UNIVERSITY of INFORMATION TECHNOLOGY and MANAGEMENT in Rzeszow, POLAND

Erasmus+

Information Technology course catalogue

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Bachelor Degree:

Law

1. BASIC INFORMATION ON THE COURSE

Course name	Law
Academic year	2020/2021
Faculty	Faculty of Applied Information Technology
Field of study	Information Technology
Education level	First-cycle studies – undergraduate
Education profile	Practical
Specialty	-

2. PREREQUISITES (resulting from the sequence of courses)

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3. LEARNING OUTCOMES AND METHOD OF CARRYING OUT THE ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences

No.	Description of the learning outcomes for the course	Reference to learning outcomes for the field of study
After completing the training, the student has the following **knowledge**		
P_W01	know and understand legal and ethical aspects and norms, applying information technologies, communication process and activities of IT specialists	K_W09
P_W02	know and understand basic concepts and protection rules of industrial property and copyrights as well as quality management and creation and conduct of an economic activity	K_W10
After completing the training, the student has the following **SKLILLS**		
P_U01	can effectively achieve and manage of knowledge and information from literature, data basis and other sources regarding conditions resulting from rules for protection and security of information, a student can interpret them and make proper conclusions and justify opinions	K_U01
P_U02	can prepare a documentation regarding a completing an IT task and prepare a text containing a description of results of this task	K_U03
After completing the training, the student has the following **social competences**		
P_K01	Is able to think and act in an entrepreneurial manner	K_K05

3.2. Forms of classes and number of hours and ECTS credits

Lec	Tutorial	RC	Lab	P	eL	ECTS
15	-	10	-	-	-	2

3.3 Teaching delivery methods

Forms of classes	Delivery method
Lecture	Informative and problematic lecture: verbal communication of specific educational contents in the form of continuous, systematized speech, consistent with the principles of logic, taking into account the terminology, normative acts and case law relevant to the discussed branch of law. The lecturer illustrates discussed issues with appropriately selected case studies, which are considered during the lecture and solved in cooperation with students. The lecture is supported by a presentation.

Recitation	Exercise - practical: the student, on the basis of knowledge previously acquired during lectures, develops skills of analyzing sources of law, interpretation of legal regulations and solves case studies (case study method), draws up drafts of agreements, pleadings. Working in small groups, they exchange experiences and learn to cooperate.

3.4. Learning content (separately for each form of classes)

LECTURE

No.	Learning content
L1	Public and private law. Hierarchy of sources of law. A concept of a legal relationship and its elements. Sources of legal relationships. Categories of legal relationships. Subjects of law. Subjective law.
L2	Civil law. Sources. Characteristics of civil relationships. Basic institutions. Ownership and its protection. Law of obligations
L3	Administrative law. Sources. Characteristics of administrative relationship. Administrative power.
L4	Penal law. Sources. Principles of penal law. Basic institutions
L5	Basic terms: intellectual property industrial property. Sources of law at a national and international level. Protection of other rights of intellectual property
L6	Protection of patent rights. Protection of trademarks and geographical indications
L7	Copyrights law. Essence of personal and financial copyrights. Protection of personal ad financial copy-rights. Limitation of protection of financial copyrights. Rights related to copyrights

RECITATION CLASS

No.	Learning content
Rc1	Sources of law: national law, EU law, international law, Consitution in a legal system
Rc2	Legal acts shaping a legal environment of information technologies (analysis and application)
Rc3	Legal and organizational forms of conducting business
Rc4	Entrepreneurs' rights and duties
Rc5	Freedom of contracts. Basic categories of named and unnamed contracts
Rc6	Analysis of contracts and other formal documents connected to e-commerce

3.5. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01	open questions with extended answers	Lecture
P_W02	Single answer question	
P_U01	open questions with extended answers	Recitation Class
P_U02	Case study	
P_K01	Case study	

3.6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For grade 2 the student cannot	For grade 3 the student can	For grade 4 the student can	For grade 5 the student can
P_W01	Point any legal or ethical norms of an application of information technologies, communication	Point at least 3 examples of legal or ethical norms of an application of information technologies, communication	Point at least 3 examples of legal or ethical norms of an application of information technologies, communication	Point at least 3 examples of legal or ethical norms of an application of information technologies, communication

	process and IT specialist's activity	process and IT specialist's activity	process and IT specialist's activity and present their significance	process and IT specialist's activity and present their significance and sanctions for a lack of their application
P_W02	present basic concepts and selected institutions in industrial property law and copyright law	present 50%-69% out of concepts and selected institutions in industrial property law and copy-right law presented during the classes	present 70%-89% out of concepts and selected institutions in industrial property law and copy-right law presented during the classes	present more than 90% out of concepts and selected institutions in industrial property law and copyright law presented during the classes
P_U01	effectively gain and manage a knowledge and information taken from legal acts, acts applying law, interpret them and make conclusions and formulate and justify opinions	effectively gain and manage a knowledge and information taken from legal acts ad acts applying law, without interpreting them or making conclusions or formulating and justifying opinions	effectively gain and manage a knowledge and information taken from legal acts, acts applying law and interpret them, without making conclusions or formulating and justifying opinions	effectively gain and manage a knowledge and information taken from legal acts, acts applying law and interpret them, make conclusions and formulate and justify opinions
P_U02	prepare a documentation regarding a completion of IT task and prepare a text containing a description of results of this task from a perspective of intellectual property rights	prepare a simple documentation regarding a completion of IT task and prepare a text containing a description of results of this task from a perspective of intellectual property rights	prepare a more advanced documentation regarding a completion of IT task and prepare a text containing a description of results of this task from a perspective of intellectual property rights	prepare a complex documentation regarding a completion of IT task and prepare a text containing a description of results of this task from a perspective of intellectual property rights
P_K01	think and act in an entrepreneurial manner	think and act in an entrepreneurial manner (a choice of a legal form of business)	think and act in an entrepreneurial manner (a choice of a legal form of business and listing 2-3 entrepreneurs' rights and duties)	think and act in an entrepreneurial manner (a choice of a legal form of business and listing 4-6 entrepreneurs' rights and duties)

3.7. Literature

Obligatory literature
Cyrul W. (ed.), Information Technology and Law, Jagiellonian University Press, Kraków 2014.
Jabłońska-Bonca E., Introduction to law, Wolters Kluwer, Warszawa 2017.
Jamroży M., Basics of law, SGH, Warszawa 2015.
Kruczalak J. (ed.), An outline of Polish Commercial Law, Wyd. Uniwersytetu Gdańskiego, Wolters Kluwer 2019.

Supplementary literature
Gajda A., Rytel-Warzocha A., Uziębło P., Constitutional law, Wyd. Uniwersytetu Gdańskiego, Wolters Kluwer 2017.
Kruczalak J. (ed.), An outline of Polish Commercial Law, Wyd. Uniwersytetu Gdańskiego, Wolters Kluwer 2019.

1. BASIC INFORMATION ON THE COURSE

Course name	Fundamentals of Economics
Academic year	2020/2021
Faculty	Faculty of Applied Information Technology
Field of study	Information Technology
Education level	First-cycle studies – undergraduate
Education profile	Practical
Specialty	-

2. PREREQUISITES (resulting from the sequence of courses)

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3. LEARNING OUTCOMES AND METHOD OF CARRYING OUT THE ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences

No.	Description of the learning outcomes for the course	Reference to learning outcomes for the field of study
After completing the training, the student has the following **knowledge**		
P_W01	knows and understands cultural, social, economic, legal and ethical aspects and standards of the use of computer technologies, communication process and IT activities.	K_W09
P_W02	knows and understands the basic concepts and principles of creating and running a business	K_W10
After completing the training, the student has the following **SKLILLS**		
P_U01	Can - when formulating and solving tasks involving the design of IT solutions - take into account their non-technical aspects, including environmental, economic and legal ones.	K_U01, K_U03
After completing the training, the student has the following **social competences**		
P_K01	Is able to think and act in an entrepreneurial manner	K_K05

3.2. Forms of classes and number of hours and ECTS credits

Lec	Tutorial	RC	Lab	P	eL	ECTS
15	-	10	-	-	-	2

3.3 Teaching delivery methods

Forms of classes	Delivery method
Lecture	Informative lectures - content is provided in a continuous and structured manner. Students are given ready knowledge in a scientific form including the terminology used in economics.
Recitation	Exercise - based on the use of various sources of knowledge (tasks, case studies, newspaper articles). Students perform assigned tasks individually or in groups under the supervision of the lecturer, and then present their solutions, which can be the subject of discussion. The lecturer acts as a guide, shows examples of solutions, gives feedback, corrects errors.

3.4. Learning content (separately for each form of classes)

LECTURE

No.	Learning content

L1	Introduction to economics - the concept and subject of economics. Genesis and process of formation of economy as a science. The phenomenon of scarcity. Micro and macroeconomics. Positive and normative economics.
L2	The concept and functions of markets. Demand and determinants of demand. Supply and supply determinants. Equilibrium price
L3	Market structures. Importance of competition. Market forms: perfect competition, full monopoly, monopolistic competition, oligopoly.
L4	Circular circulation in the economy. Global demand. Measures of the social effect (GDP, GNP)
L5	Key concepts of economy, inflation, unemployment, business cycle, economic growth and development. Banks and the banking system. The stock market. Investment funds. Insurance.
L6	Creating and running a business

RECITATION CLASS

No.	Learning content
Rc1	The essence of economics. The production possibilities curve. Micro and macroeconomics, Positive and normative economics
Rc2	The concept and functions of markets. Demand and determinants of demand. Shift of the demand curve and movement along the demand curve. Supply and determinants of supply. Shift of the supply curve and movement along the supply curve. Equilibrium price, market efficiency. Simple price elasticity of demand.
Rc3	Market forms: perfect competition, full monopoly, monopolistic competition, oligopoly
Rc4	Circular circulation in the economy. Measures of the social effect (GDP, GNP). Key concepts of the economy, inflation, unemployment, business cycle, economic growth and development.
Rc5	Principles and objectives of doing business

3.5. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01	Open questions	Lecture
P_W02		
P_U01	Project – the plan	Recitation Class
P_K01		

3.6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For grade 2 the student cannot	For grade 3 the student can	For grade 4 the student can	For grade 5 the student can
P_W01	correctly answer any of the questions on the course test	correctly answer one question included in the course test	correctly answer two questions included in the course test	correctly answer three questions included in the course test
P_W02	correctly answer any of the questions on the course test	correctly answer one question included in the course test	correctly answer two questions included in the course test	correctly answer three questions included in the course test

P_U01	correctly answer any of the questions on the course test	correctly answer one question included in the course test	correctly answer two questions included in the course test	correctly answer three questions included in the course test
P_K01	correctly answer any of the questions on the course test	correctly answer one question included in the course test	correctly answer two questions included in the course test	correctly answer three questions included in the course test

3.7. Literature

Obligatory literature
Blanchard O. (2017) Macroeconomics. 7th ed., Pearson, Boston.
Mankiw N.G. (2018) Macroeconomics. 10th ed., Worth Publishers, New York.
Arthur O'Sullivan, Steven M. Sheffrin, Stephen J. Perez, Microeconomics: principles, applications and tools / - 8th ed. - Harlow: Pearson, cop. 2013.
Jeffrey M. Perloff, Microeconomics, Reading, Mass: Addison-Wesley, cop. 1998.

Supplementary literature
Burda C., Wyplosz M. (2017) Macroeconomics. A European text. 7th ed., Oxford University Press, Oxford.
Snowdon B., Vane H. (2005) Modern macroeconomics, Edward Elgar Publishing, New York.
M. Parkin, Economics, Pearson, 2010.

Discrete Mathematics

1. BASIC INFORMATION ON THE COURSE

COURSE NAME	Discrete Mathematics				
TEACHER	dr hab., prof. WSIiZ Jerzy Król				
FACULTY	Faculty of Applied Information Technology				
FIELD OF STUDY	Information Technology				
CYCLE	first-cycle				
EDUCATION PROFILE	practical				
SEMESTER (NUMBER)	3	**ACADEMIC YEAR**	2022/2023	**FORM OF STUDIES**	full-time

FORM OF CLASSES	FORM OF CREDITS	NUMBER OF HOURS	ECTS CREDITS
Lecture	Examination	30	6
Recitation Class	Credit with grade	30	

2. PREREQUISITES (resulting from course succession)

Mathematics

3. COURSE OUTCOMES - KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES

Item	Description of the learning outcomes for the course On completing the course, the student has the following KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES
P_W01	Explain the basic concepts of discrete mathematics, in particular related to the number theory, graphs and sets
P_W02	Describe the ways of theorems proofing
P_U01	Count on the sets and sentences
P_U02	Check the properties of relations
P_U03	Use the graph algorithms
P_U04	Solve equations, including recursive equations
P_U05	Solve the basic tasks of combinatorics

4. COURSE CONTENT (separately for each form of classes)

Lecture

Item	Course Content
1	Elements of mathematical logic. Propositional calculus
2	Methods of proof assertion
3	Algebra of sets. Introduction to fuzzy sets
4	Relations of equivalence and order
5	A linear diophantine equations

6	Basic combinatorial methods. Counting the sets
7	Fundaments of the theory of severability and numbers
8	Congruences and residue systems
9	Using the theory of numbers in cryptography
10	Elements of discrete probability
11	Introduction to graph theory and graph trees
12	Using of the graph algorithms
	Exam

Recitation Class

Item	Course Content
1	Propositional calculus. Elements of fuzzy logic
2	Direct and not direct proofs. Mathematical induction
3	Calculus of sets and relations
4	Significant inequalities
5	Sum and product. Average values. Pigeonhole principle
6	Iteration and recursion
7	Primes and coprime numbers. Characteristics of severability
8	A linear diophantine equation
9	Congruents and residue systems
10	Using the theory of numbers in cryptography - examples of ciphers and their characteristics
11	Discrete probability
12	Algorithms of the graph theory
13	Using of the graph algorithms
	Test

5. METHODS OF VERIFYING ATTAINING COURSE OUTCOMES

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01	Test- open questions	Lecture
P_W02	Test- open tasks	Recitation Class
P_U01	Test- open tasks	Recitation Class
P_U02	Test- open tasks	Recitation Class
P_U03	Test- open tasks	Recitation Class
P_U04	Test- open tasks	Recitation Class
P_U05	Test- open tasks	Recitation Class

6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For the grade of 2 the student cannot	For the grade of 3 the student can	For the grade of 4 the student can	For the grade of 5 the student can
P_W01	Choose the correct answers in less than 50% of the questions	Choose the correct answers in more than 50% of the questions and less than 75% of the questions	Choose the correct answers in more than 75%(or equal) of the questions and less than 90% of the questions	Choose the correct answers in more than 90%(or equal) of the questions
P_W02	Choose the correct answers in less than 50% of the questions	Choose the correct answers in more than 50% of the questions and less than 75% of the questions	Choose the correct answers in more than 75%(or equal) of the questions and less than 90% of the questions	Choose the correct answers in more than 90%(or equal) of the questions
P_U01	Perform basic operations on sets, use of functors logic	Perform basic operations on sets, use of functors logic, check whether an expression is a tautology	Perform basic operations on sets, use of functors logic, e.g. in order to check whether an expression is a tautology	Fluently perform operations on sets, use of functors logic, check whether an expression is a tautology check whether an expression is a tautology
P_U02	Check the properties of relations, neither in a graphical nor analytical way	check the properties of relations (in a graph or analysis way), specify when the relationship is a fine or equivalence	check the properties of relations, know when the relationship is a fine or equivalence, use the chart/illustration for verifying ownershipof the relationships	check whether the relationship is a relationship of order or equivalence, use the chart/illustration for verifying properties of relations
P_U03	Present the graph in none form, and use and differentaite none graph algorithms	Present in chosen form, use some graph algorithms	Present graph in demanded form, use given graph algorithms	Present graph in demanded form, use the correct/best graph algorithms
P_U04	Solve none recursive equations	Solve simple recursive equations	Solve recursive equations	Solve recursive equations using proper properties and theorems
P_U05	Formulate neither problem nor suggest method to solve any combinatorial problem	Formulate a simple combinatorial problem and propose methods how to solve this combinatorial problem	Formulate a combinatorial problem and propose method how to solve this combinatorial problem	Formulate a combinatorial problem and propose the best method how to solve this combinatorial problem

7. LITERATURE

Obligatory Reading
J.K.Truss, Discrete mathematics for computer scientists, Harlow, 1999.

Supplementary Reading
D.Rene, A.Hassane, Discrete, continuous and hybrid Petri nets, Berlin , 2005.

Operating systems

1. BASIC INFORMATION ON THE COURSE

COURSE NAME	Operating Systems				
TEACHER	dr inż. Janusz Korniak				
FACULTY	Faculty of Applied Information Technology				
FIELD OF STUDY	Information Technology				
CYCLE	first-cycle				
EDUCATION PROFILE	practical				
SEMESTER (NUMBER)	1	**ACADEMIC YEAR**	2022/2023	**FORM OF STUDIES**	full-time

FORM OF CLASSES	FORM OF CREDITS	NUMBER OF HOURS	ECTS CREDITS
Lecture	Examination	24	6
Laboratory	Credit with grade	16	
Project		20	

2. PREREQUISITES (resulting from course succession)

NA

3. COURSE OUTCOMES - KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES

Item	Description of the learning outcomes for the course On completing the course, the student has the following KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES
	On success completion of the course, student gains the knowledge necessary to
P_W01	Describe the basics of OS architecture and operations
P_W02	Explain rules and theory related to management and processing of information in OS
P_W03	Describe how OS manages devices, explain most frequently used processor management method and scheduling tasks in real and virtual OS
	On success completion of the course, student gains the skills to be able to
P_U01	Manage OS including installation I/O devices, creation user accounts, file system setup and management
P_U02	Apply appropriate commands or system tools for process management in OS
P_U03	Apply appropriate methods and tools for OS configuration and management
P_U04	Configure basic services in OS and apply appropriate security policy applied in real industrial conditions
P_U05	Develop documentation and design and implement simple script in OS shell

4. COURSE CONTENT (separately for each form of classes)

Lecture

Item	Course Content

W1	OS overview and classification
W2	Process management in OS - proces states, proces description, proces control, threads, concurrency. Classic synchronization problems.
W3	Principles of OS operation. Process management, task scheduling.
W4	Memory management, types of memory, virtual memory management
W5	I/O devices management , I/O subsystem, central unit interaction with I/O devices
W6	File systems. Security of file systems, file permitions
W7	Distributed systems - distributed processing , client-server technologies, clusters , remote access, remote services.

Laboratory

Item	Course Content
L1	OS installation and configuration
L2	Working with the shell, CLI
L3	User, groups and rights management
L4	Process management
L5	Management basics of OS
L6	OS Network services
L7	OS Security

Project

Item	Course Content
P1	Identify the problem to solve by using fundamentals of OS shell programming. Programming in OS shell language. Solution testing in OS shell and creation the project description.

5. METHODS OF VERIFYING ATTAINING COURSE OUTCOMES

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01 P_W02 P_W03	Exam	Lecture
P_U01 P_U02 P_u03 P_U04	Skill test	Laboratory
P_U05	Project evaluation	Project

6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For the grade of 2 the student cannot	For the grade of 3 the student can	For the grade of 4 the student can	For the grade of 5 the student can
P_W01	Describe the basics of OS architecture and operations	Describe the basics of OS architecture and operations in basic level	Describe the basics of OS architecture and operations in wider range	Describe details of OS architecture and operations
P_W02	Explain rules and theory related to management and processing of information in OS	Explain basic rules and theory related to management and processing of information in OS	Explain common rules and theory related to management and processing of information in OS	Explain detailed rules and theory related to management and processing of information in OS
P_W03	Describe how OS operates and manages devices	Decribe basics of device operation and management in OS	Decribe more details of device operation and management in OS	Decribe deeply details of device operation and management in OS
P_U01	Install I/O devices, create user accounts, set up file system	Install typical I/O devices, create administrator account and set up some file system	Install I/O devices, create administrator and dedicated user accounts, set up and manage file system	Install standard and non standard I/O devices, create dedicated user accounts and groups, set up file systems and manage using ACLs
P_U02	Apply any commands or system tools for process management in OS	Apply only basic commands or system tools for process management in OS	Apply appropriate commands and system tools for the same task in process management in OS	Apply appropriate commands, system tools and self designed scripts for the same task in process management in OS
P_U03	Apply any methods and tools for OS configuration and management	Apply one method and tool for OS user configuration and management, or for different OS resources configuration and management	Apply three methods and tools for OS user configuration and management, or for different OS resources configuration and management	Apply more than three methods and tools for OS user configuration and management, or for different OS resources configuration and management
P_U04	Configure basic services in OS and apply appropriate security policy	Configure one of basic services in OS and apply appropriate security policy	Configure two of basic services in OS and apply appropriate security policy	Configure basic services in OS and apply appropriate security policy and explain apply methods
P_U05	Design simple script in OS shell	Design simple script in OS shell	Develop documentation and design and implement simple script in OS shell	Develop documentation and design and implement simple script in OS shell, demonstrate different ways for solving task

Course outcome	For the grade of 2 the student cannot	For the grade of 3 the student can	For the grade of 4 the student can	For the grade of 5 the student can

7. LITERATURE

Obligatory Reading
R. Garg, G. Verma, Operating Systems, 2016
NDG Linux Essentials , http://netacad.com
Operating System fundamental OS concepts, http://tutorialspoint.com

Supplementary Reading
Andrew S. Tanenbaum, Modern Operating Systems (3rd edition), USA, Person Educational International, 2009
Operating Systems: Internals and Design principles (6th edition) William Stallings,USA, Printice hall, 2009
Operating systems: A systematic view (5th edition) William S. Davis, T. M. Rajkumar. - 5th ed. - Boston, Mass : Addison Wesley, 2001.

CASE Tools Methodology

1. BASIC INFORMATION ON THE COURSE

COURSE NAME	CASE Tools Methodology				
TEACHER	dr inż. Jacek Jakieła				
FACULTY	Faculty of Applied Information Technology				
FIELD OF STUDY	Information Technology				
CYCLE	first-cycle				
EDUCATION PROFILE	practical				
SEMESTER (NUMBER)	5	**ACADEMIC YEAR**	2022/2023	**FORM OF STUDIES**	full-time

FORM OF CLASSES	FORM OF CREDITS	NUMBER OF HOURS	ECTS CREDITS
Laboratory	Credit with grade	30	7
Project	Credit with grade	30	

2. PREREQUISITES (resulting from course succession)

Requirements engineering, Programming languages

3. COURSE OUTCOMES - KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES

Item	Description of the learning outcomes for the course On completing the course, the student has the following KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES
P_W01	define concepts and ideas regarding Computer Aided Software Engineering domain.
P_W02	explain the ways (why and how) the CASE tools may be used in the context of different system development methodologies.
P_U01	Select proper CASE Tool and use it in software development project according to specific methodology and assigned task.
P_U02	Use CASE tools in the process of software system specification development for selected application domain and methodology.
P_K01	understand the importance and explain the relevance of CASE tools proper usage in the system development process.

4. COURSE CONTENT (separately for each form of classes)

Laboratory

Item	Course Content
L1	Introduction to visual modeling. Model management basics. Preparing the project structure with CASE Tool.
L2	Preparing inception deck for software project. Elevator pitch, product box, not-in list and project glossary.

L3	Business modeling with CASE Tools. Modeling business aspects with standard UML notation - UML Business Modeling Profile.
L4	Business modeling with CASE Tools. Business modeling with BPMN notation.
L5	Domain modeling with UML. Identifying business objects, finding and modeling relationships between objects.
L6	Requirements modeling. Business, stakeholders and solution requirements. Defining relationships between requirements.
L7	Requirements modeling with use cases - part 1. Dividing system into subsystems. Developing simple use case diagrams.
L8	Requirements modeling with use cases - part 2. Extending use case diagrams with include and extend relationships.
L9	Requirements modeling with use cases - part 3. Developing use case scenarios. Happy day scenarios and alternative scenarios. Adding triggers, pre- and post-conditions. Specifying additional requirements.
L10	Agile requirements modeling. Using user stories in requirement specification.
L11	System architecture modeling with CASE Tools.
L12	Preparing data model. Modeling ERD diagrams with CASE Tools. SQL (DDL) scripts generation.
L13	Model based code generation with CASE Tools.
L14	Managing software projects with CASE Tools.

Project

Item	Course Content
P1	The goal of the project is to develop comprehensive software system specification for an assigned problem domain according to given methodology. Students are using methodology and selected CASE Tools for supporting analysis and design activities.

5. METHODS OF VERIFYING ATTAINING COURSE OUTCOMES

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01, P_W02	Discussion about project artifacts developed during labs for selected case study.	Laboratory
P_U01	Practical exercises based on the model problems and case studies - skills verification in the areas of using CASE Tools in software development driven by state-of-the art methodologies.	Laboratory
P_U02	Project development and defence	Project
P_K01	Discussion evaluation during labs and project presentation.	Project, Labs

6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For the grade of 2 the student cannot	For the grade of 3 the student can	For the grade of 4 the student can	For the grade of 5 the student can
P_W01	define basic concepts related	define basic concepts related to disciplined	describe goals, process and activities done by	describe goals, process and activities done by

Course outcome	For the grade of 2 the student cannot	For the grade of 3 the student can	For the grade of 4 the student can	For the grade of 5 the student can
	to disciplined approach to software development	approach to software development	software engineer for selected software development methodology	software engineer for all software development methodologies introduced during classes
P_W02	define what is CASE Tool and main advantages of using it	define what is CASE Tool and main advantages of using it	describe key functionalities of CASE tool their application to software development process and selected methodology	describe in detail best practices how CASE Tools may be used in all disciplines defined by state-of-the art methodologies as well as related benefits
P_U01	select CASE Tool functionality for typical system development activities	select CASE Tool functionality for typical system development activities and do simple simple design activity in CASE tool environment	use CASE Tool functionality for selected analysis and design activities related to specific software development methodology	use CASE Tool functionality for most analysis and design activities related to software development methodologies introduced during classes
P_U02	develop in CASE tool environment the structure for project artifacts according to specific methodology and select proper models for analysis and design activities	develop in CASE tool environment the structure for project artifacts according to specific methodology and select proper models for analysis and design activities as well as create specification document template	use CASE tool environment in the development process of detailed software specification according to selected methodology and generate project documentation with specific pre-defined templates	use CASE tool environment in the development process of detailed software specification according to selected methodology and generate project documentation with individually templates
P_K01	explain in clear and understandable manner the role and relevance of CASE Tools as well as benefits related to their usage	generally explain in clear and understandable manner the role and relevance of CASE Tools as well as benefits related to their usage	precisely explain in clear and understandable manner the role and relevance of CASE Tools as well as benefits related to their usage	explain at length in clear and understandable manner the role and relevance of CASE Tools as well as benefits related to their usage

7. LITERATURE

Obligatory Reading
Fox C., J.: Introduction to software engineering design : processes, principles, and patterns with UML2. Pearson, 2006.
Hazzan, O.: Agile software engineering. Springer-Verlag, 2008
Sommerville, I.: Software engineering. Pearson, 2016.

Supplementary Reading
Enterprise Architect Documentation, Sparx Systems.
O'Docherty M.: Object-oriented analysis and design : understanding system development with UML 2.0. John Wiley & Sons, 2005.

English Language

English Language (BA degree - 4 ECTS)	
Laboratory	• Developing vocabulary in accordance with the textbook applicable at a given level, taking into account the vocabulary from the field of science and scientific disciplines relevant to the field of study. • Grammatical structures according to the textbook applicable at a given level. • Practicing the comprehension of written text in accordance with the textbook applicable at a given level, taking into account topics in the field of science and scientific disciplines relevant to the field of study. • Practicing listening comprehension in accordance with the textbook applicable at a given level. • Developing the ability to prepare oral statements (e.g. presentations) in accordance with the textbook applicable at a given level, taking into account topics in the field of science and scientific disciplines relevant to the field of study. • Developing the ability to prepare written statements in accordance with the textbook applicable at a given level, taking into account topics in the field of science and scientific disciplines relevant to the field of study.

1. BASIC INFORMATION ON THE COURSE

Course name	Social and Occupational Problems of IT
Academic year	2022/2023
Faculty	Faculty of Applied Information Technology
Field of study	Information Technology
Education level	First-cycle studies - undergraduate
Education profile	Practical
Specialty	-

2. PREREQUISITES (resulting from the sequence of courses)

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3. LEARNING OUTCOMES AND THE METHOD OF CARRYING OUT ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences,

No.	Description of the learning outcomes for the course	Reference to learning outcomes for the field of study
After completing the training, the student has the following **knowledge**		
P_W01	Discuss social and / or professional IT problems	K_W09, K_W11
P_W02	Discuss issues related to acting of IT specialist on the labor market, including setting up and running a business	K_W10
After completing the training, the student has the following **skills**		
P_U01	Analyze non-IT aspects of solution for IT problem	K_U15, K_U21
P_U02	Critically asses the results of job predisposition test and plan own professional career	K_U06
After completing the training, the student has the following **social competences**		
P_K01	Describe the negative impacts of defects during the phrase of non-technical aspects analysis for IT project	K_K02
P_K02	Describe the negative impacts of an IT engineer's non-ethical behavior concerning employee-employer, client-service provider, society - service provider relations	K_K03
P_K03	Analyze changes in the labor market concerning own opportunities and job demands	K_K01

3.2. Forms of classes and number of hours and ECTS credits

Lec	Con	Ex	Lab	ZP	P	eL	ECTS
-	10	-	-	-	-	-	1

3.3 Teaching delivery methods

Forms of classes	Delivery method
Tutorial	Information and problem-based lecture with the use of multimedia techniques. The lecturer provides structured information that provides theoretical basis for solving problems arising during the lecture.

3.4. Learning content (separately for each form of classes)

Tutorial

No.	Learning content
T1	Social problems of computer science (development of computer science, social context of computer science, problems of the Internet, protection of personal data)
T2	Occupational problems of IT specialists (IT professions and IT education, ethics in IT, risk of IT ventures, legal protection of intellectual property)
T3	IT specialist in the labor market (job search, entrepreneurship basics, effective time management)

3.5. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01	Knowledge exam – open questions	Tutorial
P_W02		
P_U01	Essay	
P_U02		
P_K01	Knowledge exam – open questions	
P_K02		
P_K03		

3.6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For grade 2 the student cannot	For grade 3 the student can	For grade 4 the student can	For grade 5 the student can
P_W01	Discuss social or professional IT problems	Discuss one problem	Discuss two problems	Discuss three problems
P_W02	Discuss issues related to the functioning of IT in the labor market	Discuss one issue	Discuss two issues	Discuss three issues
P_U01	calculate the cost of project implementation	calculate the cost of project implementation	calculate the cost of project implementation and assess the risk	calculate the cost of project implementation, assess and man-age the risk
P_U02	Critically asses the results of job predisposition test and plan own professional career	Critically asses the results of one job predisposition test	Critically asses the results of two job predisposition tests	Critically asses the results of job predisposition test and plan own professional career
P_K01	Describe the negative impacts of defects during the phrase of non-technical aspects analysis for IT project	Describe the negative impacts of defects during the phrase of risk assessment for IT project	Describe the negative impacts of defects during the phrase of risk assessment and implementation cost for IT project	Describe the negative impacts of defects during the phrase of risk assessment, implementation cost, scheduling and lack of

				supervision for IT project
P_K02	Describe the negative impacts of an IT engineer's non-ethical behavior concerning employee-employer, client-service provider, society - service provider relations	Describe the negative impacts of an IT engineer's non-ethical behavior concerning one relation	Describe the negative impacts of an IT engineer's non-ethical behavior concerning two relations	Describe the negative impacts of an IT engineer's non-ethical behavior concerning three relations
P_K03	Analyze changes in the labor market concerning own opportunities and job demands	Know sources and methods useful for analyzing changes in the labor market	Know sources and methods useful for analyzing changes in the labor market, explain the need for continuous professional training	Know sources and methods useful for analyzing changes in the labor market, explain the need for continuous professional training, track job trends and opportunities

3.7. Literature

Obligatory literature
Teaching materials provided by the lecturer
Sara Baase, Timothy M. Henry, A Gift of Fire, Social, Legal, and Ethical Issues for Computing Technology, Pearson, Fifth edition, 2018 or newer

Supplementary literature
Adams A. A., McCrindle R.: Pandora's Box: Social and Professional Issues of the Information Age, Wydawnictwo John Wiley & Sons Ltd, Chichester 2008.
Bott F.: Professional Issues in Information Technology, 2nd edition, BCS, 2014 or more recent.

Network Technologies CCNA

1. BASIC INFORMATION ON THE COURSE

COURSE NAME	Network Technologies (CCNA)				
TEACHER	dr inż. Janusz Korniak				
FACULTY	Faculty of Applied Information Technology				
FIELD OF STUDY	Information Technology				
CYCLE	first-cycle				
EDUCATION PROFILE	practical				
SEMESTER (NUMBER)	1	**ACADEMIC YEAR**	2022/2023	**FORM OF STUDIES**	full-time

FORM OF CLASSES	FORM OF CREDITS	NUMBER OF HOURS	ECTS CREDITS
Lecture	Examination	20	5
Laboratory	Credit with grade	16	

2. PREREQUISITES (resulting from course succession)

NA

3. COURSE OUTCOMES - KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES

Item	Description of the learning outcomes for the course On completing the course, the student has the following KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES
	On success completion of the course, student gains the knowledge necessary to
P_W01	Describe the layers of network reference models, protocols, services, technologies, standards and network equipment
P_W02	Explain information security issues
P_W03	Describe tools and methods for network analysis
	On success completion of the course, student gains the skills to be able to
P_U01	Apply recommendations and standards related to security during planning of computer network
P_U02	Analyze the traffic in real network and in simulated one by using appropriate tools and software
P_U03	Recognize information security threats
P_U04	Install cabling and network equipment for simple LAN
P_U05	Configure network equipment
P_U06	Perform basic troubleshooting of the network communication

4. COURSE CONTENT (separately for each form of classes)

Lecture

Item	Course Content
W1	Elementary principles of communication, OSI reference model, TCP/IP model. Data encapsulation .

W2	Network services and application layer, presentation layer and session layer of the OSI model
W3	Transport layer of the OSI model - goals and TCP and UDP protocols. Reliable and best effort communication.
W4	Network layer of the OSI model - Ipv4 and IPv6 protocols. Routing basics.
W5	General tasks of data link later of the OSI model. Point to point and multi-access communication.
W6	Signal propagation, modulation and coding. The usage of different communication media.
W7	Ethernet - the basics of CSMA/CD algorithm, switches and hubs.
W8	Wireless LAN - physical basics, security issues and mitigation.
W9	Fundamentals of Wide Area Networks and examples such as PPP, Frame Relay and ADSL.

Laboratory

Item	Course Content
L1	Application layer protocol identification and analysis including encrypted traffic (ex. Using PGP)
L2	Exploration of the communication using TCP and UDP.
L3	IPv4 and IPv6 addressing implementing, using and exploring DHCP operations.
L4	Building straight-through and cross-over cables for device interconnection. UTP cabling testing.
L5	Exploring of Ethernet communications. Unicast, broadcast and multicast traffic identification.
L6	Exploring Ethernet switch and Wi-Fi access point operations. Analyzing of ARP protocol operation.
L7	Simple network implementation. Device connecting, configuring and verifying.

5. METHODS OF VERIFYING ATTAINING COURSE OUTCOMES

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01 P_W03	Exam	Lecture
P_U02 P_U04 P_U05 P_U06	Skill test	Laboratory
P_U01 P_U03	Excesise evaluation	Laboratory
P_W02	Knowlage test	Laboratory

6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For the grade of 2 the student cannot	For the grade of 3 the student can	For the grade of 4 the student can	For the grade of 5 the student can
P_W01	Describe the layers of network reference models, protocols,	Describe the layers of network reference models, protocols, services, technologies,	Describe the layers of network reference models, protocols, services, technologies, standards and network	Describe the layers of network reference models, protocols, services, technologies, standards and network equipment in the level which

Course outcome	For the grade of 2 the student cannot	For the grade of 3 the student can	For the grade of 4 the student can	For the grade of 5 the student can
	services, technologies, standards and network equipment	standards and network equipment in basic level	equipment in more details	proves individual study of extra materials and documentation
P_W02	Explain information security issues	Explain basic information security issues	Explain information security issues in more details	Explain information security issues in deep details
P_W03	Describe tools and methods for network analysis	Describe basics of tools and methods for network analysis	Describe more details of tools and methods for network analysis	Describe deep details of tools and methods for network analysis
P_U01	Apply recommendations and standards related to security during planning of computer network	Apply, mentioned in the classroom recommendations and standards related to security during planning of computer network	Apply autonomously discovered recommendations and standards related to security during planning of computer network	Apply autonomously discovered recommendations and standards related to security during planning of computer network beyond the covered in the class
P_U02	Analyze the traffic in real network and in simulated one by using appropriate tools and software	Analyze the traffic in real network and in simulated one by using appropriate tools and software in the basic manner	Analyze the traffic in real network and in simulated one by using appropriate tools and software in the extender manner (with details of communication)	Analyze the traffic in real network and in simulated one by using appropriate tools and software in the level which proves individual study and exploration
P_U03	Recognize information security threats	Recognize most common information security threats	Recognize standard set of information security threats	Recognize wide set of information security threats
P_U04	Install cabling and network equipment for the LAN during assigned time	Install cabling and network equipment for simple LAN during assigned time	Install proficiently cabling and network equipment for simple LAN during assigned time	stall proficiently various cabling and network equipment for simple LAN during assigned time
P_U05	Configure network equipment	Configure, using selected method, basic settings of network equipment	Configure, using selected method, basic and additional settings of network equipment	Configure, using various methods, basic and additional settings of network equipment
P_U06	Perform basic troubleshooting of the network communication	Perform basic troubleshooting of known problems in the network communication	Perform basic troubleshooting of unknown problems in the network communication	Perform basic troubleshooting of unknown problems in the network communication using systematic approach

7. LITERATURE

Obligatory Reading
http://cisco.netacad.com - materials of Cisco Networking Academy Program CCNA R&S Introduction to networks
Anurag Kumar, D. Manjunath, Joy Kuri., Wireless networking, Burlington, MA : Morgan Kaufmann Publishers, cop. 2008.
Oppenheimer P.: Top-down network design, Cisco Press, cop. 2011

Supplementary Reading
Gary A. Donahue, Network Warrior, O'Reilly Media; Second Edition edition (June 2, 2011)
Kurose R.: Computer Networking: A Top-Down Approach., Pearson; 6th edition (March 5, 2012)

. BASIC INFORMATION ON THE COURSE

Course name	Computer Graphics with HCI Elements
Academic year	2022/2023
Faculty	Faculty of Applied Information Technology
Field of study	Information Technology
Education level	firs-cycle -- undergraduate
Education profile	Practical
Specialty	-

2. PREREQUISITES (resulting from the sequence of courses)

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3. LEARNING OUTCOMES AND THE METHOD OF CARRYING OUT ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences,

No.	Description of the learning outcomes for the course	Reference to learning outcomes for the field of study
After completing the training, the student has the following **knowledge**		
P_W01	Identify the basic concepts of graphic and communication human computer.	K_W01
P_W02	Discuss the basic ideas behind the process design.	K_W14
P_W03	Apply basic ideas of the design process.	K_W15
After completing the training, the student has the following **SKLILLS**		
P_U01	is able to work individually and in a team, using various communication channels; is able to develop and implement a work schedule ensuring compliance with the deadlines	K_U02, K_U13
P_U02	is able to develop documentation for the implementation of the IT task and prepare a discussion on the results of the project task	K_U03, K_U13
P_U03	is able to use software suitable for computer graphics, to formulate visual messages in a creative and constructive way, to combine analogue and digital techniques in order to achieve a satisfactory final result	K_U08, K_U13

3.2. Forms of classes and number of hours and ECTS credits

Lec	Tut	Ex	Lab	ZP	P	eL	ECTS
-	15	-	15	-	-	-	2

3.3 Teaching delivery methods

Forms of classes	Delivery method
Tutorial	Knowledge transferred in the form of a lecture interspersed with the forms of informative, problem and conversation. In addition, the lecturer asks the topic for independent study in order to broaden knowledge.

Laboratory	Discussion of the topic, theoretical introduction to the subject of color spaces, demonstrations within the laboratory groups, individual and collective corrections, realization of a joint project

3.4. Learning content (separately for each form of classes)

TUTORIAL

No.	Learning content
T1	Human factors influencing interactive software and system engineers.
T2	Introduction to computer graphics
T3	Theories, rules and guidelines for interface design.
T4	Nielsen's heuristics.
T5	Design process management and interface devices.

LAB

No.	Learning content
Lab1	Basics of raster graphics
Lab2	Website analysis from the point of view of its usefulness and effectiveness
Lab3	Draft website as a step of design process
Lab4	Use of computer graphics
Lab5	Designing a graphical web interface

Project

No.	Learning content
P1	Practical application of knowledge about designing graphical user interface. The student's task is to prepare a graphical interface of any (agreed with the instructor) application for a mobile device. The project involves creating graphic interfaces and testing them (implementation is not required).

3.5. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01	Open test questions	Tutorial
P_W02		
P_W03		
P_U01	Highly stimulated project	Laboratory
P_U02		
P_U03	Project evaluation	Project

3.6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For grade 2 the student cannot	For grade 3 the student can	For grade 4 the student can	For grade 5 the student can
P_W01	Correctly answer 50% of the test questions	Correctly answer more than 50% of the test questions	Correctly answer more than 80% of test questions	Correctly answer more than 90% of the test questions

P_W02	Describe the indicated design rule.	Describe the indicated design rule.	Describe the indicated design rule showing the understanding of the presented content.	Describe the indicated design rule showing the understanding of the presented content and indicating examples of use
P_W03	Name Nielsen's heuristics.	Name and describe 6 Nielsen's heuristics.	Name and describe 8 Nielsen's heuristics.	Name and describe 10 Nielsen's heuristics.
P_U01	work individually and in a team, using various channels of communication; is not able to prepare and implement a work schedule ensuring compliance with the deadlines	work individually; is able to prepare and carry out a work schedule ensuring that deadlines are met	work individually and in a team, communicating directly with others; is able to develop and implement a work schedule ensuring compliance with the deadlines	work individually and in a team, using various communication channels; is able to develop and implement a work schedule ensuring compliance with the deadlines
P_U02	prepare documentation of the implementation of the IT task and prepare a discussion on the results of the project task	develop documentation for an IT task at a basic level	develop documentation for an IT task	develop documentation for the implementation of the IT task and prepare a discussion on the results of the project task
P_U03	use software appropriate for computer graphics, to formulate visual messages in a creative and constructive way; to combine analogue and digital techniques in order to achieve a satisfactory final effect.	use software suitable for computer graphics	use software suitable for computer graphics, to formulate visual messages in a creative and constructive way	use software suitable for computer graphics, to formulate visual messages in a creative and constructive way, to combine analogue and digital techniques in order to achieve a satisfactory final result

3.7. Literature

Obligatory literature

Ben Shneiderman, Designing the User Interface- Strategies for Effective Human - Computer Interaction(3rd edition),Addison Wesley Longman,Maryland,1998
Jacob Nielsen, Designing Web usability, Indianapolis : New Riders, 2000
Barry G. Blundell, An Introduction to computer graphics and creative 3-D environment, Springer, London,2008

Supplementary literature
Gulliksen J., Göransson B., Boivie I. et al., Key Principles for User-centred System Design, in Behaviour & Information Technology, Nov-Dec, Vol. 22, No. 6, pages 397-409, 2003
Peter Shirley, Fundamentals of Computer graphics (2nd edition), AK Peters Ltd.,USA, 2005
Righetti X. , Study of Prototyping Tools for User Interface Design. Information System Interfaces - University of Geneva, 46p, 2006
Ryu H., Modelling Human-Computer Interaction , RLIMS (6), 31-40, 2004

Introduction to electronics and electrical engineering

Introduction to electronics and electrical engineering (BA degree - 4 ECTS)	
Lecture	• Fundamentals of circuit theory. Ohm and Kirchhoff's laws. • Operational amplifiers. • Synthesis of logic circuits. Combinational and sequential circuits. • Junction semiconductor diodes and their application in power supply systems. • Bipolar field transistors. • Selected nonlinear analogy circuits: modulation and demodulation, oscillators, digital-to-analog and analog-to-digital converters.
Laboratory	• Parameters of selected passive elements, examples of power supply systems. • Properties of an exemplary transistor amplifier or selected features of active elements. • Attributes of circuits built on an integrated operational amplifier, on the example of a voltage amplifier or an active filter. • Features of the resonant amplifier and the parameters of the signal generator built on it. • Selected parameters of digital circuits on the example of: sequential and combinational circuits or A / C and C / A converters.

1. BASIC INFORMATION ON THE COURSE

Course name	Introduction to web technologies
Academic year	2022/2023
Faculty	Faculty of Information Technology
Field of study	Information Technology
Education level	First-cycle studies – undergraduate
Education profile	Practical
Specialty	-

2. PREREQUISITES (resulting from the sequence of courses)

Algorithms and Data Structures

3. LEARNING OUTCOMES AND THE METHOD OF CARRYING OUT ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences,

No.	Description of the learning outcomes for the course	Reference to learning outcomes for the field of study
After completing the training, the student has the following **knowledge**		
P_W01	Describe the limitations and advantages associated with creating web services and the application of algorithmic and computational thinking in the process.	K_W03
P_W02	Describe an appropriate design methodology that takes into account the software development processes of web sites.	K_W03
After completing the training, the student has the following **SKLILLS**		
P_U01	Apply appropriate basic web development tools and technologies such as in real IT settings.	K_U09 K_U11
P_U02	Apply appropriate technologies to design and implement the website, and format its appearance such as in real IT conditions.	K_W03 K_U11
P_U03	Apply the selected library for the language to extend the functionality of the website as in a real IT environment.	K_U09
P_U04	Apply a programming language for dynamic web services such as in real IT environments	K_U11
P_U05	Carry out an IT task in the field of web services design along with project documentation	K_U02 K_U09
After completing the training, the student has the following **Social competences**		
P_K01	He is characterized by continuous readiness and openness to independent: understanding of cognitive problems and solving practical problems, if necessary consulting experts	K_K07

3.2. Forms of classes and number of hours and ECTS credits

Lec	Tutorial	RC	Lab	P	eL	ECTS
14	-	-	14	24	-	6

3.3 Teaching delivery methods

Forms of classes	Delivery method
Lecture	Knowledge imparted in two forms involving a combination: • an informative lecture, and • problem-based lecture, by giving topics for independent study, in order to broaden the student's knowledge.
Laboratory	Practical exercises at the computer. Students independently or with the help of the teacher solve practical tasks using the available laboratory manual.
Project	Individual realization of a large practical task concerning the design and implementation of a website according to the assumptions given by the instructor.

3.4. Learning content (separately for each form of classes)

LECTURE

No.	Learning content
L1	Introduction. Basics of website design
L2	HTML (HypetText Markup Language)
L3	Overview of Cascade Style Sheet(s)
L4	Responsive websites (based on Bootstrap, for example)
L5	Basics of interaction of web applications (sites) and databases
L6	Selected JavaScript technologies (frameworks and/or libraries) to create dynamic websites (note - teacher can choose from REACT, Angular and Vue.js)
L7	Web applications executed on the server side (e.g. ASP .NET)

LABORATORY

No.	Learning content
Lab1	Preparing development environment. Designing documents with the use of HTML language.
Lab2	Formatting of content and layout of websites. Designing websites according to the specification.
Lab3	Getting the web design to work on different types of devices, including mobile devices.
Lab4	Using JavaScript and solutions based on it to build elements of WWW services.
Lab5	Basics of building dynamic websites and web applications based on server-side languages.

PROJECT

LP.	EDUCATIONAL CONTENT IMPLEMENTED IN THE PROJECT
P1	Individual realization of a large practical task concerning the design and implementation of a website according to the assumptions given by the instructor.

3.5. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01 P_W02	Open questions	Lecture
P_U01	Practical task	Laboratory
P_U02	Practical tasks	Laboratory

P_U03	Practical tasks	Laboratory
P_U04	Practical tasks	Laboratory
P_U05	Project	Project
P_K01	Project	Project

3.6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For grade 2 the student cannot	For grade 3 the student can	For grade 4 the student can	For grade 5 the student can
P_W01	Discuss the most important elements in terms of limitations and advantages related to the creation of web services and the application of algorithmic and computational thinking in this process.	Discuss the key elements in terms of the limitations and advantages associated with creating web services and applying algorithmic and computational thinking to the process.	Discuss most elements of the limitations and advantages associated with creating web services and applying algorithmic and computational thinking in the process.	Discuss everything from the limitations and advantages associated with creating web services and applying algorithmic and computational thinking to the process.
P_W02	For the problem task given by the instructor - describe the principles of creating a logic and presentation layer.	For the problem task given by the instructor - describe the rules for creating the logic and presentation layer.	For the problem task given by the instructor - describe the principles of creating a multi-layer application with event handling.	For the problem task given by the instructor - describe the principles of creating a multilayer application with event handling and describe the principles of testing.
P_U01	Apply the selected environment to create web sites to a basic extent	Apply the selected environment to create web sites to a basic extent	Apply the selected environment to create websites using advanced supporting tools	Apply the selected environment to create web services using external libraries
P_U02	Select and use appropriate technologies to develop a website	Select and apply basic technologies to make a basic website	Select and apply basic technologies such as HTML and CSS to create a website while maintaining an appropriate document structure	Select and apply basic technologies such as HTML, CSS and JavaScript to create a website while maintaining an appropriate document structure
P_U03	Use cascading style sheets to a basic extent	Apply cascading style sheets taking into account their basic functioning principles	Apply cascading style sheets considering classes, pseudo-classes, pseudo-elements, identifiers and cascading styles	Apply cascading style sheets and other technologies derived from CSS taking into account the correct presentation of content on mobile devices
P_U04	Use a server-side language to a basic extent	Use a server-side language to a basic extent	Apply a basic server-side executable language as part of a web service	Apply server-side language execution including advanced web solutions
P_U05	Develop design and documentation	Correctly perform a design task for the creation of a static	Correctly perform the project task of creating a website with	Correctly perform the project task of creating a dynamic website

		website and develop documentation for this task	dynamic elements and develop documentation for this task	using a database and prepare documentation for this task
K_K01	He is not characterized by continuous readiness and openness to independent: understanding of cognitive problems and solving practical problems, if necessary consulting experts	is characterised by continuous readiness and openness to independent: understanding of cognitive problems and solving practical problems, if necessary consulting experts		
		understanding and solving problems to a minimum extent	understanding and solving problems in a standardized scope	understanding and solving problems beyond the standard range

3.7. Literature

Obligatory literature
Chong Lip Phang, Mastering Front-End Web Development: 14 Books in 1. Introducing 200+ Extensions. An Advanced Guide, Independently published 2020
Paul McFedries, Web Design Playground: HTML & CSS the Interactive Way, Manning Publications 2019

Supplementary literature
Terry Felke-Morris, Basics of Web Design: HTML5 & CSS, Pearson; 5th edition, 2019
World Wide Web Consortium course repository - http://www.w3schools.com

1. BASIC INFORMATION ON THE COURSE

Course name	Contemporary information culture
Academic year	2022/2023
Faculty	Faculty of Information Technology
Field of study	Information Technology
Education level	First-cycle studies – undergraduate
Education profile	Practical
Specialty	-

2. PREREQUISITES (resulting from the sequence of courses)

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3. LEARNING OUTCOMES AND THE METHOD OF CARRYING OUT ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences,

No.	Description of the learning outcomes for the course	Reference to learning outcomes for the field of study
After completing the training, the student has the following **knowledge**		
P_W01	knows the basic concepts of information culture	K_W11
P_W02	understands the principles of critical approach to information	K_W11

3.2. Forms of classes and number of hours and ECTS credits

Lec	Tutorial	RC	Lab	P	eL	ECTS
10	-	-	-	-	-	1

3.3 Teaching delivery methods

Forms of classes	Delivery method
Lecture	Informative and problem-based lecture.

3.4. Learning content (separately for each form of classes)

LECTURE

No.	Learning content
L1	Introduction to the terminology of information culture: basic concepts, elements, importance for individual and social life. Information literacy versus information culture.
L2	Post-truth: causes, manifestations, and effects in individual and social life.
L3	The concept, genesis and history of fake news. The effects of fake news on public debate.
L4	Information culture as an essential element of individual culture. Information competency.
L5	Information culture as the essence of civil society: contemporary threats and challenges to civil society and the rule of law.

3.5. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01	Closed test	Lecture
P_W02	Closed test	Lecture

3.6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For grade 2 the student cannot	For grade 3 the student can	For grade 4 the student can	For grade 5 the student can
P_W01	answer 50% of the questions about the information culture	answer 50% of questions about information culture	answer 70% of questions about information culture	answer 90% of questions about information culture
P_W02	characterize the principles of critical approach to information	characterize 50% of principles of critical approach to information	characterize 70% of rules of critical approach to information	characterize 90% of the principles of critical thinking about information

3.7. Literature

Obligatory literature
Andrew A. Adams, Rachel J. McCrindle, Pandora's Box: Social and Professional Issues of the Information Age, Wiley 2008.

Supplementary literature
Mauro Barisione, Asimina Michailidou (red.), Social Media and European Politics. Rethinking Power and Legitimacy in the Digital Era, Palgrave Macmillan UK 2017.
Lee McIntyre, Post-Truth, MIT Press 2018.
Sven Bernecker, Amy K. Flowerree, Thomas Grundmann (red.), The Epistemology of Fake News, Oxford University Press 2021.

1. BASIC INFORMATION ON THE COURSE

Course name	Fundamentals of Mathematics
Academic year	2022/2023
Faculty	Faculty of Applied Information Technology
Field of study	Information Technology
Education level	First-cycle studies – undergraduate
Education profile	Practical
Specialty	-

2. PREREQUISITES (resulting from the sequence of courses)

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3. LEARNING OUTCOMES AND METHOD OF CARRYING OUT THE ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences

No.	Description of the learning outcomes for the course	Reference to learning outcomes for the field of study
After completing the training, the student has the following **knowledge**		
P_W01	basic knowledge of mathematical logic and single-variable functions necessary for logical thinking and mathematical problem solving	K_W01
After completing the training, the student has the following **SKLILLS**		
P_U01	performance of operations on sentences and sets	K_U20
P_U02	solving equations and inequalities and performing operations on functions	K_U20

3.2. Forms of classes and number of hours and ECTS credits

Lec	Tutorial	RC	Lab	P	eL	ECTS
16	-	18	-	-	-	4

3.3 Teaching delivery methods

Forms of classes	Delivery method
Lecture	Informative and problematic lecture: The lecturer introduces the necessary concepts and discusses the issue. Suggesting to students the main problems, he discusses with them possible ways of solving tasks. He presents examples and tasks, which are considered and solved in cooperation with students.
Recitation	Exercise - practical: The student constructs his own solution methods on the basis of previously acquired knowledge and skills. He indicates similarities and differences with methods used in other branches of mathematics. Moreover, he/she enriches his/her abilities by practicing the skills on the basis of knowledge acquired during lectures. In particular, uses indicated fragments of literature and own studies. Working in small groups, they exchange experience and learn to cooperate.

3.4. Learning content (separately for each form of classes)

LECTURE

No.	Learning content
L1	Elements of mathematical logic. Classical propositional calculus. Many-valued logics.

L2	Calculation with quantifiers. Theorem proving methods.
L3	Algebra of sets. Number Sets. Elements of set theory.
L4	Cartesian products of sets. Introduction to relations. Functions as relations.
L5	Properties of functions and operation on functions.
L6	Operations on algebraic expressions. Equations and inequalities. The absolute value.
L7	Quadratic functions. Polynomials. Rational functions.
L8	Exponential and logarithmic functions. Trigonometric and cyclometric functions.
L9	Sequences and limits of sequences.

RECITATION CLASS

No.	Learning content
Rc1	Classical propositional calculus. Three-valued logic
Rc2	Quantifiers. Direct proof and indirect proof
Rc3	Algebra of sets. Indexed families of sets. Cartesian products of sets.
Rc4	Properties of functions and operation on functions.
Rc5	Solving equations and inequalities
Rc6	Quadratic functions. Polynomials and operations on polynomials. Rational functions.
Rc7	Power and logarithm. Exponential and logarithmic functions
Rc8	Trigonometric functions
Rc9	Number sequences and their properties. Limits of sequences.

3.5. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01	Open questions- tasks to be solved	Lecture
P_U01	Open questions- tasks to be solved	Recitation Class
P_U02	Open questions- tasks to be solved	Recitation Class
P_U03	Open questions- tasks to be solved	Recitation Class

3.6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For grade 2 the student cannot	For grade 3 the student can	For grade 4 the student can	For grade 5 the student can
P_W01	Select the correct answers in more than 50% of the questions	Select the correct answers in more than 50% of the questions and less than 70% of the questions	Select the correct answers in more than (or equal to) 70% of the questions and less than 85% of the questions	Select the correct answers in more than (or equal to) 85% of the questions
P_U01	Use logical functors and perform basic operations on sets	Use logical functors, check basic tautologies and perform basic operations on sets	Use logical functors, check tautologies, perform operations on sets	use logical functors, check tautologies, apply logical laws and perform operations on sets fluently
P_U02	solve equations / inequalities and	solve simple equations / inequality	solve equations / inequalities and perform simple	solve equations / inequalities and

	perform operations on functions		operations on functions	perform operations on functions

3.7. Literature

Obligatory literature
J.K. Truss: Discrete mathematics for computer scientists, Harlow 1999
E.F. Haeussler, R.S. Paul, R. Wood: Introductory Mathematical Analysis, Prentice Hall 2005

Supplementary literature
Khan Academy materials: https://www.khanacademy.org/math/precalculus
Khan Academy materials: https://www.khanacademy.org/math/algebra2

Programming

Programming (BA degree - 5 ECTS)	
Lecture	• Review of programming languages and selected application development technologies. • Life cycle of a programming project - elements of software engineering. • Requirements management - specification of system requirements. • Methods and tools of software design - elements of the UML language (the use case diagram). • Documentation automation. • Version control systems in software production. • Software testing methods and tools.
Laboratory	• Creating programs with a graphical interface in the .NET environment - Windows Forms technology • Creating programs with a graphical interface in the .NET environment - Windows Presentation Foundation technology • Working with data in programs in the .NET environment • Program versioning - working with the repository • Program testing - creating unit tests in Visual Studio • Documenting the program - documenting comments
Project	• Specification of design requirements - development of project assumptions. • Development of a schedule and division of tasks • Project implementation. • Testing and validation of the solution. • Preparation of documentation

1. BASIC INFORMATION ON THE COURSE

Course name	Introduction to programming
Academic year	2022/2023
Faculty	Faculty of Information Technology
Field of study	Information Technology
Education level	First-cycle studies – undergraduate
Education profile	Practical
Specialty	-

2. PREREQUISITES (resulting from the sequence of courses)

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3. LEARNING OUTCOMES AND THE METHOD OF CARRYING OUT ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences,

No.	Description of the learning outcomes for the course	Reference to learning outcomes for the field of study
After completing the training, the student has the following **knowledge**		
P_W01	has knowledge in mathematics necessary for the analysis and development of simple computer programs and the implementation of basic algorithms	K_W01
P_W02	has a structured knowledge of programming methodology and techniques, including basic algorithmic techniques and the importance of algorithmic and computer thinking in solving problems using computer programs	K_W03
After completing the training, the student has the following **SKLILLS**		
P_U01	is able to consciously and effectively use reusable resources in constructing simple computer programs	K_U10
P_U02	is able to design, implement, validate and debug simple programs in a structured programming language and implement basic algorithms and assess their complexity	K_U11

3.2. Forms of classes and number of hours and ECTS credits

Lec	Tutorial	RC	Lab	P	eL	ECTS
20	-	-	20	14	-	5

3.3 Teaching delivery methods

Forms of classes	Delivery method
Lecture	Informative and problem-based lecture, combined with elements of demonstration.
Laboratory	Laboratory exercises at the computer. During the classes students independently implement and debug computer programs using the integrated environment.

Project	The project involves the independent implementation of a program to solve a programming problem. The project is carried out in consultation with the teacher and ends with a discussion and presentation of a working solution.

3.4. Learning content (separately for each form of classes)

LECTURE

No.	Learning content
L1	The process of creating a computer program in a high level language - working in RAD environment
L2	Defining variables and data types, input-output operations
L3	Language Operators
L4	Conditional instruction
L5	Iterative instructions
L6	Boards
L7	Multi-choice instructions
L8	Defining and calling up functions

LABORATORY

No.	Learning content
Lab1	RAD experience - creating simple console programs
Lab2	Defining variables, data types, basic arithmetic operations
Lab3	Use of conditional instruction
Lab4	Iterative instructions: loops while, do-while, for
Lab5	Storage of data in tables
Lab6	Multi-choice instructions
Lab7	Defining and using functions in the program

PROJECT

No.	Learning content
P1	Development of the project assumptions
P2	Programme implementation
P3	Presentation of the result

3.5. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01	Open or closed question test	Lecture
P_W02	Open or closed question test	Lecture
P_U01	Practical task	Laboratory, Project
P_U02	Practical task	Laboratory, Project

3.6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For grade 2 the student cannot	For grade 3 the student can	For grade 4 the student can	For grade 5 the student can
P_W01	demonstrate knowledge of mathematics necessary for the analysis and development of simple computer programs and the	Demonstrate at a basic level the knowledge of mathematics necessary for the analysis and development of simple computer	demonstrate a good level of mathematical knowledge necessary for the analysis and development of simple computer programs and the	Demonstrate a very good knowledge of mathematics necessary for the analysis and development of simple computer programs and the

	implementation of basic algorithms	programs and the implementation of basic algorithms.	implementation of basic algorithms	implementation of basic algorithms.
P_W02	demonstrate knowledge of programming methodology and techniques, including basic algorithmic techniques and the importance of algorithmic and computer thinking in solving problems using computer programs	demonstrate basic knowledge of programming methodology and techniques, including basic algorithmic techniques and the importance of algorithmic and computer-based thinking in solving problems using computer programs	demonstrate a good level of knowledge of programming methodology and techniques, including basic algorithmic techniques and the importance of algorithmic and computer thinking in solving problems using computer programs	demonstrate a very good knowledge of programming methodology and techniques, including basic algorithmic techniques and the importance of algorithmic and computer thinking in solving problems using computer programs
P_U01	use reusable resources in constructing simple computer programs	at a basic level use reusable resources in the construction of simple computer programs	use reusable resources at a good level in constructing simple computer programs	use reusable resources at a very good level in constructing simple computer programs
P_U02	design and implement a simple program in a structured programming language	design and implement simple programs in a structured programming language	design, implement, validate and debug simple programs in a structured programming language	design, implement, validate and debug simple programs in a structured programming language and implement basic algorithms and assess their complexity

3.7. Literature

Obligatory literature
Kernighan, Brian W.: The C programming language , Prentice Hall 2011, or newer
B. Stroustrup, Programming : Principles and Practice Using C++, Pearson Education, New Jersey, 2015, or newer
B. Stroustrup, The C++ Programming Language, Pearson Education, New Jersey, 2013, or newer

Supplementary literature
R. C. Martin, Clean Code : A Handbook of Agile Software Craftsmanship, Pearson Education, Upper Saddle River, 2009

1. BASIC INFORMATION ON THE COURSE

Course name	Introduction to IT
Academic year	2022/2023
Faculty	Faculty of Information Technology
Field of study	Information Technology
Education level	First-cycle studies – undergraduate
Education profile	Practical
Specialty	-

2. PREREQUISITES (resulting from the sequence of courses)

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3. LEARNING OUTCOMES AND THE METHOD OF CARRYING OUT ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences,

No.	Description of the learning outcomes for the course	Reference to learning outcomes for the field of study
After completing the training, the student has the following **knowledge**		
P_W01	Describe the basic systems and numerical codes used in computer science, make conversions between the basic systems and know how to perform arithmetic operation in these systems.	K_W01
P_W02	Present the basic elements of Boole's algebra used to describe the operation of computer systems and make transformations to the Booleans function.	K_W08
P_W03	Can describe ways of representing data (numbers, text, sound and image) in computer systems.	K_W06
After completing the training, the student has the following **SKLILLS**		
P_U01	Can convert decimal numbers with and without a sign to numbers in binary, octal and hexadecimal systems. Perform arithmetic actions on numbers in different systems, especially on binary numbers.	K_U20
P_U02	Can transform and minimize the Booleans function.	K_U20
P_U03	Use a spreadsheet to test and visualize number conversion issues, arithmetic actions on numbers in different number systems.	K_U22
After completing the training, the student has the following **Social competences**		
P_K01	Understands the need to learn and acquire new knowledge.	K_K01

3.2. Forms of classes and number of hours and ECTS credits

Lec	Tutorial	RC	Lab	P	eL	ECTS
14	-	-	14	-	-	3

3.3 Teaching delivery methods

Forms of classes	Delivery method

Lecture	Informative and problem-based lecture.
Laboratory	Practical exercises and problem solving.

3.4. Learning content (separately for each form of classes)

LECTURE

No.	Learning content
L1	History of Informatics, modern trends in computer science.
L2	Basic systems and numerical codes used in IT. Rules of performing arithmetic actions on different numerical systems. Arithmetic errors.
L3	Representation of real numbers: FP2 code, IEEE754 standard.
L4	Basics of the theory of digital systems; Boole's algebra; logical functions, ways of representing logical functions, minimizing of logical functions.
L5	Digital blocks - logic systems, digital gateways, sequential blocks.
L6	Data encoding and representation - encoding of characters, images, sounds and videos. Difference between lossy compression and lossless. Data compression formats.

LABORATORY

No.	Learning content
Lab1	Organizational activities. Health and safety training. Rules of passing the subject. Basics of Excel.
Lab2	Numerical systems: decimal, binary (binary), hexadecimal (hexadecimal). Conversion of numbers between different systems. The Horner algorithm. Exercises in number conversion. Conversion of numbers in different systems in Excel.
Lab3	Representation of real numbers. Character code - module. Supplementary codes. Variable position system. Exercises in conversion of numbers in Excel.
Lab4	Arithmetic and bit operations in selected number systems.
Lab5	An element of logic. The binary record of Boole's algebra. Axioms of Boole's algebra. Minimizing Boolean functions. Using MS Excel sheet to test logical expressions.
Lab6	Digital data - encoding of characters, images. Recording of sound and video material. Compression - lossless, lossless. Data compression formats. Using MS Excel sheet to generate charts.

3.5. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01	Closed test	Lecture
P_W02	Closed test	Lecture
P_W03	Closed test	Lecture
P_U01	Practical tasks	Laboratory
P_U02	Practical tasks	Laboratory
P_U03	Practical tasks	Laboratory
P_K01	Discussion, activity in class	Laboratory

3.6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For grade 2 the student cannot	For grade 3 the student can	For grade 4 the student can	For grade 5 the student can
P_W01	answer 50% of the questions about the system and numerical codes	answer 50% of questions about systems and numerical codes	answer 70% of questions about systems and numerical codes	answer 90% of questions about systems and numerical codes

P_W02	answer 50% of questions about Boole's algebra, digital gateways and minimizing Boolean functions	answer 50% of questions about Boole's algebra, digital gateways and minimizing Boolean functions	answer 70% of questions about Boole's algebra, digital gateways and minimizing Boolean functions	answer 90% of the questions about Boole's algebra, digital gateways and minimizing Boolean functions
P_W03	answer 50% of questions about binary operations	answer 50% of the questions about binary operations.	answer 75% of questions about binary operations.	answer 90% of the questions about binary operations.
P_U01	solve at least 50% of problems in converting signed and unsigned decimal numbers to numbers in binary, octal and hexadecimal systems. Perform arithmetic operations on numbers in various systems, especially on binary numbers.	solve at least 50% of problems in converting signed and unsigned decimal numbers to numbers in binary, octal and hexadecimal systems. Perform arithmetic operations on numbers in various systems, especially on binary numbers.	solve at least 75% of problems in converting signed and unsigned decimal numbers to numbers in binary, octal and hexadecimal systems. Perform arithmetic operations on numbers in various systems, especially on binary numbers.	solve at least 90% of problems in converting signed and unsigned decimal numbers to numbers in binary, octal and hexadecimal systems. Perform arithmetic operations on numbers in various systems, especially on binary numbers.
P_U02	Solve at least 50% of the tasks of transforming and minimizing the Boolean function.	Solve at least 50% of the tasks of transforming and minimizing the Boolean function.	Solve at least 75% of the tasks of transforming and minimizing the Boolean function.	solve at least 90% of the tasks of transforming and minimizing the Boolean function.
P_U03	Use a spreadsheet to test the issues from the period of number conversion, arithmetic actions on numbers in different number systems.	Use a spreadsheet to test issues of number-to number conversion in different number systems.	Use a spreadsheet to test issues of number conversion and arithmetic activities on numbers in different number systems.	Use a spreadsheet to test and visualize number conversion issues, arithmetic actions on numbers in different number systems.
P_K01	participate actively in the activities	participate actively in the activities	actively participate in classes presenting their solution to the problem	actively participate in classes presenting various solutions to the problem, justifying their choices

3.7. Literature

Obligatory literature
Sunil, Tanna, Advanced Binary for Programming & Computer Science: Logical, Bitwise and Arithmetic Operations, and Data Encoding and Representation 1st Edition, Answers 2000 Limited,
Rex Page, Ruben Gamboa: Essential Logic for Computer Science, Kindle Edition 2018
Lecture materials.

Supplementary literature
https://www.tutorialspoint.com/basics_of_computers/index.htm

Team Project

1. BASIC INFORMATION ON THE COURSE

COURSE NAME	Team Project				
TEACHER	dr inż. Łukasz Piątek				
FACULTY	Faculty of Applied Information Technology				
FIELD OF STUDY	Information Technology				
CYCLE	first-cycle				
EDUCATION PROFILE	practical				
SEMESTER (NUMBER)	5	**ACADEMIC YEAR**	2022/2023	**FORM OF STUDIES**	full-time

FORM OF CLASSES	FORM OF CREDITS	NUMBER OF HOURS	ECTS CREDITS
Project	Credit with grade	30	4

2. PREREQUISITES (resulting from course succession)

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3. COURSE OUTCOMES - KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES

Item	Description of the learning outcomes for the course On completing the course, the student has the following KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES
P_W01	To prepare specification of team project covering all elements of its structure
P_W02	Take into account the trade-off rule in problem solving process
P_U01	To choose bibliography
P_U02	To communicate in the team
P_U03	To execute the project according to elaborated specification
P_U04	To present results of own work
P_U05	To organise the work for project and the self-learning process
P_K01	To follow rules of work in the team
P_K02	Understand the non-technical aspects occurring in computer science and economy projects design and implementation

4. COURSE CONTENT (separately for each form of classes)

Project

Item	Course Content
P1	Preparing conspect - Project specification Project works planning Project realisation

	Elaborating documentation Results presentation

5. METHODS OF VERIFYING ATTAINING COURSE OUTCOMES

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01-P_W02 P_U01-P_U05 P_K01-P_K02	Project	Project

6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For the grade of 2 the student cannot	For the grade of 3 the student can	For the grade of 4 the student can	For the grade of 5 the student can
P_W01	elaborate specification (synopsis) of the team project	elaborate correctly the structure of the specification with some kind of mistakes in a field of substantive content of its elements	elaborate correctly the structure of the specification with substantive content of all its elements	elaborate correctly the structure of the specification with substantive content of all its elements to a given deadline
P_W02	take into account the trade-off rule	take into account the trade-off rule accordingly to two aspects	take into account the trade-off rule accordingly to three aspects	take into account the trade-off rule accordingly to at least four aspects
P_U01	choose bibliography sources correctly	choose bibliography sources correctly limited to proposed by instructor	choose bibliography sources correctly extending proposed by instructor by new polish language items	choose bibliography sources correctly extending proposed by instructor by new non-polish language items.
P_U02	be active in any three analysed form of verbal activity.	be active in the field of generative behaviour only which is new idea proposition in the dialogue (solution, aim, conclusion stated on the basis of data analysed, etc.)	be active in the field of generative and information behaviour only which is new knowledge delivery according to discussion subject.	be active in the field of generative, information and evaluation behaviour which is presenting explained opinion according to discussion subject.
P_U03	execute the project according to elaborated specification	To execute the project according to technical assumptions (functionality, usefulness,...)	To execute the project according to technical and economical assumptions (cost calculation)	To execute the project according to technical, economical and time assumptions (observance of schedule execution in each stages of project)
P_U04	elaborate project documentation	elaborate project documentation contains some mistakes (disagreements with template)	elaborate project documentation agreed with given template	elaborate project documentation agreed with given template and perform professional

Course outcome	For the grade of 2 the student cannot	For the grade of 3 the student can	For the grade of 4 the student can	For the grade of 5 the student can
				presentation of obtained results
P_U05	organise the work for project nor the self-learning process	organise the work for project and the self-learning process with significant help from the instructor	organise the work for project and the self-learning process with small help from the instructor	organise the work for project and the self-learning process without any help from the instructor
P_K01	engage in team work (student remains passive)	engage in team work	engage in team work by taking at least two roles	engage in team work by taking at least three roles and also leader role at chosen stage of work
P_K02	understand the non-technical aspects occurring in computer science and economy projects design and implementation	understand the non-technical aspects occurring in computer science and economy projects design and implementation	understand the detailed non-technical aspects occurring in computer science and economy projects design and implementation	understand all the non-technical aspects occurring in computer science and economy projects design and implementation

7. LITERATURE

Obligatory Reading
H. Kerzner, Project management : a systems approach to planning, scheduling and controlling. - 8th ed. - Hoboken, New Jersey : John Wiley & Sons. 2003.
H. Kerzner, Project management : case studies, New Jersey, 2003.

Supplementary Reading
K. Koskinen , Management of tacit knowledge in a project work context , Helsiniki, 2001.
J. Phillips , PMP : project management professional study guide, San Francisco, 2006.
T. Kloppenborg , Project management : a contemporary approach : organize, plan, perform, South-Western Cengage Learning, Mason, 2009.

Cybersecurity Essentials

Cybersecurity Essentials (BA degree - 6 ECTS)	
Lecture	• Cyberspace - security actors, cybercriminals, security specialists, the impact of threats on people, business, institutions • Security models and standards. Basic components: confidentiality, integrity, availability • Threats and Vulnerabilities - Overview • Ensuring confidentiality - cryptography. Techniques, tools, protocols • Ensuring integrity. Integrity control methods, digital signature, certificates. Integrity in databases • High availability and reliability. Reliability methods, incident response, disaster recovery • Securing devices and systems. Securing servers and networks. Physical security
Laboratory	• Identification of threats using professional databases. Preparation of the environment based on virtualization • The use of authentication, authorization and accounting methods in operating systems • Detection of basic threats in the operating system • Password encryption and cracking • Examination of digital signatures. Configuring secure remote access • Securing the operating system

Artificial Intelligence

Artificial Intelligence (BA degree - 4 ECTS)	
Lecture	• Natural and artificial intelligence. Preliminary issues • State space and selected methods of searching it • Object identification. Minimum-distance methods • Expert systems. Goals and tasks. Inference • Machine learning elements. Rules and decision trees • Application of artificial intelligence methods
Laboratory	• Determining decision rules, classification of objects • Generating decision trees, classification of objects • Minimum-distance methods • Cluster analysis • Examination of the significance of attributes • Computational intelligence: neural networks, genetic algorithms or other methods

Requirements Engineering (BA degree - 7 ECTS)	
Laboratory	• Examples of good practice in the requirements specification. Presentation of basic concepts related to the discipline of requirements engineering. • Identification of the system's stakeholders and their needs. Definition of an IT project dictionary. • Defining the vision and scope of the system. • Requirements analysis and modeling based on a structural methodology. • Analysis and modeling of information requirements. • Requirements analysis and modeling based on object-oriented methodology. • Requirements analysis and modeling based on the guidelines of agile methodologies. • Preparation of the requirements specification document.
Project	• The main goal of the project is to develop a specification of system requirements for a specific application domain in accordance with the indicated specification template and with the use of selected methods, techniques and tools. The specification document should contain all design artifacts indicated by the tutor prepared in the selected CASE tool.

Master Degree:

IT systems engineering

1. BASIC INFORMATION ON THE COURSE

Course name	IT Systems Engineering
Academic year	2022/2023
Faculty	Faculty of Information Technology
Field of study	Information Technology
Education level	Second-cycle – postgraduate
Education profile	Practical
Specialty	-

2. PREREQUISITES (resulting from the sequence of courses)

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3. LEARNING OUTCOMES AND THE METHOD OF CARRYING OUT ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences,

No.	Description of the learning outcomes for the course On completing the course, the student has the following KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES
P_W01	Apply existing theories, models, tools, and formal methods to the process of developing requirements specifications and modeling and designing a complex computer system with real-world requirements.
P_W02	apply appropriate design methodology to complex information systems, understands the relationships between system components; knows methods and tools for designing information systems.
P_W03	describe the organization of the various stages of an information system project life cycle including implementation and cost estimation.
P_U01	Use English to create a project description and presentation.
P_U02	Conduct a research experiment by interpreting the results obtained.
P_U03	Write a technical text in English based on a broader research material.
P_U04	evaluate and compare design solutions and software development processes, with respect to given usability and economic criteria (complexity of algorithms, speed of operation, time consumption, cost, etc.).
P_U05	design and select appropriate CASE tools supporting the process of analysis, design and development of an information system.
P_U06	independently formulate and test hypotheses related to the selection of appropriate methodologies and their tools in the process of modeling and developing an information system.

3.2. Forms of classes and number of hours and ECTS credits

Lec	Tutorial	RC	Lab	P	eL	ECTS
14	-	-	18	18	-	4

3.3. Learning content (separately for each form of classes)

LECTURE

No.	Learning content

L1	Issues related to computer systems engineering along with the rank of its importance and issues of ethical and professional responsibility of information systems engineers.
L2	Analyze existing information systems and the design cycles used in the technologies of key vendors of those systems.
L3	Specification of deliverables arising as part of an ongoing IT project.
L4	Discuss the process of building logical data models of a designed information system.
L5	Convert developed and available logical models of the system into a physical model.
L6	Structural analysis methods in the design of decision systems and data warehouses.
L7	System interaction with the user and presentation of information. Principles of proper graphical user interface design.

LABORATORY

No.	Learning content
Lab1	Introduction to the process of analyzing an information system using the CASE tool Enterprise Architect.
Lab2	Data Flow Diagrams (DFD). Verification of the correctness and non-contradiction of DFD diagrams.
Lab3	ERD (Entity Relationship Diagram). Distinguishing objects. Distinguishing direct relationships. Determining types of relationships.
Lab4	Normalization of entity relationships in ERD diagrams.
Lab5	Balancing the ERD diagram against the DFD and process specifications.
Lab6	Create a state transition diagram of the designed information system module.
Lab7	Create a data dictionary for a defined information system logic model.

PROJECT

No.	Learning content
P1	Acquire knowledge of agile approach methodologies such as Scrum, Lean Software Development, Adaptive Development, Feature Driven Development, and Test Driving Development in terms of problems involving structural analysis in terms of entity relationships, data flow, and events conditioning the state of each information system object.

3.4. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01	Written exam	Lecture
P_W02	Written exam	Lecture
P_W03	Written exam	Lecture
P_U01	Skill test	Laboratory
P_U02	Skill test	Laboratory
P_U03	Skill test	Laboratory
P_U04	Project lab	Laboratory
P_U05	Skill test	Laboratory
P_U06	Project evaluation	

3.5. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For grade 2 the student cannot	For grade 3 the student can	For grade 4 the student can	For grade 5 the student can
P_W01	Discuss the functional decomposition model of an	Discuss the functional decomposition model of an information system description.	Discuss the functional decomposition model of an information system	Discuss the functional decomposition model of an information

	information system description.		description with a data model according to one selected methodology.	system description with a data model according to at least two methodologies indicated by the instructor.
P_W02	Describe the specifics of the processes and conditions of the workflow system component relationships.	Describe the specifics of the processes and conditions of the workflow system component relationships.	Indicate methods and tools appropriate to specific processes and conditions in the form of dependencies between components of the designed IT system.	Describe the logical data model and functional model of the system taking into account the specific processes and conditions in the form of dependencies between components of the designed information system.
P_W03	Discuss the methodology for approaching information system design with heavy and light processes.	Discuss the methodology for approaching information system design with heavy and light processes.	Identify the correct approach to an agile methodology of their choice for a problem task defined by the instructor.	Identify the correct approach for the agile methodologies indicated by the instructor for the problem task defined by the instructor.
P_U01	Evaluate basic prototyping techniques for developing system software.	Evaluate basic prototyping techniques for developing system software in a basic scope	Evaluate basic prototyping techniques for developing system software in more detailed scope	Evaluate basic and less known prototyping techniques for developing system software in more detailed scope.
P_U02	In the process of estimating the analyzed process and system conditions, estimate the time and cost of implementation of the indicated phase of the information system development process.	In the process of estimating the analyzed process and system conditions, estimate the time and cost of implementation of the indicated phase of the information system development process.	In the process of estimating the analyzed process and system conditions, estimate the time and cost of implementation of all phase of the information system development process.	In the process of estimating the analyzed process and system conditions, estimate the time and cost of implementation of all phase of the information system development process and whole project.

P_U03	Develop basic structural tests related to the chosen information system development methodology.	Develop basic structural tests related to the chosen information system development methodology.	Perform the indicated structural tests associated with the chosen information system development methodology.	Perform the indicated structural and functional tests related to the chosen information system development methodology.
P_U04	Indicate the legal aspects related to the process of creating a specific and dedicated system solution.	Indicate the legal aspects related to the process of creating a specific and dedicated system solution.	Formulate a design specification for a complex information system taking into account legal aspects, including intellectual property protection.	Formulate the design specification of a complex information system taking into account legal aspects including intellectual property protection and other non-technical aspects such as social and economic aspects.
P_U05	Correctly select CASE tools, thanks to which it is possible to create both functional and logical model of the IT system being implemented.	Correctly select CASE tools, thanks to which it is possible to create both functional and logical model of the IT system being implemented.	Select the optimal environment and the optimal tools for the assumed information system development methodology in the context of the problem domain.	Make the appropriate selection of CASE tools and environment best suited to both the type of project being implemented and the associated process considerations.
P_U06	Formulate hypotheses related to the identification of the best design methodologies for a given system specificity, including process and hardware considerations.	Formulate hypotheses related to the identification of the best design methodologies for a given system specificity, including process and hardware considerations.	Formulate hypotheses related to indicating the best design methodologies for a given system specificity, including process and hardware conditions, as well as their tools in the process of modeling and creating an information system.	Test previously defined hypotheses related to the identification of the best design methodologies for a given specific information system, including process and hardware considerations.

3.6. Literature

Obligatory literature

Sommerville I.: Software Engineering, Pearson, 2015 or newer.
Bass L., Clements P., Kazman R. ,Software architecture in practice, Addison-Wesley, Upper Saddle River, NJ, 2013

Supplementary literature
Martin Fowler, Patterns of Enterprise Application Architecture, Addison-Wesley Professional, 2002 or newer
Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, Addison-Wesley Professional, 1994 or newer

1. BASIC INFORMATION ON THE COURSE

Course name	Research Methodology
Academic year	2022/2023
Faculty	Faculty of Information Technology
Field of study	Information Technology
Education level	Second-cycle studies – postgraduate
Education profile	Practical
Specialty	-

2. PREREQUISITES (resulting from the sequence of courses)

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3. LEARNING OUTCOMES AND THE METHOD OF CARRYING OUT ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences,

No.	Description of the learning outcomes for the course	Reference to learning outcomes for the field of study
After completing the training, the student has the following **SKLILLS**		
P_U01	To plan to conduct their own research in the field of information technology science	K_W04
P_U02	Formulate research problems and hypotheses	K_U14
P_U03	Propose the possibility of self-complementarity of knowledge and skills	K_U01

3.2. Forms of classes and number of hours and ECTS credits

Lec	Tutorial	RC	Lab	P	eL	ECTS
14	-	-	-	20	-	3

3.3 Teaching delivery methods

Forms of classes	Delivery method
Lecture	A lecture combined with the direct activity of the listeners themselves, aimed at solving theoretical or practical problems.
Project	The individual project involving the use of methods, techniques and tools related to the methodology of research and conducting their own research on topics indicated by the instructor. Preparing a report of the results.

3.4. Learning content (separately for each form of classes)

LECTURE

No.	Learning content
L1	The methodology and the methodology of scientific research
L2	Identification of the object and purpose of research

L3	Problems and research hypotheses
L4	The variables and their indicators
L5	Methods, techniques and research tools

Project

No.	Learning content
P1	Each student develops an individual case study demonstrating the use of methods, techniques, and a tool related to the subject and performs an individual report for a problem identified by the instructor.

3.5. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_U01	The evaluation is based on a report presenting the application of techniques, methods and tools indicated by the trainer	Project
P_U02	Written elaboration	Lecture
P_U03	Written elaboration	Lecture

3.6. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For grade 2 the student cannot	For grade 3 the student can	For grade 4 the student can	For grade 5 the student can
P_U01	Carry out his own scientific research in the area of information technology science	Plan the research / project to be carried out, including the subject and purpose of the research, as well as the proposed method of conducting them and their time scale	Plan to conduct scientific research, including the subject and purpose of the research, as well as the proposed method of their implementation and their scale of time, as well as to propose a research problem and raise research hypotheses	Plan for detailed scientific research, including the subject and purpose of the research, as well as the proposed method, techniques and research tools, determine variables and indicators, and propose a research problem and raise research hypotheses
P_U02	Formulate scientific problems and hypothesis	Flawlessly describe what a research problem is and determine the essence of its formulation	Flawlessly describe what is the research problem and research hypothesis, as well as determine the essence of formulating research problems and hypotheses	Flawlessly describe what is the problem and research hypothesis, determine their essence and precisely formulate research problems and hypotheses
P_U03	Propose the possibilities of individual completion of knowledge and skills	Propose the possibilities of self-supplementing knowledge and skills	Propose the possibilities of self-supplementing knowledge and skills, including interdisciplinary knowledge	Propose the possibility of self-complementing knowledge and skills, including interdisciplinary knowledge, and assess how useful knowledge

				and skills will be to carry out basic scientific research

3.7. Literature

Obligatory literature
A. Zeliaś, *Contemporary problems of statistical and econometrics research*, Cracow, 2001 or newer
B. Laurel, *Design research : methods and perspectives,* Cambridge, 2003 or newer

Supplementary literature
L. M. Rea & R. A. Parker, *Designing and conducting survey research : a comprehensive guide*, San Francisco, 1997 or newer
B. Hancké*, Intelligent research design : a guide for beginning researchers in the social sciences*, Oxford , 2009 or newer

1. BASIC INFORMATION ON THE COURSE

Course name	Computational Methods in Science and Technology
Academic year	2022/2023
Faculty	Faculty of Information Technology
Field of study	Information Technology
Education level	Second-cycle – postgraduate
Education profile	Practical
Specialty	-

2. PREREQUISITES (resulting from the sequence of courses)

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3. LEARNING OUTCOMES AND THE METHOD OF CARRYING OUT ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences,

No.	Description of the learning outcomes for the course On completing the course, the student has the following KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES
P_W01	Choose the right numerical algorithm for the problem you are trying to solve
P_W02	Explain the idea of a numerical algorithm
P_W03	Estimate the accuracy of the computation of a given problem using a specific numerical algorithm
P_W04	Describe numerical methods for solving selected problems
P_U01	Can apply an appropriate algorithm to solve a practical problem
P_U02	Able to solve a practical problem with numerical methods using appropriately selected method on tools

3.2. Forms of classes and number of hours and ECTS credits

Lec	Tutorial	RC	Lab	P	eL	ECTS
16	-	-	20	20	-	4

3.3. Learning content (separately for each form of classes)

LECTURE

No.	Learning content
L1	Introduction to the numerical computing tool.
L2	Elements of linear algebra: matrices, matrix operations, determinant of a matrix, inverse matrix in a numerical computing tool.
L3	Systems of linear equations. Gauss's method of elimination, Jordan's method.
L4	Extremes of functions. Optimization methods.
L5	Interpolation and approximation of functions. Interpolation with Lagrange and Newton polynomials. Mean square approximation, uniform approximation.
L6	Numerical integration. The method of trapezoids, Simpson's method. Monte-Carlo methods.
L7	Ordinary differential equations. Euler's method, Runge-Kutta methods.
L8	Sources of error in numerical calculations.

LABORATORY

No.	Learning content

Lab1	Introduction to numerical methods and numerical errors. Representation of numbers in binary form, rounding errors.
Lab2	Numerical methods of linear algebra: numerical solution of systems of linear equations, finding eigenvalues and eigenvectors of matrices.
Lab3	Interpolation of functions. Interpolation with Lagrange polynomials, Netwon polynomials.
Lab4	Approximation of functions. Approximation by polynomials, trigonometric functions.
Lab5	Numerical differentiation. Differential quotients.
Lab6	Numerical integration. Simple and complex trapezoidal and Simpson's formulas.
Lab7	Numerical solution of differential equations. Euler's method.

PROJECT

No.	Learning content
P1	Use of numerical methods in practical applications.

3.4. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01 – W03	Open question exam	Lecture
P_W04	Homework or colloquium	Project
P_U01	Skill test	Laboratory
P_U02	Project evaluation	Project

3.5. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For grade 2 the student cannot	For grade 3 the student can	For grade 4 the student can	For grade 5 the student can
P_W01	Select the correct algorithm for the given problem	Select the correct algorithm for the given problem by giving its name	Choose the right algorithm for the given problem giving its name and the idea of its operation illustrated by the execution of the first two steps of the algorithm	Select an appropriate algorithm for a given problem, giving its name, idea of operation (supported by performance of the first two steps of the algorithm) and limitations in practical application
P_W02	Explain the idea of a numerical algorithm	Explain the idea of a numerical algorithm	Explain the idea of a numerical algorithm using a simple example	Explain the idea of a numerical algorithm using an advanced example
P_W03	Estimate the accuracy of the calculations	Estimate the accuracy of calculations using ready-made formulas to determine the error of the numerical algorithm used	Estimate the accuracy of calculations using analysis of a simple problem	Estimate the accuracy of calculations using analysis of a complex problem

P_W04	List the methods used to solve the given problem	List the methods used to solve the given problem	List and describe numerical methods used to solve selected problems	Describe and compare various numerical methods used to solve selected problems
P_U01	Apply the correct algorithm to solve the problem	Solve the given problem using an appropriate numerical algorithm	Solve the given problem using an appropriate numerical algorithm at a low level of abstraction	Solve the given problem using an appropriate numerical algorithm at a low level of abstraction and select and describe the main steps leading to the solution
P_U02	Solve tasks using numerical methods	Solve the task using numerical methods	Solve the task with numerical methods at a low level of abstraction	Solve the task with numerical methods at a low level of abstraction and select and describe the main steps leading to the solution

3.6. Literature

Obligatory literature
Todd Young and Martin J. Mohlenkamp**,** Introduction to Numerical Methods and Matlab Programming for Engineers, Ohio University, 2021, http://www.ohiouniversityfaculty.com/youngt/IntNumMeth/
Hildebrand F.B. Introduction to Numerica Analysis, McGraw-Hill Book Company, 1974 or newer
https://pythonnumericalmethods.berkeley.edu/notebooks/Index.html

Supplementary literature
Pav S.E., Numerical Methods Course Notes University of California at San Diego, La Jolla, 2005 or newer
http://www.freetechbooks.com

1. BASIC INFORMATION ON THE COURSE

Course name	Computational Intelligence (CUI)
Academic year	2022/2023
Faculty	Faculty of Information Technology
Field of study	Information Technology
Education level	Second-cycle – postgraduate
Education profile	Practical
Specialty	-

2. PREREQUISITES (resulting from the sequence of courses)

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3. LEARNING OUTCOMES AND THE METHOD OF CARRYING OUT ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences,

No.	Description of the learning outcomes for the course On completing the course, the student has the following KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES
P_W01	Describe advanced methods and tools of artificial intelligence and their mathematical model.
P_W02	Select and discuss the appropriate machine learning algorithm to solve the problem and discuss the organizational structures and how the brain processes information.
P_U01	Use English to create a project description and presentation.
P_U02	Conduct a research experiment by interpreting the results obtained.
P_U03	Write a technical text in English based on a broader research material.

3.2. Forms of classes and number of hours and ECTS credits

Lec	Tutorial	RC	Lab	P	eL	ECTS
14	-	-	14	24	-	4

3.3. Learning content (separately for each form of classes)

LECTURE

No.	Learning content
L1	Introduction to cognitive intelligence and cognitive systems
L2	Introduction to cognitive neurobiology and functional cognitive attitudes
L3	The emerging living brain and its functional organization
L4	Perception, attention and awareness
L5	Memory and learning

LABORATORY

No.	Learning content
Lab1	Perception and attention.
Lab2	Teaching
Lab3	Memory

PROJECT

No.	Learning content
P1	Analysis of the problem and existing solutions. Choosing the right test method. Testing and analysis of preliminary results. Validation and comparison of methods used. Documentation of design works according to technical requirements. Project presentation.

3.4. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01	Colloquium	Lecture
P_W02	Colloquium	Lecture
P_U01	Project	Project
P_U02	Colloquium	Laboratory
P_U03	Homework	Lecture

3.5. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For grade 2 the student cannot	For grade 3 the student can	For grade 4 the student can	For grade 5 the student can
P_W01	Discuss 50% of the issues of advanced methods and tools of artificial intelligence	Discuss 50% of the issues of advanced methods and tools of artificial intelligence	Discuss 70% of the issues of advanced methods and tools of artificial intelligence	Discuss 90% of the issues of advanced methods and tools of artificial intelligence
P_W02	Discuss 50% of the issues of machine learning, organizational structures and information processing by the brain.	Discuss 50% of the issues of machine learning, organizational structures and information processing by the brain.	Discuss 70% of the issues of machine learning, organizational structures and information processing by the brain.	Discuss 90% of the issues of machine learning, organizational structures and information processing by the brain.
P_U01	Use English sufficiently to create a description and presentation of the project in the form of an article and a scientific presentation.	Use English enough to create a short description and presentation of the project. However, the created description and presentation requires many corrections.	Use English enough to create a description and presentation of the project without major linguistic or technical errors.	Use English well and create a description and presentation of the project in the form of an article and a scientific presentation for the conference.
P_U02	Conduct a research experiment and	Conduct a research experiment and very	Conduct a research experiment and	Conduct a research

	interpret the results obtained.	poor interpretation of the results. Carry out a comparative analysis, but without ideas for better results.	interpret the results obtained. Carry out a comparative analysis and propose better solutions in relation to the existing ones.	experiment, interpret and describe the results obtained. Carry out a comparative analysis and create a better solution than the current state of knowledge on the subject.
P_U03	Develop a text in English based on broader basic research material	Develop a text in English based on broader basic research material	Develop a text in English based on broader research material to a good degree	Develop a text in English based on broader research material to a very good degree

3.6. Literature

Obligatory literature
L. Rutkowski: Computational Intelligence - Methods and Techniques, Publisher Springer-Verlag, Berlin Heidelberg 2008 or newer
R. C. O'Reilly, Y. Munakata: Computational Explorations in Cognitive Neuroscience Understanding the Mind by Simulating the Brain, Cambridge, MA: MIT Press, 2000 or newer (2016): https://grey.colorado.edu/CompCogNeuro/index.php/CCNBook/Main ..

Supplementary literature
J. Bach: Principles of Synthetic Intelligence, Publisher Oxford University, Oxford 2009 or newer
P. Haikonen: The cognitive approach to conscious machines, Publisher Imprint Academic, 2003 or newer
L. Shapiro, "Embodied Cognition", Routledge, 2010 or newer
P. Haikonen: "Consciousness and Robot Sentience", World Scientific Publishing Company, 2012 or newer
T. T. Rogers i J. L. McClelland: Semantic Cognition: A Parallel Distributed Processing Approach, Publisher MIT Press, Cambridge 2004 or newer
R. Pfeifer, C. Scheier: Understanding Intelligence, MIT Press, Cambridge 2001 or later

1. BASIC INFORMATION ON THE COURSE

Course name	Monographic Lecture (Petri Nets)
Academic year	2021/2022
Faculty	Faculty of Information Technology
Field of study	Information Technology
Education level	Second-cycle – postgraduate
Education profile	Practical
Specialty	-

2. PREREQUISITES (resulting from the sequence of courses)

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3. LEARNING OUTCOMES AND THE METHOD OF CARRYING OUT ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences,

No.	Description of the learning outcomes for the course On completing the course, the student has the following KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES
P_W01	Showing the algorithms, methods and tools used to develop solutions to computer problems in the lecture topic area
P_W02	Discussing development trends and latest developments in IT applications in science and technology in the lecture topic area

3.2. Forms of classes and number of hours and ECTS credits

Lec	Tutorial	RC	Lab	P	eL	ECTS
10	-	-	-	10	-	2

3.3. Learning content (separately for each form of classes)

LECTURE

No.	Learning content
Lec1	Presentation of selected algorithms, methods and tools for IT problem solving in Petri Nets
Lec2	Use of information technology methods, techniques and tools to solve problems in Petri Nets
Lec3	Identifying developmental trends and key new developments in computer applications for Petri Nets

3.4. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_W01 – W02	Colloquium/Open test	Lecture

3.5. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course outcome	For grade 2 the student cannot	For grade 3 the student can	For grade 4 the student can	For grade 5 the student can
P_W01	show selected algorithms, methods, and tools used to develop solutions to IT issues in the lecture topic area	sufficiently demonstrate the selected algorithms, methods and tools used to develop practical solutions to IT problems in the area of lecture topics	present selected algorithms, methods, and tools for developing practical IT solutions for lecture topics	explain in detail the algorithms, methods and tools used to develop practical solutions to IT problems in the area of lecture topics
P_W02	discuss the trends and latest developments in IT applications in lecture topics	discuss basic trends and state-of-the-art developments in IT in lecture topics	discuss superior trends and latest developments in IT applications in lecture topics	discuss in detail the trends and latest developments in IT applications in lecture topics

3.6. Literature

Obligatory literature
D. Rene, A. Hassane, Discrete, continuous and hybrid Petri nets, Heidelberg : Springer Verlag, Berlin 2005 lub nowsze
G. Claude, V. Rüdiger, Petri nets for systems engineering : a guide to modeling, verification, and applications, Heidelberg : Springer Verlag, Berlin 2003 lub nowsze

Supplementary literature
I. Koch, et al., Modeling in systems biology the petri net approach. London: Springer, 2011 lub nowsze
J. R. Silva and P. M. del Foyo, "Timed Petri Nets," 2012 lub nowsze
A. Gogolinska and W. Nowak, "Petri Nets Approach to Modeling of Immune System and Autism," in Artificial Immune Systems. vol. 7597, C. Coello Coello, et al., Eds., ed: Springer Berlin / Heidelberg, 2012 lub nowsze, pp. 86-99.

CCNA CyberOps Workshop (MA degree - 2 ECTS)	
Laboratory	• Network traffic monitoring • Analysis of network protocols and services based on captured data • Preparation of an environment with virtual machines, Kali, Metasploitable, Security Onion • Malware detection in transmission, analysis and response • Analysis of attacks on database systems • Using Squil, ELSA, Bro

Sociological and Legal Aspects of Security

Sociological and Legal Aspects of Security (MA degree - 2 ECTS)	
Lecture	• Selected components of the information system and their tasks resulting from cooperation with humans • Classification of social engineering attacks and methods of their implementation • Methods of protection against social engineering attacks • Laws and regulations governing the functioning of IT • Norms and standards regulating the functioning of IT
Recitation class	• Methods of testing susceptibility to social engineering attacks • Building a scenario of a social engineering attack and an attempt to implement it • Analysis of security solutions required by the GDPR - formalization

Advanced Network Technologies

Advanced Network Technologies (MA degree - 4 ECTS)	
Laboratory	• Redundancy testing using different versions of STP and Etherchannel • Scaling the OSPF protocol • Routing redistribution between OSPF, EIGRP, RIP protocols • Implementation of scalable IPv6 networks - OSPFv3 configuration and tunneling • Implementing BGP • Creating BGP routing policy • Integrating IGP and EGP Routing
Project	• Putting a research hypothesis in the field of network technologies. Planning the experiment - making assumptions, choosing a method and tools, assigning roles in the team. Preparation of tools, software or models and execution of the experiment. Data analysis and drawing conclusions

Programming Multimedia Interfaces

Programming Multimedia Interfaces (MA degree - 1 ECTS)	
Lecture	• Discussion of the methodology of designing multimedia interfaces • Overview of technological solutions used in the design of multimedia interfaces and the area of their application • Presentation of selected tools supporting the construction of applications with a multimedia interface, and management of the project development and testing process