05 | Weighted sum of forming evaluations  F1 – F9 (laboratory). |
| | K1INF_U08 | |
| | K1INF_U11 | |
| | K1INF_K01 | |
| | K1INF_K04 | |

## PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[41] G. Ash, "Dynamic routing in telecommunication networks", McGraw-Hill, 1998.

[42] R.K. Ahuja, T.L. Magnanti, J.B. Orlin, "Network flows: theory, algorithms and applications", Prentice Hall, 1993.

[43] A.S. Tanenbaum, „Sieci komputerowe", Helion, 1991 - 2013

[44] D. Mehdi, K. Ramasamy, "Network Routing: Algorithms, Protocols, and Architectures", The Morgan Kaufmann Series in Networking, 2007

[45] Z. Papir, „Ruch telekomunikacyjny i przeciążenia w sieciach pakietowych", WKiŁ, Warszawa 2002

[46] J. Woźniak, K. Nowicki, „Sieci LAN, MAN i WAN – protokoły komunikacyjne", Wydawnictwo FPT, Kraków 1998

[47] K. Nowicki, J. Woźniak, „Przewodowe i bezprzewodowe sieci LAN', Oficyna PW, Warszawa 2003.

[48] A. Kasprzak, „Rozległe sieci komputerowe z komutacją pakietów", Oficyna PWr, Wrocław 1997.

[49] A. Grzech, „Sterowanie ruchem w sieciach teleinformatycznych", Oficyna PWr, Wrocław 2002.

[50] B. Russell, „Podstawy sieci komputerowych", WKŁ, Warszawa 2009

[51] V.S. Bagad, I.A. Dhotre, „Computer networks", Technical Publications, 2009.

[52] http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html


SECONDARY LITERATURE:

[1] Akademia sieci Cisco CCNA, PWN, 2008

[2] S. Haykin, „Systemy telekomunikacyjne", WKiŁ, Warszawa 1999.

[3] MIT Free Open Course Materials (http://ocw.mit.edu/index.htm) http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

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

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

# MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
## Routing and switching in networks

### AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Program content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W11 | C1, C2, C3 | Lec 1 – Lec 5 | N1, N2, N3 |
| PEK_W02 | K1INF_W12 | C1, C2, C3, C4 | Lec 1 – Lec 5 | N1, N2, N3 |
| | | | | |
| PEK_U01 (skills) | K1INF_U05 | C3, C4 | Lab 1 – Lab 9 | N2, N4, N5 |
| PEK_U02 | K1INF_U08 | C3, C4 | Lab 1 – Lab 9 | N2, N4, N5 |
| PEK_U03 | K1INF_U11 | C1, C2, C3, C4 | Lec 1 – Lec 5 Lab 1 – Lab 9 | N1, N2, N3, N4, N5 |
| | | | | |
| PEK_K01 (competences) | K1INF_K01 | C1, C2, C3, C4 | Lec 1 – Lec 5 Lab 1 – Lab 9 | N1, N2, N3, N4, N5 |
| PEK_K02 | K1INF_K04 | C1, C2, C3, C4 | Lec 1 – Lec 5 Lab 1 – Lab 9 | 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 Department of Computer Science and Management / DEPARTMENT……………
### SUBJECT CARD
**Name in Polish: Rozproszone bazy danych**
**Name in English: Distributed databases**
**Main field of study (if applicable): Informatics**
**Specialization (if applicable): ……………**
**Level and form of studies: 1st/ 2nd* level, full-time / part-time***
**Kind of subject: obligatory / optional / university-wide***
**Subject code INZ007657**
**Group of courses YES / NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | | 18 | | |
| Number of hours of total student workload (CNPS) | 90 | | 60 | | |
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |

| For group of courses mark (X) final course | | | | | |
|---|---|---|---|---|---|
| Number of ECTS points | 3 | | 2 | | |
| including number of ECTS points for practical (P) classes | 0 | | 1 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 1,2 | | 0,8 | | |

*delete as <mark>not</mark> applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**
4. Basic knowledge of computer systems design.
5. Knowledge of programming languages and platforms, web applications (HTML, XML, C#, JavaScript).
6. Knowledge of application development in one of the ASP technology based on MS Visual Studio.
7. Knowledge and skills in the field of databases and SQL.

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**SUBJECT OBJECTIVES**
C1 Acquisition of knowledge diffusion paradigm databases and applications of database systems, with a three-tier architecture of distributed systems, databases, types of transparency in the access to data in databases, data repositories, three orthogonal architecture DDBMS.
C2 Acquisition of basic knowledge in the field of designing horizontal primary and secondary fragmentation algorithms, as well as in the field of vertical fragmentation algorithms, meaning affinity of attributes in data in databases, clustering algorithms and vertical splitting of database tables.
C3 Acquisition of basic knowledge of replication fragments and their allocation alternatives, implementation heuristics and control of semantic data integrity, management views, security.
C4 Acquisition of basic knowledge of distributed SQL query, the optimization of such queries and algebraic optimization, distributed transaction processing, 2PC and 3PC protocols, as well as basic knowledge of the business paradigms DDBMS architecture, topology DDBMS systems, the role of machines in a distributed database system.
C5 The acquisition of specific knowledge and skills in the field of mechanisms for creating and administration of distributed databases allocated on MS SQL Server servers and on and ASP.NET technology platform, and other technology platforms, including mobility. The mechanisms and maintain load balancing in distributed database processing.

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**SUBJECT EDUCATIONAL EFFECTS**
relating to knowledge:
PEK_W01 – has knowledge of the paradigm dispersion databases and applications of database systems, with a three-tier architecture of distributed systems, databases, types of transparency in the access to data in databases, data repositories, three orthogonal architecture DDBMS.
PEK_W02 – has knowledge of the design algorithms of primary and secondary horizontal fragmentation, as well as in the field of vertical fragmentation algorithms, has knowledge of attribute affinity and clustering data in databases, vertical clustering and splitting algorithms of database tables.
PEK_W03 – has knowledge of the replication fragments and their allocation heuristic alternatives, and of implementation and control of semantic data integrity, management views, security.
PEK_W04 – has knowledge of distributed SQL queries, know how optimize the queries and how work their algebraic optimization, has knowledge of distributed transaction processing, 2PC and 3PC protocols, as well as basic has knowledge of the business DDBMS architecture paradigms,

DDBMS systems topology, machines roles in a distributed database system.

PEK_W05 – has specific knowledge and skills in the field of mechanisms for creating and administration of distributed databases allocated on MS SQL Server servers and on and ASP.NET technology platform, and other technology platforms, including mobility. The mechanisms and maintain load balancing in distributed database processing.

relating to skills:

PEK_U01 – able to create and manage databases distributed across servers MS SQL Server and ASP.NET technology platform and other proprietary technology platforms - with databases on mobile devices, inclusive, as well as how to create distributed databases.

PEK_U02 – knows how to build and test a prototype web-based system with a distributed database model, taking into account subscription-publishing system and business paradigm for replication transaction, snapshot transaction, and merge transaction.

relating to social competences:

PEK_K01 – know how to carry out research work as a team and solve problems.

| PROGRAMME CONTENT | |
|---|---|

| Form of classes - lecture | Number of hours |
|---|---|
| Lec 1 Databases distribution paradigm, data and processing logic distribution. | 2 |
| Lec 2 Three-orthogonal architecture of DDBMS system, distribution of the data and control. | 2 |
| Lec 3 Designing distribution, horizontal fragmentation primary and secondary, algorithms. | 2 |
| Lec 4 Fragmentation vertical affinity, grouping and splitting algorithms. | 2 |
| Lec 5 Replication fragments and alternative allocation heuristics. | 2 |
| Lec 6 Business paradigms of DDBMS architecture, topology of DDBMS system, the roles of machines. | 2 |
| Lec 7 Control mechanisms of consistency and synchronization of data copies of the data. | 2 |
| Lec 8 Detailed analysis of distribution on MS SQL Server - Part II. Load balancing systems in the processing of distributed databases. Distributed databases in ASP.NET technology platforms. | |
| Lec 9 Databases on Microsoft and Sybase on PDA and mobile messaging. | 2 |
| Total hours | 18 |

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

| Form of classes - laboratory | Number of hours |
|---|---|
| Lab 1 Design and create a prototype web-based system in accordance with a methodology of designing Web-based systems with a distributed database - a sketch of the manufacturing process. | 2 |

| | | |
|---|---|---|
| Lab 2 | Concept. Determination of functional and non-functional objectives of the project - the purpose of the project, the mission system, the scope of the prototype system. Actors. Functional and non-functional requirements. The main assumptions of distribution. The schedule of production. The business architecture and application logic and database  the distribution system locations. | 2 |
| Lab 3 | Subscription-publishing model of system. | 2 |
| Lab 4 | Installing the development environment. Installing the database server component of vertical, horizontal and hybrid database distribution implementation, and installing tools for monitoring and tuning database distribution with SQL Server. Creation of application with centralized database. | 2 |
| Lab 5 | Project of horizontal fragmentation of database. | 2 |
| Lab 6 | Project of database vertical and hybrid fragmentation. | 2 |
| Lab 7 | The physical model of fragmentation. The mechanism of replication. Building a database server infrastructure, at least two-machine or two instances. | 2 |
| Lab 8 | Creating a distributed database. Adding publishers and subscribers for transactional publications and for snapshot publications. Adding mechanisms for merge publications. | 2 |
| Lab 9 | Adding publishers and subscribers for transactional publications and for snapshot publications, and related agents. | 2 |
| | Total hours | 18 |

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

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

| TEACHING TOOLS USED |
|---|
| N1. Traditional lectures based on multimedia presentations. N2. A computer lab with Internet access, and virtualization capabilities of workstations and servers. N3. Student workload – preparing for the tasks of laboratory and small design tasks. N4. Student workload – studying the issues discussed during the lecture. N5. Consultations for students. |

**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_U02, PEK_K01 | Ratings for implementation and documentation of web application with a distributed database, the implementation of mobility and load balancing. |
| F2 | PEK_U01-PEK_U05 | Ratings for the implementation and documentation of laboratory tasks. |
| C | PEK_W01-PEK_W05 | Final test for the lecture. |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[1] T. Ozsu, P. Valduriez, *Principles of distributed database systems*, Prentice-Hall, 1991.
[2] A.S. Tanenbaum, Maarten van Steen, *Distributed Systems Principles and Paradigms*, International Edition (1) and Ed. 2nd, Prentice-Hall, Inc., New Jersey 2002.
[3] G. Coulouris, J. Dollimore, T. Kinberg, *Distributed Systems Concepts and Design*, Fourth edition, Addison-Wesley Publishers Limited, 2005.
[4] D. Bell, J. Grimson, *Distributed Database Systems*, Reading 38, Addison Wesley, 1992.
[5] J. Gray, A. Reuter, *Transaction Processing: Concepts and Techniques*, Morgan-Kauffman, 1994.

**SECONDARY LITERATURE:**

[1] A.S. Tanenbaum, Maarten van Steen, *Systemy rozproszone. Zasady i paradygmaty*, (Ed. 2nd, 2002), Edycja polska (1), WNT, Warszawa 2006.
[2] G. Coulouris G., J. Dollimore, T. Kindberg, *Systemy rozproszone Koncepcja i projektowanie*, Wyd. 2, WNT, Warszawa 1998.
[3] *Dokumentacja elektroniczna systemu Microsoft SQL Server 200X Books On-Line*.
[4] N. Lynch, *Distributed Algorithms*, Morgan-Kauffman, 1996.

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

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

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

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| **PEK_W01 (knowledge)** | K1INF_W04 | C1 | Lec1-Lec2 | N1, N4-N5 |
| **PEK_W02** | K1INF_W04 | C2 | Lec2-Lec3 | N1, N4-N5 |
| **PEK_W03** | K1INF_W04 | C3 | Lec5 | N1, N4-N5 |
| **PEK_W04** | K1INF_W04 | C4 | Lec6 | N1, N4-N5 |
| **PEK_W05** | K1INF_W04 | C1-C5 | Lec7-Lec9, Lab1-Lab9 | N1, N4-N5 |
| **PEK_U01 (skills)** | K1INF_U06-K1INF_U07, K1INF_U13 | C1-C5 | Lec7-Lec9, Lab1-Lab9 | N1-N5 |
| **PEK_U02** | K1INF_U06-K1INF_U07, K1INF_U13 | C5 | Lab1-Lab9 | N2-N5 |
| **PEK_K01 (competences)** | | C5 | Lab1-Lab9 | N2-N4 |

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

*** - from table above

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FACULTY W8 / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish …… Rozproszone systemy informatyczne**
**Name in English …… Distributed computer systems**
**Main field of study (if applicable): Informatics**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd* level, full-time / part-time***
**Kind of subject: obligatory / optional / university-wide***
**Subject code INZ001666**
**Group of courses YES / NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | | 9 | | |
| Number of hours of total student workload (CNPS) | 60 | | 30 | | |
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | | 1 | | |

2

| | | | | | |
|---|---|---|---|---|---|
| including number of ECTS points for practical (P) classes | 0 | | 1 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 | | 0,4 | | |

*delete as applicable

<table>
<tr><td colspan="2"><strong>PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES</strong></td></tr>
</table>

13. Basic knowledge of computer networks.
14. Knowledge of programming in Java.
15. Basic knowledge of programming in C.

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## SUBJECT OBJECTIVES

C1 Obtaining basic knowledge of the architecture of distributed computer systems.
C2 Knowledge of selected algorithms and mechanisms used in distributed computing systems.
C3 Acquiring practical skills of implementation of simple applications for selected distributed processing environments.

## SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Describes the basic architectures of distributed computing systems and sample solutions of such systems..

PEK_W02 Lists and describes the mechanisms used to support distributed computer systems.

PEK_W03 Knows the basic algorithms used in the basic functions of distributed processing systems..

relating to skills:

PEK_U01 Student is able to implement a simple application on distributed computing cluster.

PEK_U02 Student is able to implement a simple distributed application in the internetwork.

PEK_U03 Student is able to apply the principles of work, including safety rules, in a typical cluster computing workplace.

relating to social competences:

## PROGRAMME CONTENT

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Presentation of the organization and program of the course. Introduction to lecture subject: basic characteristics, the purpose and design assumptions of distributed and multiprocessor systems. | 2 |
| Lec 2 | The basic architecture (structures and software) of distributed systems. | 2 |
| Lec 3 | Communication in distributed systems - point-to-point communication, collective communication, communication costs. MPI environment. | 2 |
| Lec 4 | Communications services and processing on higher levels - Remote Procedure Call (RPC), Distributed Objects (DO). Selected technologies of RPC and DO implementations. | 2 |
| Lec 5 | The coordination of distributed processes - time synchronization, mutual exclusion. Deadlocks in distributed systems. | 2 |

| Lec 6 | Distributed transactions. Concurrency control. | 2 |
|---|---|---|
| Lec 7 | Reliability of processing in distributed systems. Agreement problems. Election algorithms. Reliable communication in distributed systems. | 2 |
| Lec 8 | Selected topics of contemporary ideas for distributed systems: Service-oriented architecture (SOA). Web- services. Basics of P2P systems. | 2 |
| Lec 9 | Passing test. | 2 |
| | Total hours | **18** |

| Form of classes - class | Number of hours |
|---|---|
| Total hours | |

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab 1 | Health and Safety Training . Discussion of the organization and program of activities. Presentation of teaching tools . | 1 |
| Lab 2 | Basics of programming in computer cluster environment. | 1 |
| Lab 3 | Basics of programming distributed applications using the MPI standard. | 1 |
| Lab 4 | The implementation of MPI point-to-point communication. | 1 |
| Lab 5 | Collective (group) communication in the MPI standard. | 1 |
| Lab 6 | Basics of programming distributed applications in Java RMI. | 1 |
| Lab 7 | Selected advanced techniques for distributed processing in Java RMI. | 1 |
| Lab 8 | The implementation of distributed applications using selected RPC standards | 1 |
| Lab 9 | Summarization and final assessment of classes.. | 1 |
| | Total hours | 9 |

| Form of classes - project | Number of hours |
|---|---|
| Total hours | |

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

| TEACHING TOOLS USED |
|---|
| N1. Lecture supported by multimedia presentations.<br>N2. Preparatory multimedia presentations for exercises.<br>N3. Software to implement distributed application for selected processing environments.<br>N4. Sample programs for exercise.<br>N5. The e-learning system for publication of teaching materials, exercises, announcements, and collection and evaluation of student work, as well as for testing of acquired knowledge. |

# EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| F1 – Lab3 | PEK_U01 PEK_U03 | Assessment of the completeness and quality of the solution of the problem. 0÷10 point scale. |
| F2 – Lab4 | PEK_U01 PEK_U03 | Assessment of the completeness and quality of the solution of the problem. 0÷10 point scale. |
| F3 – Lab5 | PEK_U01 PEK_U03 | Assessment of the completeness and quality of the solution of the problem. 0÷10 point scale. |
| F4 – Lab6 | PEK_U02 PEK_U03 | Assessment of the completeness and quality of the solution of the problem. 0÷10 point scale. |
| F5 – Lab7 | PEK_U02 PEK_U03 | Assessment of the completeness and quality of the solution of the problem. 0÷10 point scale. |
| F6 – Lab8 | PEK_U02 PEK_U03 | Assessment of the completeness and quality of the solution of the problem. 0÷10 point scale. |
| P1 - the final evaluation of the laboratory. | PEK_U01 PEK_U02 PEK_U03 | The rate determined on the basis of the total points of forming ratings F1 to F6 according to the formula: - less than 50% of the points - 2.0 (insufficient) [50%, 60%) – 3.0 (sufficient) [60%, 70%) – 3.5 (sufficient+) [70%, 80%) – 4.0 (good) [80%, 90%) – 4.5 (good+) [90%, 100%) – 5.0 (very good) 100% – 5.5 (excellent) |
| P2 - the final evaluation of the lecture. | PEK_W01 PEK_W02 PEK_W03 | Test of knowledge - with the use of electronic test of the e-learning system. Score points obtained from the test. The grading scale such as for P1. |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[35]    Tanenbaum A. S., van Steen M.: Distributed systems: principles and paradigms, Pearson Prentice Hall, 2007.

[36]    Coulouris G., Dollimore J., Kindberg T.: Distributed systems: concepts and design, Addison-Wesley, 2005.

[37]    Shirazi, Behrooz A.: Scheduling and load balancing in parallel and distributed systems, IEEE Press, 1995.

[38]    Buford J. Yu H., Lua E.K.: P2P Networking and Applications, Morgan Kaufman 2009

[39]    Curry E.: Message-Oriented Middleware, Middleware Communications, 2004.

[40]    Oracle electronic resources– materials for the considered technologies: http://www.oracle.com

[41]    IBM Redbooks electronic documentation– materials for the considered technologies: http://www.ibm.com/redbooks

**SECONDARY LITERATURE:**

[1] Silberschatz A., Petersom J., Galvin P.:  Operating system concepts, John Wiley & Sons, 2010.

[2] R. Steinmetz, K. Wehrle: Peer-to-Peer Systems and Applications, LNCS 3485, Springer, 2005.

[3] Hasan J.: Expert Service-Oriented Architecture in C#: Using the Web Services Enhancements 2.0, Apress, 2004.

[4] M. P. Papazoglou: *Web Services & SOA. Principles and Technology*, Pearson Education Limited, 2012

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

**Mariusz Fraś, mariusz.fras@pwr.edu.pl**

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Distributed computer systems**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION ……………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (wiedza) | K1INF_W12 | C1 | Lec1, Lec2, Lec4, Lec8, | N1, N5 |
| PEK_W02 | K1INF_W12 | C1 | Lec3,,,,. Lec7 | N1, N5 |
| PEK_W03 | K1INF_W12 | C2, C3 | Lec3,…,Lec7 | N1, N5 |
| PEK_U01 (umiejętności) | K1INF_U04 | C3 | Lab1,…,Lab5  Lec3 | N1, N2, N3, N4, N5 |
| PEK_U02 | K1INF_U04 | C3 | Lab6,…,Lab9  Lec4 | N1, N2, N3, N4, N5 |
| PEK_U03 | K1INF_U14 | C3 | Lab1,…,Lab9 | N2, N3, N4, N5 |

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

*** - from table above

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FACULTY **Computer Science and Management** / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish     Seminarium dyplomowe**
**Name in English     Diploma seminar**
**Main field of study (if applicable): Informatics**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd* level, full-time / part-time***
**Kind of subject: obligatory / optional / university-wide***
**Subject code   INZ0285S**

| Group of courses ~~YES~~ / NO* | | | | | |
|---|---|---|---|---|---|
| | Lecture | Classes | Laboratory | Project | Seminar |
| Number of hours of organized classes in University (ZZU) | | | | | 30 |
| Number of hours of total student workload (CNPS) | | | | | 60 |
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | ~~Examination~~ / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | | | | | 2 |
| including number of ECTS points for practical (P) classes | | | | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | | | | | 1,2 |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Knowledge, skills and competences acquired at Informatics field of study until 7th semester

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**SUBJECT OBJECTIVES**

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

C2 Providing students with basic skills related to preparation and presentation of scientific texts, beginning from the choice of topic, selection of tasks to be performed, , use of literature and also how to write thesis and how obtained results should be interpret.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

…

relating to skills:

PEK_U01 He is able to acquire information from literature, databases and other sources, for the purpose of preparation a presentation on a selected topic, is able to integrate the information obtained, interpret them and also draw conclusions and formulate and justify opinions.

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

PEK_U03 He is able to prepare and give a presentation prepared in Polish and English, related to the results of his engineering task

relating to social competences:

PEK_K01 He understands the need and knows the possibilities of lifelong learning and improvement his professional and social competences

PEK_K02 He is aware of importance and understanding of non-technical aspects and impacts of engineering activity related to information technologies.

PEK_K03- He can cooperate to prepare and realize a presentation

PEK_K04- He can properly determine the choice of subjects to set presentation and correctly determines its structure and means of expression

PEK_K05 – He correctly identifies and resolves dilemmas associated in the profession

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - lecture** | | **Number of hours** |
| Lec 1 | | |
| Lec 2 | | |
| | Total hours | |
| **Form of classes - class** | | **Number of hours** |
| Cl 1 | | |
| Cl 2 | | |
| | Total hours | |
| **Form of classes - laboratory** | | **Number of hours** |
| Lab 1 | | |
| Lab 2 | | |
| | Total hours | |
| **Form of classes - project** | | **Number of hours** |
| Proj 1 | | |
| Proj 2 | | |
| | Total hours | |
| **Form of classes - seminar** | | **Number of hours** |
| Sem 1 | Familiarization with the principles of engineering thesis realization at Informatics field. Rules related to student presentations. Determining the schedule of student presentations. | 2 |
| Sem 2 | Review of basic skills related to preparation and presentation of scientific and technical texts by students, beginning from the choice of topic, selection of tasks to be performed, use of literature and also how to write thesis and how obtained results should be interpret. | 2 |
| Sem 3 – Sem9 | During semester each student has 2 presentations. The first presentation is related to the general view of the engineering thesis topic, its placement in the literature and in the Informatics field. The student should present the primary aim of thesis, the state of art related to thesis topic, the concept of solution, the initial structure of thesis and timetable for further work. The purpose of the second presentation is preparation to defense and demonstrate presentation skills in English. The second presentation consists of two parts, namely, | 14 |

| discussion of the results of the work in English and a short presentation in Polish devoted to the results of the thesis. | |
|---|---|
| Total hours | 18 |

## TEACHING TOOLS USED

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

## EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| **Evaluation** (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| P | PEK_U01, PEK_U02, PEK_U03, PEK_K01, PEK_K02, PEK_K03, PEK_K04, PEK_K05. | Evaluation of the presentation at the seminar and prepared documentation from the presentation. The evaluation shall be subject to the fulfillment of the requirements for the presentation, including its substantive scope, structure and organization of presentation, techniques of conversation, a form of presentation, compactness of presentation and conclusions reached. Participation in the discussions after presentation is also evaluated. In addition, the seminar leader is able to control the cooperation between supervisors and graduate students. |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[53]     Literature related to the scope of realized thesis selected by student and recommended by the promoter.
[54]     Requirements for engineering thesis at the Faculty of Computer Science and Management, Wrocław University of Technology, www.wiz.pwr.wroc.pl

**SECONDARY LITERATURE:**

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

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

# MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Diploma seminar**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY  **Informatics**
AND SPECIALIZATION ……………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| **PEK_U01 (skills)** | K1INF_U11 | C1, C2 | Se1-9 | N1, N2, N3 |
| **PEK_U02** | K1INF_U12 | C1, C2 | Se1-9 | N1, N2, N3 |
| **PEK_U03** | K1INF_U13 | C1, C2 | Se1-9 | N1, N2, N3 |
| **PEK_K01 (competences)** | K1INF_K01 | C1, C2 | Se1-9 | N1, N2, N3 |
| **PEK_K02** | K1INF_K02 | C1, C2 | Se1-9 | N1, N2, N3 |
| **PEK_K03** | K1INF_K03 | C1, C2 | Se1-9 | N1, N2, N3 |
| **PEK_K04** | K1INF_K04 | C1, C2 | Se1-9 | N1, N2, N3 |
| **PEK_K05** | K1INF_K05 | C1, C2 | Se1-9 | N1, N2, N3 |

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

*** - from table above

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

**SUBJECT CARD**

**Name in Polish: Sieci komputerowe**

**Name in English: Computer communication networks**

**Main field of study (if applicable): Information technology**

**Specialization (if applicable): ……………………..**

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

**Kind of subject: obligatory**

**Subject code INZ006704**

**Group of courses: NO**

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 0 | 18 | 0 | 0 |
| Number of hours of total student workload (CNPS) | 90 | | 90 | | |
| Form of crediting | Examination | | Crediting with grade | | |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 3 | | 3 | | |
| including number of ECTS points for practical (P) classes | | | 3 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 1,2 | | 1,2 | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

16. Has a basic knowledge of linear algebra, analytic geometry and mathematical analysis, necessary for solving simple problems of an engineering calculation of technical and non-technical disciplines (K1INF_W01)

17. Has a basic knowledge of discrete mathematics, mathematical logic and mathematical statistics, the necessary information to solve simple engineering problems (K1INF_W02)

18. Has a basic knowledge of computer organization and architecture (K1INF_W08)

19. Has a basic knowledge of the design and operation of operating systems (K1INF_W10)

20. Can use indicated an analytical method and plan and carry out a simple experiment and computer simulation engineering, conduct a survey and analyze the results, particularly for the selected system components (K1INF_U09)

21. Knows the basic methods and tools for collecting, processing and retrieval of information and to extract knowledge (K1INF_W16)

22. Can use the right tools to build a simple model of the process (the object), to formulate a specific task analysis and decision making (K1INF_U15)

23. Has the ability to self-education, including in order to improve professional competence (K1INF_U05)

24. Understands and knows the need continuous training opportunities and improving their social skills and (K1INF_K01)

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**SUBJECT OBJECTIVES**

C1. Ordered, underpinned by theoretical knowledge in the field of taxonomy, structure and applications of computer networks, circuit switching and switching messages and tiered hierarchical models of computer networks, construction and functionality of network protocols, network protocols, rules of cooperation in piles according to protocols and analysis of quantitative and qualitative existing networks computer.

C2. Skills of analysis, design and configuration of network solutions using network models, standards and protocol stacks, formulation design and analysis tasks of network solutions and assess the suitability of a variety of networking solutions for the implementation of various services distributed systems.

| C3. Skills for the selection of the appropriate variety of networking solutions to achieve business goals supported by IT systems. |
|---|

| **SUBJECT EDUCATIONAL EFFECTS** |
|---|
| Relating to knowledge:<br>K1INF_W11: Has basic knowledge of IT systems and computer networks<br>K1INF_W12: Has basic knowledge in the field of distributed systems architecture and methods for multiprocessor and distributed computing<br>K1INF_W14: Has basic knowledge of the architecture of the Internet and Web-based systems<br><br>Relating to skills:<br>K1INF_U05: Has the ability to self-study, including in order to improve the professional competence<br>K1INF_U06: Can choose the hardware and software components of a computer system for specific applications<br>K1INF_U08: Can configure basic network hardware and software in computer networks<br>K1INF_U11: Can obtain information from literature, databases and other sources, also in English, including for the purposes of self-education and improving professional skills, able to integrate the information, make their interpretation, as well as draw conclusions and formulate and justify opinions.<br><br>Relating to social competences:<br>K1INF_K01: Understands and knows the need for continuous training opportunities and improve their professional competence and social<br>K1INF_K04: He can appropriately prioritize for implementation specified by you or other tasks |

| **PROGRAMME CONTENT** | |
|---|---|
| **Form of classes - lecture** | **Number of hours** |
| Lec 1 Classification of computer networks. Circuit switching and message switching (packet switching). Evaluation of the effectiveness of resource use in networks with different switching methods. The optimal packet length (task formulation). Classification of data communications traffic. | 2 |
| Lec 2 Connecting open systems model (Open Systems Interconnection model) and other models of computer networks. Layered network models and principles of cooperation between the layers. | 2 |
| Lec 3 Open Systems Interconnection model layers – the physical layer. | 2 |
| Lec 4 Medium access method in local and wide area networks, wired and wireless networks. | 2 |
| Lec 5 Open Systems Interconnection model layers - the data link layer. Implementations of the data link layer functions in different network standards. HDLC (High Level Data Link Control) protocol as an example of the connection in the data link layer. | 2 |
| Lec 6 Open Systems Interconnection model layers - the network layer. Implementations of the network layer functions in different network standards. | 2 |
| Lec 7 Measures of the quality of services provided by networks serving streaming and elastic traffic. The tasks of routing and flow control. Node queuing model of | 2 |

| | packet-switched networks. | |
|---|---|---|
| Lec 8 | IP (Internet Protocol) as an example of connectionless protocol at the network layer. Addressing issues in networks. Congestions and congestion control tasks in packet switched networks. | 2 |
| Lec 9 | TCP (Transport Control Protocol) as an example of protocol at the transport layer connection. Guidelines for the development of a network of circuit switched and packet switched. Concepts of providing the quality of services in computer networks. New generations of computer networks. | 2 |
| | Total hours | **18** |

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - laboratory** | | **Number of hours** |
| Lab 1 | Organizational Information. Physical media, making the cables. | 2 |
| Lab 2 | Communication over the network. Wired computers connections. | 2 |
| Lab 3 | Using Wireshark™ to view and examine protocol data units. Application layer protocols. | 2 |
| Lab 4 | IPv4 addressing. Packet Tracer. Network simulator. Using Wireshark™ to view protocol data units. Network and transport layer protocols. | 2 |
| Lab 5 | Establishing a console session with switch/router. Basic Cisco device configuration. | 2 |
| Lab 6 | Basic Cisco device configuration part 2. Managing router and switch configuration. Password recovery procedure. | 2 |
| Lab 7 | Creating VLAN (Virtual Local Area Network) network on switches. Connections between switches with trunk lines. | 2 |
| Lab 8 | Managing the VLANs with VTP (Virtual Transfer Protocol) protocol. Basic static route configuration. Basic Inter-VLAN routing. Basic RIP (Routing Information Protocol) configuration. | 2 |
| Lab 9 | Exams based on Cisco CCNA (*Cisco* Certified Network Associate) Exploration. Grading. | 2 |
| | Total hours | **18** |

| TEACHING TOOLS USED |
|---|
| N1. Traditional lecture. Multimedia presentations. |
| N2. Student's own works – solving experiments and tasks in laboratory. |
| N3. Student's own works – literature studies. |
| N5. Collective works in laboratory |
| N5. Student's own works – preparation of presentations and technical documentations. |

| EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT |
|---|

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
| --- | --- | --- |
| F1 (lecture) | K1INF_W11<br>K1INF_W12<br>K1INF_W14<br>K1INF_U05<br>K1INF_U06<br>K1INF_U08<br>K1INF_U11<br>K1INF_K01<br>K1INF_K04 | Observation of student's activity. Solving exercises. Preparation and presentation delivery. |
| F1 – F9 (laboratory) | K1INF_U05<br>K1INF_U06<br>K1INF_U08<br>K1INF_U11<br>K1INF_K01<br>K1INF_K04 | Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and evaluation of student independence. Analysis of reports of exercise. |
| P (lecture) | K1INF_W11<br>K1INF_W12<br>K1INF_W14<br>K1INF_U05<br>K1INF_U06<br>K1INF_U08<br>K1INF_U11<br>K1INF_K01<br>K1INF_K04 | Examination taking into account results of forming evaluation F1 (lecture) |
| P (laboratory) | K1INF_U05<br>K1INF_U06<br>K1INF_U08<br>K1INF_U11<br>K1INF_K01<br>K1INF_K04 | Weighted sum of forming evaluations F1 – F9 (laboratory). |

**PRIMARY AND SECONDARY LITERATURE**

PRIMARY LITERATURE:

[55] A.S. Tanenbaum, „Computer networks", Prentice Hall; 1996

[56] G. Pujolle, D. Seret, D. Dromard, E. Horlait, „Integrated Digital Communication Networks", J. Wiley & Sons

[57] B. Russell, „The art of computer networks", Prentice Hall; 2009

[58] V.S. Bagad, I.A. Dhotre, „Computer networks", Technical Publications, 2009.

[59] http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

[60] M. Roden, „Analog and digital communication systems", Prentice Hall


SECONDARY LITERATURE:

[1] MIT open cources:http://ocw.mit.edu/courses/electrical-engineering-and-computer-science

[2] CCNA Exploration Network Fundamentals, Cisco Academy, PWN, 2008

[3] http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

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

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Computer communication networks**

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Program content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W11 | C1,C3 | Lec 1 – Lec 9 | N1, N2, N3 |
| PEK_W02 | K1INF_W12 | C1, C2 | Lec 1 – Lec 9 | N1, N2, N3 |
| PEK_W03 | K1INF_W14 | C1, C3 | Lec 1 – Lec 9 | N1, N2, N3 |
|  |  |  |  |  |
| PEK_U01 (skills) | K1INF_U05 | C2 | Lab 1 – Lab 9 | N2, N4, N5 |
| PEK_U02 | K1INF_U06 | C2 | Lab 1 – Lab 9 | N2, N4, N5 |
| PEK_U03 | K1INF_U08 | C2 | Lab 1 – Lab 9 | N2, N4, N5 |
| PEK_U04 | K1INF_U11 | C1, C2, C3 | Lec 1 – Lec 9 Lab 1 – Lab 9 | N1, N2, N3, N4, N5 |
|  |  |  |  |  |
| PEK_K01 (competences) | K1INF_K01 | C1, C2, C3 | Lec 1 – Lec 9 Lab 1 – Lab 9 | N1, N2, N3, N4, N5 |
| PEK_K02 | K1INF_K04 | C1, C2, C3 | Lec 1 – Lec 15 Lab 1 – Lab 15 | N1, N2, N3, N4, N5 |

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

Zał. nr 4 do ZW 64/2012

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

## SUBJECT CARD

**Name in Polish: Sieci komputerowe II**
**Name in English: Computer communication networks II**
**Main field of study (if applicable): Computer science**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1$^{st}$ level, part-time**
**Kind of subject: obligatory**
**Subject code INZ007654**
**Group of courses NO**

|  | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 0 | 18 | 0 | 0 |
| Number of hours of total student workload (CNPS) | 60 |  | 60 |  |  |
| Form of crediting | Examination | Crediting with grade |  |  |  |
| For group of courses mark (X) final course |  |  |  |  |  |
| Number of ECTS points | 2 |  | 2 |  |  |
| including number of ECTS points for practical (P) classes |  |  | 2 |  |  |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 |  | 0,8 |  |  |

*delete as applicable

### PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Has a basic knowledge of linear algebra, analytic geometry and mathematical analysis, which is necessary to perform simple computing tasks on an engineering of technical and non-technical disciplines (K1INF_W01).
2. Has a basic knowledge of discrete mathematics, mathematical logic and mathematical statistics, the necessary information to solve simple engineering problems (K1INF_W02).
3. Has a basic knowledge of computer organization and architecture (K1INF_W08).
4. Has a basic knowledge of the structure and operation of an operating systems (K1INF_W10).
5. Has a basic knowledge of IT systems and computer networks (K1INF_W11).
6. Has a basic knowledge of the Internet architecture and Web-based systems (K1INF_W14).
7. Knows the basic methods and tools for collecting, processing and retrieval of information and knowledge extraction (K1INF_W16).
8. Can choose the hardware and software components of a computer system for specific applications (K1INF_U06).
9. Can be used as indicated analytical method and to plan and carry out a simple experiment engineering and computer simulation, to carry out tests and analyze results, particularly for the selected system components (K1INF_U09).
10. Can configure basic networking hardware and software in computer networks (K1INF_U08).
11. Can use the right tools to build a simple model of the process (the object), to formulate specific task analysis and decision making (K1INF_U15).

12. Has the ability to self-education, including in order to improve professional competence (K1INF_U05).
13. Understands the need and knows the possibility of lifelong learning and improving their skills and social (K1INF_K01).

**SUBJECT OBJECTIVES**

C1. Ordered, underpinned by theoretical knowledge of methods of delivering quality services in networks, reliability and safety in today's ICT systems using models of queuing and reliability models.
C2. Ordered, underpinned by theoretical knowledge of methods, algorithms, procedures and monitoring protocols for the analysis, design and management of quality, reliability and security in ICT systems.
C3. Skills for the analysis, comparison, configuration and design of networked devices and software network devices using a model of nodes and networks and standards, the task of formulating the design and analysis of network solutions and evaluate the suitability of different network solutions to support different services reliable and secure distributed communication systems.
C4. Skills for the selection of appropriate methods, algorithms, standards, tools (software and hardware) and network solutions for the design and provision of reliable and secure network services in a distributed ICT systems.

**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:
  K1INF_W11:  Has basic knowledge of IT systems and networks
  K1INF_W12:  Has basic knowledge of the architecture of distributed systems and methods for multiprocessor and distributed computing

relating to skills:
  K1INF_U05:  Has the ability to self-study, including in order to improve the professional competence
  K1INF_U08:  Can configure basic networking hardware and software in computer networks
  K1INF_U11:  Can obtain information from literature, databases and other sources, also in English, including for the purposes of self-education and professional skills development, can integrate the information, make their interpretation, and to draw conclusions and formulate and justify opinions.

relating to social competences:
  K1INF_K01:  Understands the need and knows the possibilities of lifelong learning and to improve their professional competence and social
  K1INF_K04:  Can properly set priorities for implementation specified by you or other tasks

**PROGRAMME CONTENT**

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Quality of networks and networks' services. Security of computer networks. Reliability of computer systems and networks | 2 |
| Lec 2 | Diagnostics and testing of computer hardware | 2 |

| Lec 3 | Testing and diagnostics of software | 2 |
|---|---|---|
| Lec 4 | Detection and fault tolerance in the system | 2 |
| Lec 5 | Reliability models and their use in the diagnosis and their use in planning and resource management system | 2 |
| Lec 6 | Security of computer networks. Systematics. Basic problems and how to solve them. | 2 |
| Lec 7 | Cryptography and cryptographic systems | 2 |
| Lec 8 | Attacks on security. Methods and techniques of security breaches Monitoring network traffic and detecting anomalies. | 2 |
| Lec 9 | Reliability and security of computer networks. Standards, standards and recommendations. | 2 |
| | Total hours | 18 |

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - class** | | **Number of hours** |
| Lab 1 | Organizational activities. Safety in the laboratory. | 2 |
| Lab 2 | Secure networking devices - examples of methods and their practical implementations (Secure Network Devices). | 2 |
| Lab 3 | Objectives and configuration in the tasks of authentication, authorization, and accounting (Authentication, Authorization and Accounting) networks | 2 |
| Lab 4 | Practical implementations of firewall (Firewall Technologies) | 2 |
| Lab 5 | Implementation and configuration of security systems and detection of security breaches (Intrusion Prevention) | 2 |
| Lab 6 | Implementation and configuration examples of local security networks in the tasks of security and safety violations. | 2 |
| Lab 7 | Setting up and managing virtual networks. Virtualization nodes and network links (Virtual Private Networks) | 2 |
| Lab 8 | Management of networked systems with built-in security systems (Secure Network Management) | 2 |
| Lab 9 | Solving problems in the network configuration. Improve reporting and testing. Examination. | 2 |
| | Total hours | 18 |

| TEACHING TOOLS USED |
|---|
| N1. Traditional lecture. Multimedia presentations. |
| N2. Student's own works – solving experiments and tasks in laboratory. |
| N3. Student's own works – literature studies. |
| N5. Collective works in laboratory |
| N5. Student's own works – preparation of presentations and technical documentations. |

| EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT | | |
|---|---|---|
| **Evaluation** (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
| F1 (lecture) | K1INF_W11<br>K1INF_W12<br>K1INF_U05<br>K1INF_U08<br>K1INF_U11<br>K1INF_K01<br>K1INF_K04 | Observation of student's activity. Solving exercises. Preparation and presentation delivery. |
| F1 – F9 (laboratory) | K1INF_U05<br>K1INF_U08<br>K1INF_U11<br>K1INF_K01<br>K1INF_K04 | Checking the preparation of the student. Checking the presence of the student. Observation of student activity. Observation and evaluation of student independence. Analysis of reports of exercise. |
| P (lecture) | K1INF_W11<br>K1INF_W12<br>K1INF_U05<br>K1INF_U08<br>K1INF_U11<br>K1INF_K01<br>K1INF_K04 | Examination taking into account results of forming evaluation F1 (lecture) |
| P (laboratory) | K1INF_U05<br>K1INF_U08<br>K1INF_U11<br>K1INF_K01<br>K1INF_K04 | Weighted sum of forming evaluations F1 – F9 (laboratory). |

| PRIMARY AND SECONDARY LITERATURE |
|---|

PRIMARY LITERATURE:

[61] M. Serafin, "Sieci VPN. Zdalna praca i bezpieczeństwo danych", Helion, 1991 – 2013

[62] W. Stallings, Kryptografia i bezpieczeństwo sieci komputerowych. Matematyka szyfrów i techniki kryptologii, Helion, 1991 – 2013.

[63] S. Garfinkel, G.Spafford, Bezpieczeństwo w Unixie i Internecie. Wydawnictwo RM, Warszawa 1997.

[64] B. Schneier, Kryptografia dla praktyków - protokoły, algorytmy i programy źródłowe w języku C. WNT, Warszawa 1995.

[65] D. Comer, Sieci komputerowe TCP/IP. Zasady, protokoły i architektura. WNT, Warszawa 1997.

[66] D. Bobrowski, Modele i metody matematyczne teorii niezawodności w przykładach i zadaniach. WNT, Warszawa 1985.

[67] D. Bobrowski, Probabilistyka w zastosowaniach technicznych. WNT, Warszawa 1986.

[68] I. Koźniewska, M.Włodarczyk, Modele odnowy, niezawodności i masowej obsługi. PWN, Warszawa 1978.

[69] A. Grzywak, Bezpieczeństwo systemów komputerowych i telekomunikacyjnych. Wydawnictwo SOTEL, Chorzów 1999.

[70] J. Sosnowski, Testowanie i niezawodność systemów komputerowych, Oficyna EXIT, Warszawa 2005.

[71]  J. Woźniak, K. Nowicki, „Sieci LAN, MAN i WAN – protokoły komunikacyjne", Wydawnictwo FPT, Kraków 1998

SECONDARY LITERATURE:

[1]  S. Maguire, „Niezawodność oprogramowania", Helion, 1991 – 2013.
[2]  Akademia sieci Cisco CCNA, PWN, 2008
[3]  S. Haykin, „Systemy telekomunikacyjne", WKiŁ, Warszawa 1999.
[4]  MIT Free Open Course Materials (http://ocw.mit.edu/index.htm)
      http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

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

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

## MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Computer communication networks II**

### AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Program content*** | Teaching tool number*** |
|---|---|---|---|---|
| **PEK_W01 (knowledge)** | K1INF_W11 | C1, C2, C3 | Lec 1 – Lec 9 | N1, N2, N3 |
| **PEK_W02** | K1INF_W12 | C1, C2, C3, C4 | Lec 1 – Lec 9 | N1, N2, N3 |
| | | | | |
| **PEK_U01 (skills)** | K1INF_U05 | C3, C4 | Lab 1 – Lab 9 | N2, N4, N5 |
| **PEK_U02** | K1INF_U08 | C3, C4 | Lab 1 – Lab 9 | N2, N4, N5 |
| **PEK_U03** | K1INF_U11 | C1, C2, C3, C4 | Lec 1 – Lec 9 Lab 1 – Lab 9 | N1, N2, N3, N4, N5 |
| | | | | |
| **PEK_K01 (competences)** | K1INF_K01 | C1, C2, C3, C4 | Lec 1 – Lec 9 Lab 1 – Lab 9 | N1, N2, N3, N4, N5 |
| **PEK_K02** | K1INF_K04 | C1, C2, C3, C4 | Lec 1 – Lec 9 Lab 1 – Lab 9 | N1, N2, N3, N4, N5 |

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

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FACULTY W-8 / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish** *Sieci neuronowe……………………….*
**Name in English** *Neural Networks………………………….*
**Main field of study (if applicable):** *Informatics…………….*
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ ~~2nd* level, full-time / part-time~~***
**Kind of subject: ~~obligatory /~~ optional / ~~university-wide~~***
**Subject code INZ007649**
**Group of courses ~~YES~~ / NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | | 18 | | |
| Number of hours of total student workload (CNPS) | 60 | | 60 | | |
| Form of crediting | ~~Examination~~ / crediting with grade* | Examination / crediting with grade* | ~~Examination~~ / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |

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

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. K1INF_U02; K1INF_U03 skills in coding at any high programming language 2.K1INF_W01 fundamental knowledge in differential calculus and matrices.

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**SUBJECT OBJECTIVES**

C1 Teaching neural network design

C2 Presentation of various kinds of neural networks trained in supervised and unsupervised way

C2 Teaching practical application of neural networks: a choice of neural network to a specific problem, design of its architecture and training.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

PEK_W01 Student knows theoretical backround of neural network architecture, methods of training principles of processing information

relating to skills:

PEK_U01 Student knows how to analyze and formulate problem in terms of neural network application.

PEK_U02 Student is able to design and to implement application being neural network model

PEK_U03 Student is able to plan and conduct experiments testing efficiency of applied neural network .

PEK_U04 Student knows how to prepare report describing conducted experiments.

relating to social competences:

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**PROGRAMME CONTENT**

| Form of classes – lecture | Number of |
|---|---|
| | |

| Lec 1 | Introduction to the course. Description of the course, its organization and principles of evaluation. An example of neural network application. Principles of neural network design. | 2 |
|---|---|---|
| Lec 2 | The first Simple networks: Simple perceptron, Adaline | 2 |
| Lec3 | BackPropagation- supervised training method | 2 |
| Lec4 | Multilayered networks (MLP) – the choice of architecture to the specific task, training parameters, coding inputs and outputs | 2 |
| Lec5 | Examples of MLP applications | 2 |
| Lec6 | Unsupervised networks – CounterPropagation network | 2 |
| Lec7 | Self Organizing Maps – SOM | 2 |
| Lec8 | Radial Basis Function Networks – methods of training and applications | 2 |
| Lec 9 | Associative Memories –Hopfield Network, BAM | 2 |
| | Total hours | 18 |

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

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab 1 | Introductory information - presentation of the formal principles of the course and the project assessment. Presentation of exemplary project report | 2 |
| Lab 2 | Project1: Implementation of simple perceptron and Adaline and their training to per form Simple logi cal function | 2 |
| Lab 3 | Evaluation of Project 1 and discussion on the choice of problem to solve by BP Network (Project2) .Conceptual design of the Project2. | 2 |
| Lab4 | Public presentation of the current result of Project 2 realization. | 2 |
| Lab5 | Testing and report preparation for Project2 | 2 |
| Lab6 | Public presentation of the final state of the Project 2 | 2 |
| Lab7 | Discussion on the problem chosen to solve as a Project 3 (unsupervised trained neural Network) | 2 |
| Lab8 | Public presentation of the current result of Project 3 realization (Conceptual design of the Project. Collecting data). | 2 |

| Lab9 | Public presentation of the final state of the Project 3 | 2 |
|------|--------------------------------------------------------|----|
| … | | |
| | Total hours | 18 |

| Form of classes - project | | of hours |
|---------------------------|---|----------|
| Proj 1 | | |
| Proj 2 | | |
| Proj 3 | | |
| Proj 4 | | |
| Proj5 | | |
| | Total hours | |

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

| TEACHING TOOLS USED |
|---------------------|
| N1. Informational lecture supported by multimedia presentation |
| N2. Design specification  needed for the project |
| N3. Design document template |
| N4. e-learning system  applied for publication of  didatic materials |

**EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT**

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|------|------|------|
| F1 Delivery of project1 (implementation and report) | PEK_U02  PEK_U03  PEK_U04 | Assessed are: Correctness of the task formulation, assumptions  the scheme of coding input and output  information and the current progress of the project. The way of presentation is also evaluated. The grade  scale 1-10. |
| F2 Delivery of Project 2 declaration | PEK_U01 | Every week of unjustified delay in delivering project declaration  results in  grade  reduction in course grade |
| F3 Presentation of partial results of the project2 | PEK_U01, PEK_U02 | Assessed are: Correctness of the task formulation,  assumptions  the scheme of coding input and output  information and the current progress of the project. The way of presentation |

| | | is also evaluated. The grade scale 1-10. |
|---|---|---|
| F4 Report from the implementation of the project2 | PEK_U03<br><br>PEK_U04 | Appraisal refers to the way of problem solution, experiment quality, the experiment documentation and the project report (structure, theoretical introduction and bibliography). The grade scale 1-10. |
| F5 Delivery of Project 3 declaration | PEK_U01 | Every week of unjustified delay in delivering project declaration results in grade reduction in course grade |
| F6 Presentation of partial results of the project3 | PEK_U01, PEK_U02 | Assessed are: Correctness of the task formulation, assumptions, the scheme of coding input and output information and the current progress of the project. The way of presentation is also evaluated. The grade scale 1-10. |
| F7 Report from the implementation of the project2 | PEK_U03<br><br>PEK_U04 | Appraisal refers to the way of problem solution, experiment quality, the experiment documentation and the project report (structure, theoretical introduction and bibliography). The grade scale 1-10. |
| P1 – the final grade for project | PEK_U01 – PEK_U04 | The final number of points is calculated according to the following formulae : P1=0.2F1+ 0.1 F3+ 0.3 F4+0.1 F6+ 0.3 F7. The final grade is calculated on the base of the number of points in the following way:<br><br><50%, 60%) → dst<br><br><60%, 70%) → dst+<br><br><70%, 80%) → db<br><br><80%, 90%) → db+<br><br><90%, → bdb<br><br>Remark: the final grade is reduced by half of a grade for each week of unjustified delay of a declaration or a report |
| P2– the final grade for the lecture | PEK_W01 | The test consists of open questions with given number of points. The sum of points is translated to the grades as follows:<br><br><50%, 60%) → dst |

| | | |
|---|---|---|
| | | <60%, 70%) → dst+ |
| | | <70%, 80%) → db |
| | | <80%, 90%) → db+ |
| | | <90%, → bdb |

| PRIMARY AND SECONDARY LITERATURE |
|---|

**PRIMARY LITERATURE:**

[72]  [1] S.Osowski: Sieci neuronowe w ujęciu algorytmicznym, WNT 1996
[73]  Sieci neuronowe w zastosowaniach, pod red. U. Markowskiej Kaczmar, H. Kwaśnickiej, Oficyna Wydawnicza PWr. 2005
[74]  T. Masters: Sieci neuronowe w praktyce. Programowanie w języku C++, WNT 1996
[75]  Biocybernetyka i inżynieria biomedyczna 2000 Tom 6 Sieci neuronowe (redaktorzy tomu (Włodzisław Duch, Józef Korbicz, Leszek Rutkowski, Ryszard Tadeusiewicz); Akademicka Oficyna Wydawnicza EXIT.

**SECONDARY LITERATURE:**

[42]  [1] J. ∫urada, M. Barski, W. Jędruch: Sztuczne sieci neuronowe. Podstawy teorii i zastosowania, PWN Warszawa 1996
[43]  R. Tadeusiewicz: Wprowadzenie do sieci neuronowych, StatSoft 2001.

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

Urszula Markowska-Kaczmar, urszula.markowska-kaczmar@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Neural Network**
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) | K1INF_W17 | C3 | Wy1 – Wy8 | N1,N4 |
| PEK_U01 (skills) | K1INF_U03 | C1, C2, C3 | Wy1<br><br>Pr2, Pr8 | N1, N4 |
| PEK_U02 | K1INF_U04 | C1,C3 | Pr4, Pr10 | N1, N2, N4 |
| PEK_U03 | K1INF_U07, K1INF_U10 | C1, C3 | Pr5 – Pr14 | N2, N4 |
| PEK_U04 | K1INF_U13 | C3 | Pr 7, Pr13 | N3 |
| | | | | |
| | | | | |

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY W-8 / DEPARTMENT…Informatics……………
**SUBJECT CARD**
**Name in Polish … Środowisko sieciowe Unix………………………………………….**
**Name in English…Unix in Network Environment…………………………………….**
**Main field of study (if applicable): …Informatics……………………….**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1ˢᵗ level, part-time**
**Kind of subject: optional**
**Subject code INZ007648**
**Group of courses YES**

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 9 | | 18 | | |
| 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 | | | | | |
| Number of ECTS points | 1 | | 2 | | |
|    including number of ECTS points for practical (P) | | | 2 | | |

| | classes | | | | | |
|---|---|---|---|---|---|---|
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,4 | | 0,8 | | | |

*delete as applicable

### PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of operating systems
2. Basic knowledge of computer networks

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### SUBJECT OBJECTIVES

C1 Students understand the main features of Linux and Unix operating systems
C2 Students acquire the practical skills of instalation and configuration of Unix operating systems
C3 Students acquire the practical skills of using information systems in Unix network environment

### SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Students know architecture of Unix and Linux
PEK_W02 Students know the mechanism of computer Network
PEK_W03 Students know methods used in information systems
…
relating to skills:
PEK_U01 Students have the skills of self learning in the aim of lifting professional skills
PEK_U02 Students are able to gain information from various sources
PEK_ U03 Students are able to define problems and then finding solution
…
relating to social competences:
PEK_K01 Students understand the need of continous education

### PROGRAMME CONTENT

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | General characteristic of network environment | 1 |
| Lec 2 | Architecture of Unix and Linux operating systems | 1 |
| Lec 3 | Kernel of operating system | 1 |
| Lec 4 | File systems | 1 |
| Lec 5 | Processess management | 2 |
| Lec 6 | Interprocesses communication | 1 |
| Lec 7 | Implementing and running network services | 1 |
| Lec 8 | Socket network communication | 1 |
| | Total hours | 9 |

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

| | Total hours | |
|---|---|---|
| **Form of classes - laboratory** | | **Number of hours** |
| Lab1 | Logging into the operating system | 1 |
| Lab2 | Using documentation of Linux system | 1 |
| Lab3 | File system, file and directories management | 2 |
| Lab4 | User environment | 1 |
| Lab5 | Using different  command interpreters | 2 |
| Lab6 | Linux system instalation | 2 |
| Lab7 | Network interface configuration | 1 |
| Lab8 | Network interface testing | 1 |
| Lab9 | FTP Service | 2 |
| Lab10 | DNS Service | 2 |
| Lab11 | Backup and recovery of data | 2 |
| Lab12 | User management in Linux | 1 |
| | Total hours | 18 |
| **Form of classes - project** | | **Number of hours** |
| Proj1 | | |
| Proj2 | | |
| Proj3 | | |
| Proj4 | | |
| … | | |
| | Total hours | |
| **Form of classes - seminar** | | **Number of hours** |
| Sem1 | | |
| Sem2 | | |
| Sem3 | | |
| … | | |
| | Total hours | |
| **TEACHING TOOLS USED** | | |
| N1. Lecture – traditional method<br>N2. Consultations<br>N3. Practical exercises at computer laboratory | | |

**EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT**

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

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| F1 | Laboratory | PEK_W01-03 PEK_U01- 03 | Presentation of programming work, oral explanation |
|---|---|---|---|
| P | Lecture | PEK_W01-03 PEK_U01-03 | Final test |
| C | | | |

| PRIMARY AND SECONDARY LITERATURE |
|---|

**PRIMARY LITERATURE:**

[1] Linux Programming by Example, Mathews N., Que Corporation, 2000
[2] Unix Network Programming, Stevens W., Pearson Education, 1998
[3] Advanced Unix Programming,Rockind W., Pearson Education,2004
[4]

**SECONDARY LITERATURE:**

[1] Operating System Concepts, Silberschatz A., Addison-Wesley, 2005
[2]
[3]

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

Dr inż. Sławomir Skowroński slawomir.skowronski@pwr.wroc.pl

# MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**…Unix in network Environment…………………………**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics………………………..
AND SPECIALIZATION …………………………….

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W10,K1INF_W04 | C1,C2 | Wy1-6 | N1-3 |
| PEK_W02 | K1INF_W11, K1INF_W05 | C1, C2 | Wy1-6 | N1-3 |
| PEK_W03 | K1INF_W13 | C1,C2 | Wy1-8 | N1-3 |
| … | | | | |
| PEK_U01 (skills) | K1INF_U05, K1INF_U06 | C2 | Wy1-8 | N1-3 |
| PEK_U02 | K1INF_U11, K1INF_U08 | C2 | Wy1-8 | N1-3 |
| PEK_U03… | K1INF_U08 | C1, C2 | Wy1-8 | N1-3 |
| PEK_K01 (competences) | K1INF_K05 | C1, C2 | Wy1-8 | N1-3 |
| PEK_K02 | | | | |
| … | | | | |

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

*** - from table above

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FACULTY Department of Computer Science and Management / DEPARTMENT……………
**SUBJECT CARD**
**Name in Polish: Statystyka matematyczna**
**Name in English: Statistics**
**Main field of study (if applicable): Informatics**
**Specialization (if applicable): ………………………….**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject:        obligatory / optional / university-wide\***
**Subject code        INZ002520**
**Group of courses        YES / NO\***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | 9 | | | |
| Number of hours of total student workload (CNPS) | 60 | 30 | | | |
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | 1 | | | |

| including number of ECTS points for practical (P) classes | | | | | |
|---|---|---|---|---|---|
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 | 0,4 | | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

8.  Passed the subject: Algebra and Analytic Geometry. Knowledge of the subject.
9.  Passed the subject: Mathematical analysis. Knowledge of the subject.
10. Passed the subject: Discrete Mathematics. Knowledge of the subject.

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**SUBJECT OBJECTIVES**

C1 Acquisition of basic knowledge about the essence of statistical data analysis.
C2 Acquisition of basic knowledge of estimation and estimators.
C3 Acquisition of basic knowledge of the confidence intervals for the mean and variance.
C4 Acquisition of basic knowledge of statistics and hypothesis testing of one-dimensional linear regression and multiple linear regression.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:
PEK_W01 – has knowledge of the purpose and scope of the preliminary analysis of the data, which are designed to process statistical methods.
PEK_W02 – has knowledge of estimation and various estimators.
PEK_W03 – has knowledge of the confidence intervals for the mean and variance of the normal distribution and for the difference of two normal populations.
PEK_W04 – knows statistical hypothesis testing, tests for the mean and variance of the normal distribution, tests for difference of means of two normal populations.
PEK_W05 – has knowledge of compatibility tests and independence of chi-square, and the analysis of variance, is aware of the non-parametric tests and indeed knows the one-dimensional model and multiple regression.

relating to skills:
PEK_U01 – is able to perform a preliminary analysis of data for processing statistical methods.
PEK_U02 – can attempt to estimate the point method and the method sectional.
PEK_U03 – is able to determine the confidence intervals for the mean and variance of the normal distribution and for the difference of two normal distributions, and also knows how to apply statistical hypothesis testing and perform tests mean and variance of the normal distribution and tests for the difference of the two populations.
PEK_U04 – knows how to perform compliance and independence chi-square analysis of variance - accounting exercises.

relating to social competences:
PEK_K01 – understands the importance of probability and statistics in the processes of social, economic, and technology.

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**PROGRAMME CONTENT**

| Form of classes - lecture | Number of hours |
|---|---|

| Lec 1 | Preliminary analysis of the data. | 2 |
|---|---|---|
| Lec 2 | The point estimate. Maximum likelihood estimators. | 2 |
| Lec 3 | Estimators based on the method of moments. Interval estimation. | 2 |
| Lec 4 | The confidence intervals for the mean and variance of a normal distribution. | 2 |
| Lec 5 | Confidence intervals for the difference of two normal populations. | 2 |
| Lec 6 | Testing statistical hypotheses. Tests mean and variance of a normal distribution. | 2 |
| Lec 7 | Tests for the difference of two normal populations. | 2 |
| Lec 8 | Compliance tests and independence tests. Chi-square test. Analysis of variance. The essence of nonparametric tests. | |
| Lec 9 | Simple linear regression. Multiple Regression. | 2 |
| | Total hours | 18 |

| **Form of classes - class** | | **Number of hours** |
|---|---|---|
| Cl 1 | Preliminary analysis of the data - accounting exercises. | 1 |
| Cl 2 | Point estimation - accounting exercises. | 1 |
| Cl 3 | Interval estimation - accounting exercises. | 1 |
| Cl 4 | The confidence intervals for the mean and variance of the normal distribution - accounting exercises. | 1 |
| Cl 5 | Confidence intervals for the difference of two normal populations - accounting exercises. | 1 |
| Cl 6 | Testing statistical hypotheses. Tests for the mean and variance of the normal distribution - accounting exercises. | 1 |
| Cl 7 | Tests for the difference of two normal populations - accounting exercises. | 1 |
| Cl 8 | Tests of conformity and independence chi-square analysis of variance - accounting exercises. | 1 |
| Cl 9 | Final test. | 1 |
| | Total hours | 9 |

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

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

| **Form of classes - seminar** | | **Number of** |
|---|---|---|

| | | hours |
|---|---|---|
| Sem 1 | | |
| Sem 2 | | |
| Sem 3 | | |
| ... | | |
| | Total hours | |

## TEACHING TOOLS USED

N1. Traditional lecture-based multimedia presentations.
N2. Tutorials and discussion of solutions of the foundations of probability and reliability of the system. Discussing and presenting solutions do lists. Final test of the exercise.
N3. Consultations for students.
N4. Consultations for students – solving task lists.
N5. Self-study problems of lecture.

## EVALUATION 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 | Examples and exercises accounting. Solving task lists. |
| C | PEK_W01-PEKW_05, PEK_K01 | Final test. |

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

[1] J. Koronacki, J. Mielniczuk, *Statystyka dla studentów kierunków technicznych i przyrodniczych*, WNT, Warszawa 2001.
[2] L. Gajek, M. Kaluszka, *Wnioskowanie statystyczne. Modele i metody*, Wydawnictwa Naukowo-Techniczne, Warszawa 1984.
[3] D. Bobrowski, *Modele i metody matematyczne teorii niezawodności w przykładach i zadaniach*, WNT, Warszawa 1985.
[4] R. Zieliński, *Tablice statystyczne*, WNT, Warszawa 2006.
[5] D. Bobrowski, *Probabilistyka w zastosowaniach technicznych*, WNT, Warszawa 1986.

**SECONDARY LITERATURE:**

[1] M. Maliński, *Weryfikacja hipotez statystycznych wspomagana komputerowo*, Wyd. Politechniki Śląskiej, Gliwice 2004.
[2] H. Jasiulewicz, W. Kordecki, *Rachunek prawdopodobieństwa i statystyka matematyczna. Definicje, twierdzenia, wzory*, GiS, Wrocław 2001.
[3] H. Jasiulewicz, W. Kordecki, *Rachunek prawdopodobieństwa i statystyka* matematyczna. Przykłady i zadania, GiS, Wrocław 2001.

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

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

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Statistics**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatics
AND SPECIALIZATION …………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| **PEK_W01 (knowledge)** | K1INF_W02 | Cl 1 | Lec1 | N1, N3, N5 |
| **PEK_W02** | K1INF_W02 | Cl 2 | Lec2- Lec3 | N1, N3, N5 |
| **PEK_W03** | K1INF_W02 | Cl 3 | Lec4- Lec5 | N1, N3, N5 |
| **PEK_W04** | K1INF_W02 | Cl 4 | Lec6- Lec7 | N1, N3, N5 |
| **PEK_W05** | K1INF_W02 | Cl 4 | Lec8- Lec 9 | N1, N3, N5 |
| **PEK_U01(skills)** | K1INF_W02 | Cl 1 | Cl 1 | N2, N3, N4 |
| **PEK_U02** | K1INF_W02 | Cl 2-Cl 3 | Cl 2- Cl 3 | N2, N3, N4 |
| **PEK_U03** | K1INF_W02 | Cl 3,Cl 4 | Cl 4- Cl 7 | N2, N3, N4 |
| **PEK_U04** | K1INF_W02 | Cl 4 | Cl 8 | N2, N3, N4 |
| **PEK_K01 (competences)** | K1INF_W02 | Cl 1-Cl 4 | Cl 1- Cl 9 | N1, N3, N5 |

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

*** - from table above

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FACULTY W-8 / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish …… Systemy wbudowane i mobilne**
**Name in English …… Embedded and mobile systems**
**Main field of study (if applicable): Informatics**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd* level, full-time / part-time***
**Kind of subject: obligatory / optional / university-wide***
**Subject code INZ001652**
**Group of courses YES / NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | | 18 | | |

| Number of hours of total student workload (CNPS) | 60 | | 60 | | |
|---|---|---|---|---|---|
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | | 2 | | |
| including number of ECTS points for practical (P) classes | 0 | | 2 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 1,2 | | 1,2 | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Knowledge of programming in Java
2. Basic knowledge of programming in C and/or C #

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**SUBJECT OBJECTIVES**

C1 Obtaining basic knowledge of the architecture of embedded systems and mobile applications.
C2 Obtaining basic knowledge of application design for selected types of mobile devices and embedded systems selected class.
C3 Gaining practical skills of implementation of selected, commonly used, mobile device applications, and/or selected high-level language programmable desktop system.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:
PEK_W01 Lists and characterizes basic hardware and software of embedded systems and mobile devices.
PEK_W02 Knows the basic properties and applications of specific software solutions for embedded systems, including real-time systems.
PEK_W03 Describes the operation of application components for main types of mobile phone systems.

relating to skills:
PEK_U01 Student is able to implement a simple application on the selected, mobile and embedded system platforms.
PEK_U02 Student can choose the right components and techniques used to achieve the main activities of selected applications on mobile devices.
PEK_U03 student can analyze and evaluate, in a basic scope, the characteristics of embedded system, including real-time system.
PEK_U04 Student is able to apply the principles of work, including safety rules, in a typical workplace for mobile system software development.

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**PROGRAMME CONTENT**

| Form of classes - lecture | Number of hours |
|---|---|

| Lec 1 | Introduction to lecture subject. Selected software platforms for embedded and mobile systems. | 2 |
|---|---|---|
| Lec 2 | Architecture and building of MIDP applications. | 2 |
| Lec 3 | Architecture and building of Android applications ( part 1 ) - the components and design of the application life cycle , creating basic interface, layouts and controls | 2 |
| Lec 4 | Architecture and building of Android applications (part 2) –, controlling activities, data storage. | 2 |
| Lec 5 | Architecture and basics of building Windows Phone applications. | 2 |
| Lec 6 | Selected aspects of embedded systems architecture – general characteristics and architecture of microcontrollers, integrated I/O. | 2 |
| Lec 7 | Real-time systems - definitions, characteristics, software, resource management | 2 |
| Lec 8 | Selected issues of the embedded systems and applications design. | 2 |
| Lec 9 | Passing test. | 2 |
|  | Total hours | **18** |

| **Form of classes - class** | | **Number of hours** |
|---|---|---|
|  | Total hours |  |

| **Form of classes - laboratory** | | **Number of hours** |
|---|---|---|
| Lab 1 | Health and Safety Training . Discussion of the organization and program of activities. Presentation of teaching tools . | 2 |
| Lab 2 & 3 | MIDP application - a high-level API interface and RMS. | 4 |
| Lab 4 & 5 | Android application - activities (windows), layouts and controls, activity interactions. | 4 |
| Lab 6 | Android applications - advanced UI elements. | 2 |
| Lab 7 | Android applications - data storage. | 2 |
| Lab 8 | Getting familiar with, and configuring development platform for Windows Phone applications. | 2 |
| Lab 9 | Windows Phone Application - interface elements, the basic controls, manage events and navigation between pages. | 2 |
|  | Total hours | 18 |

| **Form of classes - project** | | **Number of hours** |
|---|---|---|
|  | Total hours |  |

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

| **TEACHING TOOLS USED** |
|---|
| N1. Lecture supported by multimedia presentations. |

N1. Lecture supported by multimedia presentations.
N2. Laboratory aids for exercises.
N3. Software to implement application for specific classes of devices.
N4. Devices (smartphones, tablets, set-top boxes,) and emulators to run developed applications.
N5. The e-learning system for publication of teaching materials, exercises, announcements and
    collection and evaluation of student work, as well as for testing of acquired knowledge.

## EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| F1 – Lab3 | PEK_U01, PEK_U02, PEK_U04 | Assessment of the completeness and quality of the solution of the problem. 0÷10 point scale. |
| F2 – Lab5 | PEK_U01, PEK_U02, PEK_U04 | Assessment of the completeness and quality of the solution of the problem. 0÷10 point scale. |
| F3 – Lab6 | PEK_U01, PEK_U02, PEK_U04 | Assessment of the completeness and quality of the solution of the problem. 0÷10 point scale. |
| F4 – Lab7 | PEK_U01, PEK_U02, PEK_U04 | Assessment of the completeness and quality of the solution of the problem. 0÷10 point scale. |
| F5 – Lab8 | PEK_U01, PEK_U02, PEK_U04 | Assessment of the completeness and quality of the solution of the problem. 0÷10 point scale. |
| F6 – Lab9 | PEK_U01, PEK_U02, PEK_U04 | Assessment of the completeness and quality of the solution of the problem. 0÷10 point scale. |
| P1 - the final evaluation of the laboratory. | PEK_U01, PEK_U02, PEK_U04 | The rate determined on the basis of the total points of forming ratings F1 to F6 according to the formula: - less than 50% of the points – 2.0 (insufficient) [50%, 60%) – 3.0 (sufficient) [60%, 70%) – 3.5 (sufficient+) [70%, 80%) – 4.0 (good) [80%, 90%) – 4.5 (good+) [90%, 100%) – 5.0 (very good) 100% – 5.5 (excellent) |
| P2 - the final evaluation of the lecture. | PEK_W01, PEK_W02, PEK_W03, PEK_U03 | Test of knowledge - with the use of electronic test of the e-learning system. Score points obtained from the test. The grading scale such as for P1. |
| **PRIMARY AND SECONDARY LITERATURE** | | |

**PRIMARY LITERATURE:**

[76]    Komatineni S., MacLean D.: Pro Android 4. Apress, New York 2012
[77]    Allen, G.: Android. Beginning Android 4, Apress, New York 2012
[78]    Petzold C.: Programming Windows Phone 7, MS Press, 2010
[79]    Petzold C.: Programming Windows: Writing Windows 8 Apps With C# and XAM, MS Press, 2013
[80]    Open Handset Alliance electronic documentation: http://developer.android.com
[81]    MS Windows Phone electronic documentation: http://msdn.microsoft.com
[82]    Oracle Java electronic documentation: http://www.oracle.com
[83]    Morris S., Smith-Chaigneau A.: Interactive TV Standards: A Guide to MHP, OCAP, and JavaTV. Focal Press, 2005
[84]    Atmel 16/32 microcontroler electronic documentation: http://www.atmel.com
[85]    Kamal R.: Embedded systems - Architecture, Programming and Design, McGraw-Hill Education, 2008
[86]    Laplante P.A.: Real-Time Systems Design And Analisys, IEEE Press, 2004

**SECONDARY LITERATURE:**

[44]    Miloshevska B.: Windows Phone Toolkit In Depth" 2nd edition, 2011
[45]    Windows Phone Programming in C#, Rob Miles, 2011
[46]    Pełka R.: Mikrokontrolery – architektura, programowanie, zastosowania. WKŁ, 2000.
[47]    Daca W.: Mikrokontrolery – od układów 8-bitowych do 32-bitowych. MIKOM, 2000.
[48]    Bryndza L.: Mikrokontrolery z rdzeniem ARM9. Wyd. BTC, 2009
[49]    Ułasiewicz J.: Systemy czasu rzeczywistego QNX6 Neutrino, BTC, 2007.
[50]    Praca zbiorowa: Real Time Scheduling Theory, Kluwer Academic Publishers, 2004

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

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

…………………………

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY ………………………..
AND SPECIALIZATION …………………………….

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W09 | C1 | Lec1,…,Lec15 | N1, N5 |
| PEK_W02 | K1INF_W09 | C1 | Lec12, Lec13, Lec14 | N1, N5 |
| PEK_W03 | K1INF_W09 | C2, C3 | Lec4,…,Lec9 | N1, N5 |
| PEK_U01 (skills) | K1INF_U04 | C3 | Lab1,…,Lab15 | N2, N3, N4, N5 |
| PEK_U02 | K1INF_U04, K1INF_U06 | C3 | Lab1,…,Lab15 Lec4,…,Lec9 | N2, N3, N4, N5 |
| PEK_U03 | K1INF_U06 | C3 | Lec1,…,Lec15 | N1, N5 |
| PEK_U04 | K1INF_U14 | C3 | Lab1,…,Lab15 | N2, N4 |
|  |  |  |  |  |

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

*** - from table above

Zał. nr 4 do ZW 64/2012

FACULTY: COMPUTER SCIENCE AND MANAGEMENT

**SUBJECT CARD**

**Name in Polish Systemy operacyjne**
**Name in English Operating systems**
**Main field of study (if applicable): Information technology**
**Specialization (if applicable): ……………………..**
**Level and form of studies:1st level, part-time**
**Kind of subject: obligatory**
**Subject code INZ001650**
**Group of courses NO**

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | | 18 | | |
| Number of hours of total student workload (CNPS) | 60 | | 60 | | |
| Form of crediting | crediting with grade | | crediting with grade | | |

| For group of courses mark (X) final course | | | | | |
|---|---|---|---|---|---|
| Number of ECTS points | 2 | | 2 | | |
| including number of ECTS points for practical (P) classes | | | | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 | | 0,8 | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**
1. K1INF_W01
2. K1INF_W02
3. K1INF_W08
4. K1INF_W10
5. K1INF_U09
6. K1INF_W16
7. K1INF_U05
8. K1INF_K01

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**SUBJECT OBJECTIVES**

C1. Acquireing knowledge about architecture and tasks of operating systems.

C2. Acquireing knowledge about parallel processing, task scheduling and relevant algorithms

C3. Acquireing knowledge about memory management.

C4. Acquireing knowledge about operating systems' security and access control mechanisms

C5. Acquireing knowledge about file system management.

C6. Acquireing knowledge about distributed operating systems, their strategies for resource management with relevant algorithms.

C7. Acquireing practical knowledge about experimental assessment of chosen algorithms and methods of resource management used in modern operating systems.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:
K1INF_W10, K1INF_W12

relating to skills:
K1INF_U07, K1INF_U11

relating to social competences:
K1INF_K01, K1INF_K04

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**PROGRAMME CONTENT**

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Introduction. History, evolution and architectures of operating systems. Models of operating | 2 |

| | systems. | |
|---|---|---|
| Lec 2 | Process management in operating systems, resource allocation. | 2 |
| Lec 3 | Process coordination, semaphores, critical sections., synchronization, inter-process communication. Deadlocks. | 2 |
| Lec 4 | Memory management, paging, segmentation, virtual memory management. | 2 |
| Lec 5 | Hard disk (external memory) management. | 2 |
| Lec 6 | File systems – management and architectures. | 2 |
| Lec 7 | Access control in operating systems. | 2 |
| Lec 8 | Distributed operating systems – comunication, resource management. | 2 |
| Lec 9 | Distributed shared memory, memory consistency, CPU allocation, fault recovery. | 2 |
| | Total hours | 18 |

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab 1 | Introduction, security rules, programming environment. | 2 |
| Lab 2 | Operating systems – basic functionalities. | 2 |
| Lab 3 | Operating systems – administrative tools | 2 |
| Lab 4 | Operating systems – user account management and access control | 2 |
| Lab 5 | Processor scheduling - simulations | 2 |
| Lab 6 | Page allocation - simulations | 2 |
| Lab 7 | Memory management - simulations | 2 |
| Lab 8 | Virtual memory management – simulations | 2 |
| Lab 9 | Deadlocks, critical sections, inter-process communication | 2 |
| | Total hours | 18 |

| TEACHING TOOLS USED |
|---|
| N1. Lectures, including multimedia presentations |
| N2. Literature studies – student's work |
| N3. Student's individual work – solving problems, performing simulations, and laboratory tasks. |
| N4. Preparing lab tasks reports – student's individual work. |

**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 (lecture) | K1INF_W10<br><br>K1INF_W12<br><br>K1INF_U11<br><br>K1INF_K01<br><br>K1INF_K04 | Evaluation of student's activity and solving of exemplary tasks and problems. |
| F1 – F9 (labs) | K1INF_W10<br><br>K1INF_W12<br><br>K1INF_U07<br><br>K1INF_U11<br><br>K1INF_K01<br><br>K1INF_K04 | Evaluation of student's preparedness and presence on the labs along with his activity. Analysis and evaluation of task reports. |
| P (labs) | K1INF_W10<br><br>K1INF_W12<br><br>K1INF_U07<br><br>K1INF_U11<br><br>K1INF_K01<br><br>K1INF_K04 | Weighted sum of grades F1 – F15. |
| P (lecture) | K1INF_W10<br><br>K1INF_W12<br><br>K1INF_U11<br><br>K1INF_K01<br><br>K1INF_K04 | Written test with taking into consideration the F1. |
| | | |
| **PRIMARY AND SECONDARY LITERATURE** | | |

**PRIMARY LITERATURE:**

[1] Silbershatz, J.L. Peterson, P.B. Galvin, *Podstawy systemów operacyjnych*, WNT 1993.
[2] A.S. Tannenbaum, *Rozproszone systemy operacyjne*, Wyd. Nauk. PWN, 1997.
[3] A.M. Lister, R.D. Eager, *Wprowadzenie do systemów operacyjnych*, WNT, 1994.
[4] M.J Bach, *Budowa systemu operacyjnego UNIX*, WNT, 1995

**SECONDARY LITERATURE:**

[1] W.R. Stevens, Programowanie zastosowań sieciowych w systemie UNIX, WNT, 1995.
Gabassi, Przetwarzanie rozproszone w systemie UNIX, Wyd. Lupus.
[2] Starllings W., Organizacja i architektura systemu komputerowego, WNT, Warszawa 2004.
[3] Madeja L., Cwiczenia z systemu Linux. Podstawy obsługi systemu, Mikom, Warszawa 1999.

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

**Krzysztof Juszczyszyn PhD, krzysztof.juszczyszyn@pwr.wroc.pl**

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Operating Systems**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
**Computer Science**
AND SPECIALIZATION ……………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 | K1INF_W10 | C1-C7 | Lec1 – Lec9  La1 – La9 | N1-N4 |
| PEK_W02 | K1INF_W12 | C1-C7 | Lec1 – Lec9  La1 – La9 | N1-N4 |
| PEK_U01 | K1INF_U07 | C1-C7 | La1 – La9 | N3-N4 |
| PEK_U02 | K1INF_U11 | C1-C7 | Lec1 – Lec9  La1 – La9 | N1-N4 |
| PEK_K01 | K1INF_K01 | C1-C7 | Lec1 – Lec9  La1 – La9 | N1-N4 |
| PEK_K02 | K1INF_K04 | C1-C7 | Lec1 – Lec9  La1 – La9 | N1-N4 |

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

Zał. nr 4 do ZW 64/2012

FACULTY **Computer Science and Management**  / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish Systemy webowe**
**Name in English   *Web systems***
**Main field of study (if applicable): Informatics**
**Specialization (if applicable):**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code INZ001664**
**Group of courses YES / NO\***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in | 18 | | 9 | | 18 |

| | | | | | |
|---|---|---|---|---|---|
| University (ZZU) | | | | | |
| Number of hours of total student workload (CNPS) | 30 | | 30 | | 60 |
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | ~~Examination~~ / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 1 | | 1 | | 2 |
| including number of ECTS points for practical (P) classes | | | 1 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,4 | | 0,4 | | 0,8 |

*delete as applicable

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### PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 has a basic knowledge of the architecture of computer networks.
2 has a basic knowledge of the use and programming of web sites

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### SUBJECT OBJECTIVES

C1 familiarize students with the nature and properties of Internet traffic (web-based)
C2 familiarize students with current knowledge in the field of technical infrastructures Web-based systems
C3 mastering the creation and characterization and analysis of hardware and software infrastructures for the promotion of the quality of Web-based systems.
C4 characterization skills by students of various issues concerning the issues of Web-based systems and present in the form of scientific and technical presentations.

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### SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 has a basic knowledge of the architecture of the Internet, Web-based systems and the nature and characteristics of web-based traffic
PEK_W02 has a basic knowledge of hardware and software infrastructures for the promotion of the quality of Web-based systems.
PEK_W03 has a basic knowledge of selected methods and algorithms of web-based systems management
relating to skills:
PEK_U01 Can select hardware components and software web-based computer system for specific applications.
PEK_U02 Can apply indicated the analytical method and to plan and carry out a simple experiment and computer simulation engineering, carry out measurements and analyze results, particularly for selected components of an information system for research activities and performance of Web-based system.
PEK_U03 apply the principles of health and safety.
PEK_U04 has the ability to self-education, including in order to improve professional skills, able to independently gather information about the issues of Web-based systems for the presentation

2

of the issues.

PEK_U05 Able to prepare documentation on the task of engineering for Web-based systems and to prepare a text that contains a discussion of the results of this task.

relating to social competences:

PEK_K01 understands and knows the need for continuous training opportunities and enhancing their professional and social competence in the field of Web-based systems.

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - lecture** | | **Number of hours** |
| Lec 1 | Introduction to the course. Description of the course, the organization of classes and examination. The architecture and structure of a Web-based systems. A Brief History of the Internet - evolution, efficiency, quality Web-based systems. Characteristics of Web-based traffic. | 2 |
| Lec 2 | The HTTP protocol. Web-based transaction. The quality of web-based services. | 2 |
| Lec 3 | Web Server - organization, operation, management, implementation, control and scheduling of HTTP requests | 2 |
| Lec 4 | Architecture of high-performance scalable Web sites. Web content caching, CDN systems | 2 |
| Lec 5 | Distribution of local and global HTTP requests - architecture, methods, algorithms, implementations | 2 |
| Lec 6 | Sources of Web-data and its users. Measurements of Web. Measurement metrics. Active and passive, measurement methods. WING and MWING systems. | 2 |
| Lec 7 | Analysis of Web-based systems in terms of content mining, usage mining, structure mining, mining user profiles | 2 |
| Lec 8 | Analysis of Web-based systems in terms of performance mining | 2 |
| Lec 9 | Test in e-learning system | 2 |
| | Total hours | 18 |
| **Form of classes - class** | | **Number of hours** |
| Lab 1 | Introduction to the course. Description of the course, the organization of labs and grading. Overview of lab environment. | 1 |
| Lab 2 | SQUID - the creation of hierarchical structures and their analysis. | 2 |

| | | |
|---|---|---|
| Lab 3 | SQUID - creating ACL rules and principles. | 2 |
| Lab 4 | Content Distribution Network Simulation using CDNSim package. | 2 |
| Lab 5 | Continuation of Content Distribution Network simulation using CDNSim package. Credits. | 2 |
| | Total hours | 9 |

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

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

| Form of classes - seminar | | Number of hours |
|---|---|---|
| Se1 | Presentation of the principles of course. Selection of topics for presentations by students. Discussion of students to the principles and form of adjustment before a larger group of scientific presentation. | 2 |
| Se2-Se9 | Aim of the presentation is to deepen and detailed discussion of some theoretical and practical issues presented in the lecture "web systems". Problems are proposed for the presentation of technical problems, design, realizacyjnymi or theoretical and apply methodologies and algorithms and means (tools, software, hardware) organization and operation of Web-based systems. The choice of the problem belongs to the student. Selected issue should be defined, described and solved using the language and forms adequate to the nature of the problem and the solutions. Presentation of the individual student is expected to last exactly 30 minutes. The speaker is obliged to prepare the slides in PPT or PPTX with notes. For individual classes is an average of 3 speakers, after each occurrence is organized few-minute discussion. | 16 |
| | Total hours | 18 |

| TEACHING TOOLS USED |
|---|
| N1. Lectures supported by multimedia presentations |
| N2. Documentation manufacturers web infrastructure |
| N3 Scientific and technical publications |
| N4. E-learning system used for publication of teaching materials or announcements, collection and |

assessment of student work

N5. Additional consultations for students.

**EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT**

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| P1 – concluding lectures | PEK_W01, PEK_W02, PEK_W03 | Test in the e-Learning checking knowledge acquisited at the lectures. In this test is to assess the positive grade if the student scores at least 50% of the maximum number of points according to a formula consistent with the principle applicable to the assessment of P. |
| P2 – concluding labs | PEK_U01, PEK_U02, PEK_U03, PEK_U05 | The basis of assessment is the presence in the classroom laboratory, laboratory exercises performed and the reports of laboratory exercises. |
| P3- concluding seminar | PEK_U04, PEK_K01 | Rating P3 is weighed. Weights of individual components of the final grade P3 are as follows: evaluation of the guidance prepared and delivered a presentation - 50% rating for the activity and participation in discussions - 25%, the assessment for the presence, timely settlement of the delivery of materials and giving a presentation in accordance with the schedule-25 %. |

**PRIMARY AND SECONDARY LITERATURE**

**PRIMARY LITERATURE:**

[87]  J. F. Kurose, Sieci komputerowe, Helion, Gliwice 2006
[88]  Publikacje naukowe i techniczne podawane na bieżąco przez prowadzących
[89]  Publikacje naukowe wybrane przez studentów i dostosowane do tematu seminarium
[90]  Publikacje własne prowadzących zajęcia

**SECONDARY LITERATURE:**

[51]  http://www.squid-cache.org/
[52] Literatura uzupełniająca i strony www dostosowane do tematu seminarium
[53] Dokumentacja produktów i rozwiązań systemów webowych

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

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

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Web systems**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Infomatics**
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_W01-03** | K1INF_W14 | C1, C2, C3 | Wy1-Wy15 Se2-10, Lab2, Lab4-5 | N1, N2, N3, N4, N5 |
| **PEK_U01** | K1INF_U06 | C4 | Lab1-5 | N2, N4, N5 |
| **PEK_U02** | K1INF_U07 | C4 | Lab2-5 | N2, N3, N4, N5 |
| **PEK_U03** | K1INF_U14 | C4 | Lab1-5 | N2, N4, N5 |
| **PEK_U04** | K1INF_U05 | C3 | Se1-10 | N1, N3, N4, N5 |
| **PEK_U05** | K1INF_U13 | C3 | Lab1-5 | N2, N4, N5 |
| **PEK_K01** | K1INF_K01 | C1, C2, C3,C4 | Lab1-5, Se1-10 | N1, N2, N3, N4, N5 |

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

FACULTY W-8 / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish ……** Sztuczna inteligencja i inżynieria wiedzy **…….**
**Name in English …** Artificial Intelligence and Knowledge Engineering **….**
**Main field of study (if applicable): …** Computer Science **…….**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code INZ001663**
**Group of courses YES / NO\***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | - | 18 | - | |
| Number of hours of total student workload (CNPS) | 60 | | 60 | | |

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

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. K1INF_W02
2. K1INF_W04
3. K1INF_W05
4. K1INF_W06

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**SUBJECT OBJECTIVES**

C1: Introducing students to the area of artificial intelligence
C2: To familiarize students with the basic methods for specific types of problems.
C3: To teach how to select an appropriate intelligent technique to a given problem.

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

PEK_W01: Has basic knowledge of search and planning problems.
PEK_W02: Has basic knowledge of knowledge representation and inference methods.
PEK_W03: Know simple, popular methods of uncertain knowledge processing.
PEK_W04: Understands concepts related to the acquisition of knowledge from data and machine
          learning.
…
relating to skills:
PEK_U01: Is able to choose the appropriate intelligent method to a problem.
PEK_U02: Ability to analyze the results and prepare a report on the experiments.
PEK_U03: He can practically use the selected tools and systems.
…
relating to social competences:
PEK_K01

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**PROGRAMME CONTENT**

| **Form of classes - lecture** | | **Number of hours** |
|---|---|---|
| Lec 1 | Artificial Intelligence – basic concepts, research area, application area. Introduction to nature inspired methods, evolutionary computation in pill. | 2 |
| Lec 2 | Constraint satisfaction Problems – problem formulation, methods | 2 |
| Lec 3 | Planning task as an example of search of state space – Forward State Propagation, backward State Propagation | 2 |
| Lec 4 | Search methods | 2 |

| Lec 5 | Knowledge, the role of knowledge in computer systems. Knowledge-based systems. Knowledge representation methods | 2 |
|---|---|---|
| Lec 6 | Knowledge processing – Forward Chaining and Backward Chaining. Imprecise knowledge. | 2 |
| Lec 7 | Inference with using probability calculus, Certainty Factor and fuzzy logic | 2 |
| Lec 8 | Supervised and unsupervised learning – idea, examples, selected methods | 2 |
| Lec 9 | Summary of the course. History and perspectives of AI | 2 |
| | Total | 18 |

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

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab 1 | General information, requirements, introduction to the first exercise (Exercise 1) | 2 |
| Lab 2 | Using evolutionary computation to selected problem solving (Exercise 1) | 4 |
| Lab 3 | Constraint satisfaction problem – experimental comparison of two methods (Exercise 2) | 4 |
| Lab 4 | Planning task (Exercise 3) | 4 |
| Lab 5 | Pattern recognition using selected method of machine learning (Exercise 4) | 4 |
| | Total hours | 18 |

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

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

| TEACHING TOOLS USED |
|---|
| N1. Projector, slides presentations<br>N2. Computers in laboratory – specification of required documentation for the exercices |

| N3. E-learning system used for the publication of teaching 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 Presentation of the 1st laboratory exercise. | PEK_W01; PEK_U02; | Evaluation of Exercise 1; student can receive maximum 10 points. The delay in the implementation of the tasks causes 20% reduction of points. During one laboratory the student cannot pass more than one task. |
| F2 Presentation of the 2nd laboratory exercise. | PEK_W01; PEK_U02; | As above |
| F3 Presentation of the 3rd laboratory exercise. | PEK_W01; PEK_U02; | As above |
| F4 Presentation of the 4th laboratory exercise. | PEK_W01; PEK_U02; | As above |
| F5 During the classes will be two announced quizzes corresponding to the content of current carried out the exercise. | PEK_W01; PEK_U01; PEK_U02; | Student can receive 8 point max. for each quiz |
| P1 The final grade of the laboratory | PEK_W01; PEK_W02; PEK_U02; | The final evaluation will be issued in accordance with the following scale: 0 - 28: 2.0 29 - 35: 3.0 36 - 40: 3.5 41 - 45: 4.0 46 - 50: 4.5 51 - 56: 5.0 Two unexcused absences are allowed. For each subsequent absence grade is reduced by 0.5. |
| P2 The final grade of the lecture | PEK_W01; PEK_W02; PEK_W03; PEK_W04; PEK_U01; | Exam. The exam is a written exam, checking knowledge of the lecture. It consists of open-ended questions, with known points for each. The student to pass the course should obtain more than 50% of all possible points (50%+1 point). % of points:　　　grade [0%, 50%]:　　　2.0 [50%+1 point, 60%): 3.0 [60%, 70%):　　　3.5 [70%, 80%):　　　4 [80%, 90%):　　　4.5 [90%, 100%]:　　　5.0 |

| **PRIMARY AND SECONDARY LITERATURE** |
| --- |

**PRIMARY LITERATURE:**

[91]  Mariusz Flasiński: Wstęp do sztucznej inteligencji. PWN, Warszawa 2011.

[92]  Halina Kwaśnicka: Sztuczna inteligencja i systemy ekspertowe. Rozwój, perspektywy. Wyższa Szkoła Zarządzania i Finansów, Wrocław 2005.

[3]

[4]

**SECONDARY LITERATURE:**

[54]  Rutkowski Leszek: Metody i techniki sztucznej inteligencji . PWN, Warszawa 2005.

[55]  Nils J. Nilsson: THE QUEST FOR ARTIFICIAL INTELLIGENCE. A HISTORY OF IDEAS AND ACHIEVEMENTS. Stanford University.  Web Version: ai.stanford.edu/~nilsson/QAI/qai.pdf  Print version published by Cambridge University Press http://www.cambridge.org/us/0521122937

[56]  Jan J. Mulawka, Systemy ekspertowe. Wydawnictwa Naukowo-Techn., Warszawa, 1996.

[57]  S.J. Russel, Peter Norvig, Artificial Intelligence. A Modern Approach. Prentice Hall Series in Artificial Intelligence, 1995.

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[59]  Józef Kloch, Świadomość komputerów? Argument "Chińskiego Pokoju" w krytyce mocnej sztucznej inteligencji według Johna Searle'a. OBI, Kraków, 1996.

[60]  John R. Searle: Umysł, mózg i nauka. Wyd. Naukowe PWN, W-wa, 1995, seria Logos.

[61]  Journal papers – news on AI.

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

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

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Artificial Intelligence and Knowledge Engineering**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY …Computer Science…..
AND SPECIALIZATION ……………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W17; K1INF_W15; | C1, C2, C3 | W1-W3 | N1, N3 |
| PEK_W02 | K1INF_W17; K1INF_W15; | C1, C2, C3 | W4-W5 | N1, N3 |
| PEK_W03 | K1INF_W17; K1INF_W15; K1INF_W16 | C1, C2, C3 | W6,W7 | N1, N3 |
| PEK_W04 | K1INF_W17; K1INF_W15; K1INF_W16 | C1, C2, C3 | W8-W9 | N1, N3 |
| PEK_U01 (skills) | K1INF_U15; K1INF_U16; | C3 | L1-L9;W1-W9 | N1,N2,N3 |
| PEK_U02 | K1INF_U15; K1INF_U16; | C2, C3 | L1-L9 | N2,N3 |
| PEK_U03 | K1INF_U15; K1INF_U16; | C2, C3 | L1-L9 | N2,N3 |

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

Zał. nr 4 do ZW 64/2012

FACULTY Computer Science and Management / DEPARTMENT………………
**SUBJECT CARD**
**Name in Polish:** Techniki przetwarzania mediów cyfrowych
**Name in English:** Digital Media Processing Techniques
**Main field of study (if applicable):** Computer Science
**Specialization (if applicable):** Information Systems
**Level and form of studies: 1st/ 2nd* level, full-time / part-time***
**Kind of subject: obligatory / optional / university-wide***
**Subject code INZ005738**
**Group of courses YES / NO***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 18 | | 18 | | |
| Number of hours of total student workload (CNPS) | 60 | | 90 | | |
| Form of crediting | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* | Examination / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | 2 | | 3 | | |

2

| including number of ECTS points for practical (P) classes | 0 | | 3 | | |
|---|---|---|---|---|---|
| including number of ECTS points for direct teacher-student contact (BK) classes | 0,8 | | 1,2 | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Knowledge of Discrete Fourier Transform, Discrete Cosine Transform and reverse transformations.
2. Knowledge in the area of nature and basic parameters that characterize mechanical waves.

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**SUBJECT OBJECTIVES**

C1 Passing the knowledge on audio data digitalization, compression, transmission and processing.

C2 Acquiring knowledge on audio synthesis methods and MIDI system.

C3 Presentation of models and systems of colors and their digital representations.

C4 Acquisition of knowledge in the area of vector graphics and 3-D graphics.

C5 Acquiring knowledge on image digitalization, compression, transmission and processing.

C6 Passing Basic knowledge on Digital video and animation

C7 Acquiring practical knowledge on using specialistic software for creating and editing vector graphics.

C8 Acquisition of practical knowledge of using digital image editors.

C8 Acquiring skills of audio data edition.

C9 Acquiring practical knowledge on creating multimedia presentation joining digital image and sound.

C10 Acquisition of knowing how to prepare technical report.

C11 Acquiring knowledge in the area of industrial safety in computer laboratory

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:

PEK_W01 Student can enumerate and describe phases of audio data discretization process.

PEK_W02 Student knows methods of audio compression.

PEK_W03 Student knows sound processing techniques.

PEK_W04 Student can enumerate and describe methods of sound synthesis.

PEK_W05 Student has basic knowledge in the area of MIDI system.

PEK_W06 Student is able to enumerate and describe models and systems of colors.

PEK_W07 Student can explain what are objects and transformations in vector graphics.

PEK_W08 Student has basic knowledge on 3-D graphics.

PEK_W09 Student knows and can describe image digitalization.

PEK_W10 Student has knowledge on digital image compression.

PEK_W11 Student can indicate and describe essential operations used in digital image processing.

PEK_W12 Student has elementary knowledge on digital video animation.

relating to skills:

PEK_U01 Student knows how to use specialist software for creating, editing and joining digital media.

PEK_U02 Student knows how to effectively use methods and tools of information gathering, processing and retrieval.

PEK_U03 Student can prepare report of an engineer task completing.

PEK_U04 Student knows and applies rules of industrial safety in computer laboratory.

| PROGRAMME CONTENT | | |
|---|---|---|
| **Form of classes - lecture** | | **Number of hours** |
| Lec 1 | Introduction. Nature of sound. Parameters of acoustic wave. Foundations of psychoacoustics. Digitalization of sound: phases, parameters, distortions. | 2 |
| Lec 2 | Images of sound. Audio processing. Audio data compression. Formats of audio files. | 2 |
| Lec 3 | Sound synthesis. MIDI | 2 |
| Lec 4 | Vector graphics: objects, transformations. 3-D graphics. | 2 |
| Lec 5 | Raster graphics: image digitalization, parameters, distortion, compression. Models and systems of colors. | 2 |
| Lec 6 | Digital image processing – context-free and context-dependent operations. | 2 |
| Lec 7 | Mathematical morphology in digital image processing. | 2 |
| Lec 8 | Digital video: standards, compression. | 2 |
| Lec 9 | Animation | 2 |
| | Total hours | 18 |
| **Form of classes - class** | | **Number of hours** |
| Cl 1 | | |
| Cl 2 | | |
| Cl 3 | | |
| Cl 4 | | |
| .. | | |
| | Total hours | |
| **Form of classes - laboratory** | | **Number of hours** |
| Lab 1 | Classes organization: substantial introduction to laboratory, organization and schedule of classes, credit conditions, BHP training. | 1 |
| Lab 1, Lab 2 | Simple edition of sound files: voice recording, noise reduction, formats conversion, cutting, pasting and mixing of sounds, volume adjustment. | 3 |
| Lab 3 | Advanced edition of sound files. Spectral analysis, special effects, midi edition. | 2 |
| Lab 4 | Creating and editing vector graphics. | 2 |
| Lab 5 | Raster image processing – old photo retouch. | 2 |
| Lab 6 | Raster image edition – photo-montage. | 2 |
| Lab 7, Lab 8 | Final task – Project and realization of multimedia presentation. | 4 |
| Lab 9 | Final task presentation. | 2 |
| | Total hours | 18 |
| **Form of classes - project** | | **Number of** |

| | | hours |
|---|---|---|
| Proj 1 | | |
| Proj 2 | | |
| Proj 3 | | |
| Proj 4 | | |
| … | | |
| | Total hours | |

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

| TEACHING TOOLS USED |
|---|
| N1. Traditional lecture assisted multimedia presentation. |
| N2. E-learning: making available lecture teaching aids. |
| N3. E-learning: exam in a form of electronic test. |
| N4. E-learning: organization of laboratory classes, making available exercises instructions, patterns of documentation and other teaching aids, sending completed tasks and reports via e-portal, using forum and e-mail for teacher-student and student-student communication. |
| N5. Specialist hardware and software. |

### EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

| Evaluation (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
|---|---|---|
| F1 | | Grades of completed tasks |
| F2 | | Grades of reports |
| F3 | | Grade of final task |
| C – laboratory | | Weighted mean of grades obtained = 0,3*(mean of grades of completed tasks) + 0,3*(mean of reports grades) + 0,4*grade of final task |
| C – lecture | | Exam in a form of e-test; to pass the test student has to obtain at least 50% of total points. |
| PRIMARY AND SECONDARY LITERATURE | | |

**PRIMARY LITERATURE:**

[93] Chapman N., Chapman J., Digital Multimedia, Third Edition, John Wiley & Sons, Ltd., Chichester, 2009

[94] Malina W., Smiatacz M., Cyfrowe przetwarzanie obrazów, Warszawa: Akademicka Oficyna Wydawnicza EXIT, 2008.

[95] Czyżewski A., Dźwięk Cyfrowy: wybrane zagadnienia teoretyczne, technologia, zastosowania, Wyd. 2, Warszawa: Akademicka Oficyna Wydawnicza EXIT, 2001.

[96] Nowak W., Homan W., Midi: muzyczny standard dla komputerów, Kraków: Wydawnictwo DMM, 1994.

**SECONDARY LITERATURE:**

[62] Petrou M., Petrou C., Image Processing: The Fundamentals, 2$^{nd}$ ed., Chichester: John Wiley & Sons, 2010.

[63] Goodall, D. P., Haas, O. C. L., Signal and Image Processing, Wrocław: Wrocław University of Technology ; Łódż : PRINTPAP, 2011.

[64] Thyagarajan K. S., Digital Image Processing with Application to Digital Cinema, Elsevier, 2006.

[65] Speech and audio processing in adverse environments, Eds. Hänsler E., Schmidt G., Berlin ; Heidelberg : Springer-Verlag, cop. 2010.

[66] Zolzer U., Digital audio signal processing, Chichester: John Wiley and Sons, 1997.

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

Elżbieta Kukla, Elzbieta.Kukla@pwr.wroc.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Digital Media Processing Techniques
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Computer Science
AND SPECIALIZATION Information Systems

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 (knowledge) | K1INF_W23 | C1 | Wy1 | N1, N2, N3 |
| PEK_W02 | K1INF_W23 | C1 | Wy2 | N1, N2, N3 |
| PEK_W03 | K1INF_W23 | C1 | Wy2 | N1, N2, N3 |
| PEK_W04 | K1INF_W23 | C2 | Wy3 | N1, N2, N3 |
| PEK_W05 | K1INF_W23 | C2 | Wy3 | N1, N2, N3 |
| PEK_W06 | K1INF_W23 | C3 | Wy5 | N1, N2, N3 |
| PEK_W07 | K1INF_W23 | C4 | Wy4 | N1, N2, N3 |
| PEK_W08 | K1INF_W23 | C4 | Wy4 | N1, N2, N3 |
| PEK_W09 | K1INF_W23 | C5 | Wy5 | N1, N2, N3 |
| PEK_W10 | K1INF_W23 | C5 | Wy5 | N1, N2, N3 |
| PEK_W11 | K1INF_W23 | C5 | Wy6..Wy7 | N1, N2, N3 |
| PEK_W12 | K1INF_W23 | C6 | Wy8..Wy9 | N1, N2, N3 |
| PEK_U01 (skills) | K1INF_U04, K1INF_U09, K1INF_U11, K1INF_U12, | C7, C8, C9 | La2..La9 | N4, N5 |
| PEK_U02 | K1INF_U04, K1INF_U09, K1INF_U11, K1INF_U12, | C7, C8, C9 | La2..La9 | N4, N5 |
| PEK_U03 | K1INF_U04, K1INF_U09, K1INF_U11, K1INF_U12, | C10 | La2..La9 | N4, N5 |
| PEK_U04 | K1INF_U14 | C11 | La1..La9 | N4, N5 |

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

FACULTY Computer Science and Management / DEPARTMENT Informatics
**SUBJECT CARD**
**Name in Polish …Wprowadzenie do zarządzania projektem informatycznym…….**
**Name in English …Introduction to Software Project Management …….**
**Main field of study (if applicable): Computer Science**
**Specialization (if applicable): ……………………..**
**Level and form of studies: 1st/ 2nd\* level, full-time / part-time\***
**Kind of subject: obligatory / optional / university-wide\***
**Subject code …………….**
**Group of courses YES / NO\***

| | Lecture | Classes | Laboratory | Project | Seminar |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Number of hours of organized classes in University (ZZU) | 9 | | 18 | | |
| Number of hours of total student workload (CNPS) | 30 | | 60 | | |
| Form of crediting | ~~Examination~~ / crediting with grade* | Examination / crediting with grade* | ~~Examination~~ / crediting with grade* | Examination / crediting with grade* | ~~Examination~~ / crediting with grade* |
| For group of courses mark (X) final course | | | | | |
| Number of ECTS points | **1** | | 2 | | |
| including number of ECTS points for practical (P) classes | | | 2 | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 1 | | 2 | | |

*delete as applicable

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**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1 Knowledge of software life cycle models
2 Knowledge of software development methodologies: traditional and agile.
3 Writing skills in technical reports
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**SUBJECT OBJECTIVES**

C1 To familiarize students with the basic issues related to planning and scheduling of the project, understanding the roles and responsibilities of key members of the project and preparation of engineering project planning (software development projects).
C2 Development of skills in preparation of managerial documentation; ability to practical application of tools supporting IT project management

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**SUBJECT EDUCATIONAL EFFECTS**

relating to knowledge:
PEK_W01 student demonstrate knowledge of basic issues related to the planning and scheduling of the project
PEK_W02 students understands the responsibilities of key members of the project and has knowledge of the roles in the project
PEK_W03 has expertise in monitoring the progress and quality assurance in the project
…
relating to skills:
PEK_U01 student is able to analyze the project vision and makes a selection of project methodology
PEK_U02 student is able to plan the work and tasks to be implemented in the project
PEK_U03 student is able to choose methods to carry out the project cost estimations
PEK_U04 student is able to analyze and report a progress of the project
PEK_U05 student has the ability to present and justify their decisions

relating to social competences:
PEK_K01 student understands the need to provide high quality and availability of information systems, taking into account the needs of different user groups, recognizes the risks associated with information systems application

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**PROGRAMME CONTENT**

| Form of classes - lecture | | Number of hours |
|---|---|---|
| Lec 1 | Introduction to the topic. Description of the course, the organization of classes and examination. The basic concepts of project management. Management Methodologies: Agile and traditional | 1 |
| Lec 2 | Project planning and scheduling techniques for plan driven methods and agile driven methods. Project resources | 2 |
| Lec 3 | Team management (organization and decision-making, roles and responsibilities in a software team). Communication in project. Project risk. | 1 |
| Lec 4 | Project cost estimation . Project tracking and progress monitoring | 2 |
| Lec 5 | Software quality. Selected aspects of the measurement of processes and products | 2 |
| Lec 6 | Test | 1 |
| | **Total hours** | **9** |

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

| Form of classes - laboratory | | Number of hours |
|---|---|---|
| Lab 1 | Organizational activities. Presentation of the scope and principles of assessment. To familiarize students with the principles of health and safety regulation; introduction to MSProject 2010. | 2 |
| Lab 2 | Defining the project :Project scope definition; requirements specification. | 2 |
| Lab 3-4 | Planning the project: the traditional approach and agile approach | 4 |
| Lab 5 | Project Resource definition and allocation | **2** |
| Lab 6 | Estimation of fixed costs and the cost of staff; project risk evaluation | 2 |
| Lab 7 | Tracking the progress of meth. Earned value and burndown charts | 2 |
| Lab 8 | Project Re-planning . | 4 |
| Lab 9 | Summary-Reporting project results | 2 |
| | **Total hours** | **18** |

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

| | | |
|---|---|---|
| … | | |
| | Total hours | |

| Form of classes - seminar | | Number of hours |
|---|---|---|
| Sem 1 | | |
| Sem 2 | | |
| Sem 3 | | |
| Sem 4 | | |
| …. | | |
| | Total hours | |

| TEACHING TOOLS USED |
|---|
| N1. Informative lecture, supported by multimedia presentations. <br> N2. Examples of managerial documentation for the project, prepared in accordance with shared document templates. <br> N3. Software to support the management of the process of software development. <br> N4. E-learning system used for the publication of teaching materials as well as for collection of student assignments. |

## EVALUATION OF SUBJECT EDUCATI ONAL 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_K01 | Checking *Project Vision* -the 1st part of the project documentation (provided by the student)- according to the completeness and compliance with the template. Point scale (up to 15% of the total score) or traditional. |
| F2 | PEK_U01, PEK_U02, PEK_K01 | Checking *Plans, specifications, risk assessment*- the 2nd part of the documentation- according to the consistency, completeness and compliance with the initial vision of the project. Point scale (up to 40% of the total score) or traditional. |
| F3 | PEK_U01, PEK_U03, | Checking *Project resource estimation and project cost* documents acoording to completeness and consistency with previous documents. Point scale (up to 30% of total points) or traditional. |
| F4 | PEK_U04, PEK_U05, | Validation and checking compatibility *Monitoring, evaluation of progress* - the 4th part of the documentation of the project - with earlier documents. Point scale (up to 15% of the total score) or traditional. |
| F5 | | Tests (at least one per semester). Scale: credit / fail (four fails means lack of the lab |

| | | class completion) |
|---|---|---|
| P2 – final grade for lab class | | Rate determined on the basis of the total points of ratings forming F1 ... F4 according to the formula:<br>&lt;40% of the points ◊ ndst.<br>&lt;40%, 50%) ◊ dst<br>&lt;50%, 60%) ◊ dst +<br>&lt;60%, 70%) ◊ db<br>&lt;70%, 80%) ◊ db +<br>&lt;80%, 90%) ◊ vg<br>&gt; 90% ◊ target<br><br>or the weighted average:<br>$0.15 * 0.25 * F1 + F2 + F3 + 0.3 * 0.4 * F4$ |
| P1 – lecture final grade | PEK_W01-PEK_W03 | Colloquium - a written test checking knowledge presented during the lecture. The test is given a positive evaluation, if the student scores at least 50% of the maximum number of points. |

| PRIMARY AND SECONDARY LITERATURE |
|---|

**PRIMARY LITERATURE:**

**[1] Cadle J., Yeates D. Zarządzanie procesem tworzenia systemów informacyjnych. WNT 2004**
**[2] Schwaber K., Sprawne zarządzanie projektami metodą Scrum. APN Promise, Warszawa, 2005**
**[3]Wróblewski P., Zarządzanie projektami informatycznymi dla praktyków. Helion 2005**
**[4]Microsoft Project 2010.**

**SECONDARY LITERATURE:**

[1] E-Book – *PMBOK® Guide:* A Guide to the Project Management Body of Knowledge. Third Edition, 2004
[2] SWEBOK - Guide to the Software Engineering Body of Knowledge -  IEEE 2004.

| SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS) |
|---|
| Iwona Dubielewicz, iwona.dubielewicz@pwr.wroc.pl |

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
**Software Project Management**
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
**Computer Science**
AND SPECIALIZATION ……………………………..

| Subject educational effect | Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)** | Subject objectives*** | Programme content*** | Teaching tool number*** |
|---|---|---|---|---|
| PEK_W01 | K1INF_W18 | C1 | Lec1, Lec2, Lec 3, | N1, N2,N4 |
| PEK_W02 | K1INF_W18 | C1 | Lec 4, Lec 5, | N1, N2, N4 |
| PEK_W03 | K1INF_W18 | C1 | Lec 6, Lec 7 | |
| | | | | |
| PEK_U01 | K1INF_U10, K1INF_U14, K1INF_K02 | C2 | La1, La3 | N2, N3, N4 |
| PEK_U02 | K1INF_U10, K1INF_K02 | C2 | La 2,La3, La4, La5, La6, La12 | N2, N3, N4 |
| PEK_U03 | K1INF_U10 | C2 | La7,La8,La9 | N2, N3, N4 |
| PEK_U04 | K1INF_U10 | C2 | La10, La11 | N3, N4 |
| PEK_U05 | K1INF_U10, K1INF_K02 | C2 | La13,La14 | N3, N4 |
| PEK_K01 | K1INF_K02 | C1 | La1, La2,La6 | N3, N4 |

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

*** - from table above