Curriculum

Field of study: Computer Science

Table of contents

General characteristics of the field of study

Basic information

Faculty name:	Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering
Field of study:	Computer Science
Level:	First-cycle (engineer) programme
Profile:	General academic
Form:	Full-time studies
ISCED classification:	
Number of ECTS credits necessary to complete studies at a given level:	210
Professional title awarded to graduates:	inżynier
Cycle start date:	2023/2024, winter semester
Duration of studies (number of semesters):	7

Field of science to which the field of study is assigned:

Field engineering and technical sciences

Discipline of science to which the field of study is assigned:

Discipline	Percentage	ECTS
Technical computing and telecommunications	100%	210

Relationship between the field of study and the AGH University development strategy and the AGH University mission

Computer Science offers students not only knowledge and technical education, but also gives them the opportunity to develop their logical, constructive and assertive skills and instill in them the spirit of entrepreneurship and innovation. Thanks to the acquired knowledge and acquired skills, graduates of this faculty will not have problems finding their place in the labor market, finding employment mainly in the rapidly growing IT sector. Education in this field is an essential part of both the department's development strategy as well as the AGH University.

Information on taking into account the socio-economic demand while creating the curriculum and indication of the assumed learning outcomes matching the identified demand

The business area of IT is one of the most dynamically developing industries. IT professions, such as computer system administrators, specialists in computer networks, database programmers, software developers, system analysts or IT consultants, are in great demand not only in Poland but also abroad. Current analyzes forecast further strong growth of the labor market in IT areas. The learning outcomes for Computer Science are fully in line with the expectations of a broad group of employers and give graduates the basics to run their own business.

Education paths – scope in Polish and in English

-

Graduation paths – scope in Polish and in English

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The names of the majors in Polish and in English

Name [pl]	Name [en]

General information about the curriculum

Field of study: Computer Science

General information related to the curriculum (general learning objectives and employment opportunities, typical jobs and opportunities for graduate continuing education)

These studies aim to provide knowledge and skills necessary to create and use broadly understood computer systems. They cover both theoretical foundations in the areas of mathematics, physics, computer science, as well as practical aspects, including design and implementation of PC and mobile systems, software development (programming in various languages), systems administration, data analysis, use of programming tools (software libraries, frameworks, and environments), including commercial applications and open-source software. Upon completion of the first-cycle studies, a student acquires knowledge at the engineering level, which is extended by the practical use of this knowledge during student internship after the sixth semester.

Information on including the conclusions from the students and graduates careers monitoring in the curriculum

The business area of IT is one of the most dynamically developing industries. IT professions, such as computer system administrators, specialists in computer networks, database programmers, software developers, system analysts or IT consultants, are in great demand not only in Poland but also abroad. Current analyzes forecast further strong growth of the labor market in IT areas. The learning outcomes for Computer Science are fully in line with the expectations of a broad group of employers and give graduates the basics to run their own business.

Information on including the requirements and recommendations of the accreditation committees, in particular the Polish Accreditation Committee and industry accreditation committees in the curriculum

The results and recommendations of the accreditation commissions for the field of Computer Science are analyzed and implemented in the curricula and contents of the modules of the course.

Information on including examples of good practice in the curriculum

The Education Quality Assurance System of the Faculty ensures that good practices are included in the study program. The Faculty Education Quality Assurance System includes both the decision-making aspect as well as the didactic system monitoring. The Diploma Commission is established to give opinions on the topics of the diploma theses, which are then approved by the Deputy Dean responsible for the field of study. This commission also carries out diploma examinations.

Information on cooperation in the preparation of the curriculum with external stakeholders, in particular associations, professional and social organizations

The education program for Computer Science studies was developed by a team composed of representatives of various departments. During the discussions on the preparation of the program, experience with external stakeholders such as companies and leading foreign universities were exchanged and taken into account.

Duration, rules and form of the practical placement

The student knowledge acquired during the studies is extended by the practical use of this knowledge during a summer student internship after the sixth semester. The student internship in one of the IT industry companies lasts at least four weeks with a total student workload of 120 hours.

Admission criteria, rules and policies

Field of study: Computer Science

Description of competences expected from the candidate applying for admission to studies

Candidates applying for admission are expected to have high competences in the field of mathematics, physics and computer science. Candidates are also required to have sufficient command of the English language.

A candidate needs to register in the "e-Rekrutacja" system and enclose the scanned qualification documents:
https://www.international.agh.edu.pl/eng/regular-studies/application/
The formal requirement is finished secondary school with certificate sufficient to enroll in any university in the country where the certificate was issued.

Recruitment conditions, including the winners and finalists of the central level high school scientific Olympics, as well as winners of international and national contests

Application for studies will be conducted following the general admission rules enshrined in the relevant AGH Senate resolution. For recruitment conducted in the academic year 2020/2021 it is Resolution No. 97/2019 of the AGH Senate of June 26, 2019, and in the Regulation of the Rector of the AGH University regarding the detailed rules for the organization of admission for studies at AGH in a given academic year.

The expected limit of admissions to studies along with an indication of the minimum number of admitted candidates required to successfully launch a study cycle

Minimum number of students: 15
Maximum number of students: 30

Learning outcomes

Field of study : Computer Science

Knowledge

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
CSC1A_W01	knows and understands the basic concepts of mathematics and physics	P6S_WG_A
CSC1A_W02	knows and understands the concepts from computer science and information systems	P6S_WG_A_Inz
CSC1A_W03	knows and understands the issues in the field of data structures and programming, including databases and computer graphics	P6S_WG_A
CSC1A_W04	knows and understands the mathematical foundations of computer modeling and design	P6S_WG_A_Inz
CSC1A_W05	knows and understands the basic concepts in the field of electrical engineering, electronics, and computer measurement systems	P6S_WG_A_Inz
CSC1A_W06	knows the basic concepts of intellectual property protection, patent rights; has the knowledge necessary to understand non-technical conditions of engineering activities	P6S_WK_A
CSC1A_W07	knows and understands the general principles of creating and developing forms of individual entrepreneurship activity as well as working in a group	P6S_WK_A_Inz

Skills

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
CSC1A_U01	can work individually and in a team, properly planning work, using a variety of databases, literature and other sources	P6S_UW_A, P6S_UO_A
CSC1A_U02	is able to develop the task documentation and clearly present it on the general forum	P6S_UW_A
CSC1A_U03	has the ability to assess changes in the studied discipline and the ability to self-education	P6S_UU_A
CSC1A_U04	can use the obtained IT knowledge and mathematical models for comprehensive assessment and diagnostics of information systems	P6S_UW_A_Inz_01
CSC1A_U05	when formulating requirements and designing IT solutions, is able to take into account the necessary security and safety principles as well as non-technical aspects	P6S_UW_A_Inz_01
CSC1A_U06	can use a specialized English language in the field of mathematics, physics and computer science	P6S_UK_A
CSC1A_U07	is able to algorithmize the engineering problem and is able to design and perform an appropriate IT system using appropriate methods and tools	P6S_UW_A, P6S_UW_A_Inz_02

Social competence

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
CSC1A_K01	is aware of the social role of a technical university graduate: professional and ethical behavior, responsibility for himself/herself and the team, lifelong learning	P6S_KR_A
CSC1A_K02	understands the possibilities of commercial use of information systems	P6S_KO_A

KEU symbol	Learning outcomes prescribed to a field of study	CEU symbol
CSC1A_K03	understands the non-technical aspects and social effects of the use of IT tools	P6S_KK_A

Compliance table of engineering competence (Inz) with directional learning outcomes (KEU)

Major : Computer Science

Knowledge

CEU symbol	Learning outcomes for qualifications including engineering competence	KEU references
P6S_WG_A_Inz	knowledge of basic processes taking place in the life cycle of technical devices, facilities and systems	CSC1A_W02, CSC1A_W04, CSC1A_W05
P6S_WK_A_Inz	knowledge of basic principles of creating and developing various forms of individual entrepreneurship	CSC1A_W07

Skills

CEU symbol	Learning outcomes for qualifications including engineering competence	KEU references
P6S_UW_A_Inz_01	ability to plan and carry out experiments, including measurements and computer simulations as well as to interpret the obtained results and draw conclusions out of them. When identifying and formulating the specification of engineering problems and solving them, being able to: - use analytical, simulation and experimental methods; - recognize their systemic and non-technical aspects, including ethical connotations; - conduct a preliminary economic assessment of the proposed solutions and planned engineering activities; - perform a critical analysis of the functioning of existing technical solutions to further evaluate them;	CSC1A_U04, CSC1A_U05
P6S_UW_A_Inz_02	ability to design solutions in compliance with the given specification as well as being able to: create simple devices, facilities and systems typical for the study major or implement processes using skillfully chosen methods, techniques, tools and materials	CSC1A_U07

Field of study-prescribed outcomes coverage matrix

Field of study: Computer Science

2023/2024/S/li/EAIiIB/CSC/all

Course	Code	Semestr	CSC1A_W01	CSC1A_W02	CSC1A_W03	CSC1A_W04	CSC1A_W05	CSC1A_W06	CSC1A_W07	CSC1A_U01	CSC1A_U02	CSC1A_U03	CSC1A_U04	CSC1A_U05	CSC1A_U06	CSC1A_U07	CSC1A_K01	CSC1A_K02	CSC1A_K03
Introduction to Computer Science	ECSCS.li1O.3482c650f6076ab4c8d2b37ba7aae2fc.23	1s		x	x		x			x									
Introduction to Unix systems	ECSCS.li1O.2df7b31017c2537eaaee6dfbb863521a.23	1s		x									x			x			
Programming Languages I	ECSCS.li1O.b1e90f3c6ff45fc15aa61da4a2329ed6.23	1s		x	x											x	x		
Higher algebra	ECSCS.li1O.39914e74ca9214af32bbba8023907d84.23	1s	x						x	x	x	x			x		x		x
Mathematical Analysis	ECSCS.li1O.3a8db8b3d952ebece8dfaf621a34143c.23	1s	x			x			x	x	x	x			x				
Discrete mathematics	ECSCS.li1O.fcac267d4c47fb6be51aad7f4d5aea55.23	1s	x			x											x		
Elective Humanistic Course 1	ECSCS.li1O.60ad307cb894e.23	1s						x		x	x	x					x	x	x
Elective Humanistic Course 2	ECSCS.li2O.60ad309c44253.23	2s						x		x	x	x					x	x	x
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li2O.a8eea28ed793685c0f9e3473cf83b620.23	2s													x				
Physics I	ECSCS.li2O.f2428e5301d0765b1ce6c6548b060a8b.23	2s	x							x					x		x		
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li2O.8cde28af23df9f7ab255c368305e9d08.23	2s													x				

Course	Code	Semestr	CSC1A_W01	CSC1A_W02	CSC1A_W03	CSC1A_W04	CSC1A_W05	CSC1A_W06	CSC1A_W07	CSC1A_U01	CSC1A_U02	CSC1A_U03	CSC1A_U04	CSC1A_U05	CSC1A_U06	CSC1A_U07	CSC1A_K01	CSC1A_K02	CSC1A_K03
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li2O.4e7283329845414c8997480d3bea5b29.23	2s													x				
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li2O.4f8b27be3def6751b9ffceb4796be96b.23	2s													x				
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li2O.d79e2a7b04d11cb631da8c41ede0d9dd.23	2s													x				
Algorithms and data structures	ECSCS.li2O.fe1d983f2444dffe22c4014965205329.23	2s		x		x				x			x	x		x	x		x
Logic in Computer Science	ECSCS.li2O.cf369180a216a0366cc35975fd9841a3.23	2s	x	x	x	x				x	x	x	x	x	x	x	x		x
Programming Languages II	ECSCS.li2O.fdc6d61032fe9acf5802953ca19c99c7.23	2s		x	x	x				x	x				x	x	x	x	x
Statistics	ECSCS.li2O.0bb9ced98effdb433e3e2fafd98932fd.23	2s	x	x						x	x				x		x		x
Differential calculus	ECSCS.li2O.24783dd7cc4ac0cafa1b4a631f89e345.23	2s	x			x			x	x	x				x		x		x
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li4O.300ee33abb9652455b508d9d45af9e79.23	3s													x				
Physics II	ECSCS.li4O.b7a2fffbc9cd3de32f129c4482c3144a.23	3s	x												x		x		

Course	Code	Semestr	CSC1A_W01	CSC1A_W02	CSC1A_W03	CSC1A_W04	CSC1A_W05	CSC1A_W06	CSC1A_W07	CSC1A_U01	CSC1A_U02	CSC1A_U03	CSC1A_U04	CSC1A_U05	CSC1A_U06	CSC1A_U07	CSC1A_K01	CSC1A_K02	CSC1A_K03
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li4O.5a3c75c8fac2b5a0783ceb3b9c7d9c98.23	3s													x				
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li4O.9a331200fa654c821d96ad5434aa09a8.23	3s													x				
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li4O.2792ec57b99b0f28f75f1125b9839b34.23	3s													x				
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li4O.3c852f86c53eb5f1f214c902c1d613d0.23	3s													x				
Physics lab	ECSCS.li4O.37bcdb9baedab585ebddaa360ff65cd3.23	3s	x							x	x						x		
Object Oriented Programming	ECSCS.li4O.f30a24686c3e538a20d6893f38490a0a.23	3s		x	x		x			x	x	x	x	x	x	x		x	x
Databases I	ECSCS.li4O.56fff4b7990dab877d307b8e7162bfe8.23	3s			x											x			
Operating Systems	ECSCS.li4O.76cff58f85a90981008842c821b82002.23	3s		x						x						x			x
Introduction to Computer Graphics	ECSCS.li4O.21b5f11441d4bb6a2f6ec78a7ae497a3.23	3s		x	x											x		x	x
AGH UST International Courses Elective Module sem 4	ECSCS.li8O.3e128b1656d7f7e4847596a9954ce907.23	4s		x	x	x							x	x		x			

Course	Code	Semestr	CSC1A_W01	CSC1A_W02	CSC1A_W03	CSC1A_W04	CSC1A_W05	CSC1A_W06	CSC1A_W07	CSC1A_U01	CSC1A_U02	CSC1A_U03	CSC1A_U04	CSC1A_U05	CSC1A_U06	CSC1A_U07	CSC1A_K01	CSC1A_K02	CSC1A_K03
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li8O.643f4f5964a211a7f803d34132079fa3.23	4s													x				
Network Society & Technology	POGJOS.A200000O.a7c76f59f555e3215d634878b698ddcc.23	22																	
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li8O.143e7db5678a2d393271a64a452dac7c.23	4s													x				
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li8O.ef4b74e20166ac972af4bb4a15c9afae.23	4s													x				
Optical Fibers - Technology and Applications	POGJOS.A100000O.e50956f566d74e42860bbbb0c11e1e6c.23	21																	
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li8O.8f67b761b206666bcb89425b613b4241.23	4s													x				
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li8O.e59199a0d131cbf1fcb2df06288246bc.23	4s													x				
Distributed Control Systems	POGJOS.A100000O.e5389bc4a8d9e5d2898e87e52124e831.23	21																	

Course	Code	Semestr	CSC1A_W01	CSC1A_W02	CSC1A_W03	CSC1A_W04	CSC1A_W05	CSC1A_W06	CSC1A_W07	CSC1A_U01	CSC1A_U02	CSC1A_U03	CSC1A_U04	CSC1A_U05	CSC1A_U06	CSC1A_U07	CSC1A_K01	CSC1A_K02	CSC1A_K03
Innovation for Engineers: Design Thinking and Business Model Generation	POGJOS.A200000O.acd3c14b2af485d387332c294de1684b.23	22																	
Technology in Society	POGJOS.A100000O.8008664454b75ee55bb5458aeddce404.23	21																	
Fundamentals of Data Science	POGJOS.A200000O.631dd7c4949d7680f11db9c8258044c7.23	22																	
Fundamentals of Optimization	POGJOS.A200000O.777bddd8543130c93a829f73a1bd03a2.23	22																	
Basics of Design in SolidWorks 3D CAD Software	POGJOS.A100000O.ce7ffcde3328545e011bec9d6b6b3482.23	21																	
Databases II	ECSCS.Ii8O.692f9176145819252abe0933a6efa804.23	4s		x	x								x	x		x			
Introduction to Geoinformatics	POGJOS.A200000O.2ccd602bd84cf5fd5410279a98aaa3e5.23	22																	
Python in Engineering Calculations	POGJOS.A100000O.d19a2814acf928b4d00bd879d5d64278.23	21																	
Python Language	ECSCS.Ii78O.0ca57dd01071a89e81fe5d3559bc5b5a.23	4s lub 5s lub 6s lub 7s		x	x					x		x				x			
Software studio I	ECSCS.Ii8O.e0f77194fa95f5912cb9fe847a4726d5.23	4s		x	x			x	x	x		x	x	x			x		
Computer Networks	ECSCS.Ii8O.ddf71bd4a5b4ae28ab58253386e78e12.23	4s		x			x						x	x		x			
Software engineering	ECSCS.Ii8O.fca68aa1669c18f1464740d731a256e4.23	4s		x	x					x	x		x			x		x	x
AGH UST International Courses Elective Module sem 5	ECSCS.Ii10O.882c8713a57ce291031a0d06f0c228d6.23	5s		x	x	x							x			x			

Course	Code	Semestr	CSC1A_W01	CSC1A_W02	CSC1A_W03	CSC1A_W04	CSC1A_W05	CSC1A_W06	CSC1A_W07	CSC1A_U01	CSC1A_U02	CSC1A_U03	CSC1A_U04	CSC1A_U05	CSC1A_U06	CSC1A_U07	CSC1A_K01	CSC1A_K02	CSC1A_K03
Formal Languages and Compilers	ECSCS.li10O.fb9f7823c541196383b3b52dfc91b4c8.23	5s	x	x												x			x
Introduction to Artificial Intelligence	ECSCS.li10O.8668bac069f74b284f5cce3a7a3dee12.23	5s		x		x							x					x	
Software studio II	ECSCS.li10O.444eab118568829c0819cc1b5259de6f.23	5s		x	x	x				x	x	x	x	x			x	x	x
Introduction to the Semantic Web and Knowledge Graphs	ECSCS.li30O.6077f53df2e8d.23	5s lub 6s		x						x			x					x	x
Introduction to Process Mining	ECSCS.li10O.6077f3a31ec00.23	5s		x	x								x		x	x		x	
Introduction to Programming Language Theory	ECSCS.li50O.6077f40e8e59f.23	5s lub 7s		x	x	x					x			x		x		x	x
Constraint Programming	ECSCS.li50O.6245fa382b339.23	5s lub 7s			x	x							x			x	x		
Logic Programming	ECSCS.li50O.624614f2f0150.23	5s lub 7s			x	x						x	x			x			
Graphical Programming Languages	ECSCS.li50O.6246131d0da95.23	5s lub 7s			x	x				x	x					x	x		x
Digital Electronics and Microprocessors	ECSCS.li10O.cfb642ae2d5ae1ae377ed0a319e6f6e5.23	5s					x			x	x					x			
AGH UST International Courses Elective Module sem 6	ECSCS.li20O.2d028e347ea3c824fc2410a5a1749d82.23	6s		x	x	x							x			x			
Cybersecurity	ECSCS.li20O.e743fe8ce7708ddbc0f9bded2d81e2b0.23	6s		x	x							x	x	x		x		x	x

Course	Code	Semestr	CSC1A_W01	CSC1A_W02	CSC1A_W03	CSC1A_W04	CSC1A_W05	CSC1A_W06	CSC1A_W07	CSC1A_U01	CSC1A_U02	CSC1A_U03	CSC1A_U04	CSC1A_U05	CSC1A_U06	CSC1A_U07	CSC1A_K01	CSC1A_K02	CSC1A_K03
Web application technologies	ECSCS.li20O.48d365d31d17f6a0ba19f2e562e7e8da.23	6s		x						x		x							x
Embedded systems	ECSCS.li20O.228078523cb7f097ecc55879565d142c.23	6s					x									x		x	
Human-Computer Interaction	ECSCS.li20O.6077f3db7a765.23	6s		x				x		x	x			x			x	x	x
Professional practice	ECSCS.li20O.557aa2c67bc9c194cb3ea1eac55ffe27.23	6s								x	x	x	x	x		x	x	x	
AGH UST International Courses Elective Module sem 7	ECSCS.li40O.0e37c8e8db3d7d44ada69f5bba6ba5b4.23	7s		x	x	x							x			x			
Final Project	ECSCS.li40O.b2d85c6445cb4ca1ad39313aa3034376.23	7s	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Diploma Seminar	ECSCS.li40O.113e607328fe3b1feac36d5c37a13bcd.23	7s						x		x	x						x		
Sum (obligatory):			11	20	13	9	6	4	5	21	15	11	13	10	10	18	17	11	16
Sum (elective):			0	9	10	8	0	2	0	5	4	3	8	3	16	10	4	5	5
Sum:			11	29	23	17	6	6	5	26	19	14	21	13	26	28	21	16	21

Characteristics matrix of learning outcomes in relation to modules

Major: Computer Science

2023/2024/S/Ii/EAIiIB/CSC/all

Course	Code	Semestr	P6S_WG_A	P6S_WG_A_Inz	P6S_WK_A	P6S_WK_A_Inz	P6S_UW_A	P6S_UO_A	P6S_UU_A	P6S_UW_A_Inz_01	P6S_UK_A	P6S_UW_A_Inz_02	P6S_KR_A	P6S_KO_A	P6S_KK_A
Introduction to Computer Science	ECSCS.Ii1O.3482c650f6076ab4c8d2b37ba7aae2fc.23	1s	x	x			x	x							
Introduction to Unix systems	ECSCS.Ii1O.2df7b31017c2537eaaee6dfbb863521a.23	1s		x			x			x		x			
Programming Languages I	ECSCS.Ii1O.b1e90f3c6ff45fc15aa61da4a2329ed6.23	1s	x	x			x					x	x		
Higher algebra	ECSCS.Ii1O.39914e74ca9214af32bbba8023907d84.23	1s	x			x	x	x	x		x		x		x
Mathematical Analysis	ECSCS.Ii1O.3a8db8b3d952ebece8dfaf621a34143c.23	1s	x	x		x	x	x	x		x				
Discrete mathematics	ECSCS.Ii1O.fcac267d4c47fb6be51aad7f4d5aea55.23	1s	x	x									x		
Elective Humanistic Course 1	ECSCS.Ii1O.60ad307cb894e.23	1s			x		x	x	x				x	x	x
Elective Humanistic Course 2	ECSCS.Ii2O.60ad309c44253.23	2s			x		x	x	x				x	x	x
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.Ii2O.a8eea28ed793685c0f9e3473cf83b620.23	2s									x				
Physics I	ECSCS.Ii2O.f2428e5301d0765b1ce6c6548b060a8b.23	2s	x				x	x			x		x		
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.Ii2O.8cde28af23df9f7ab255c368305e9d08.23	2s									x				

Course	Code	Semestr	P6S_WG_A	P6S_WG_A_Inz	P6S_WK_A	P6S_WK_A_Inz	P6S_UW_A	P6S_UO_A	P6S_UU_A	P6S_UW_A_Inz_01	P6S_UK_A	P6S_UW_A_Inz_02	P6S_KR_A	P6S_KO_A	P6S_KK_A
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li2O.4e7283329845414c8997480d3bea5b29.23	2s									x				
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li2O.4f8b27be3def6751b9ffceb4796be96b.23	2s									x				
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li2O.d79e2a7b04d11cb631da8c41ede0d9dd.23	2s									x				
Algorithms and data structures	ECSCS.li2O.fe1d983f2444dffe22c4014965205329.23	2s		x			x	x		x		x	x		x
Logic in Computer Science	ECSCS.li2O.cf369180a216a0366cc35975fd9841a3.23	2s	x	x			x	x	x	x	x	x	x		x
Programming Languages II	ECSCS.li2O.fdc6d61032fe9acf5802953ca19c99c7.23	2s	x	x			x	x			x	x	x	x	x
Statistics	ECSCS.li2O.0bb9ced98effdb433e3e2fafd98932fd.23	2s	x	x			x	x			x		x		x
Differential calculus	ECSCS.li2O.24783dd7cc4ac0cafa1b4a631f89e345.23	2s	x	x		x	x	x			x		x		x
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li4O.300ee33abb9652455b508d9d45af9e79.23	3s									x				
Physics II	ECSCS.li4O.b7a2fffbc9cd3de32f129c4482c3144a.23	3s	x								x		x		
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li4O.5a3c75c8fac2b5a0783ceb3b9c7d9c98.23	3s									x				
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li4O.9a331200fa654c821d96ad5434aa09a8.23	3s									x				

Course	Code	Semestr	P6S_WG_A	P6S_WG_A_Inz	P6S_WK_A	P6S_WK_A_Inz	P6S_UW_A	P6S_UO_A	P6S_UU_A	P6S_UW_A_Inz_01	P6S_UK_A	P6S_UW_A_Inz_02	P6S_KR_A	P6S_KO_A	P6S_KK_A
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li4O.2792ec57b99b0f28f75f1125b9839b34.23	3s									x				
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li4O.3c852f86c53eb5f1f214c902c1d613d0.23	3s									x				
Physics lab	ECSCS.li4O.37bcdb9baedab585ebddaa360ff65cd3.23	3s	x				x	x					x		
Object Oriented Programming	ECSCS.li4O.f30a24686c3e538a20d6893f38490a0a.23	3s	x	x			x	x	x	x	x	x		x	x
Databases I	ECSCS.li4O.56fff4b7990dab877d307b8e7162bfe8.23	3s	x				x					x			
Operating Systems	ECSCS.li4O.76cff58f85a90981008842c821b82002.23	3s		x			x	x				x			x
Introduction to Computer Graphics	ECSCS.li4O.21b5f11441d4bb6a2f6ec78a7ae497a3.23	3s	x	x			x					x		x	x
AGH UST International Courses Elective Module sem 4	ECSCS.li8O.3e128b1656d7f7e4847596a9954ce907.23	4s	x	x			x			x		x			
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li8O.643f4f5964a211a7f803d34132079fa3.23	4s									x				
Network Society & Technology	POGJOS.A200000O.a7c76f59f555e3215d634878b698ddcc.23	22													
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li8O.143e7db5678a2d393271a64a452dac7c.23	4s									x				
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li8O.ef4b74e20166ac972af4bb4a15c9afae.23	4s									x				

Course	Code	Semestr	P6S_WG_A	P6S_WG_A_Inz	P6S_WK_A	P6S_WK_A_Inz	P6S_UW_A	P6S_UO_A	P6S_UU_A	P6S_UW_A_Inz_01	P6S_UK_A	P6S_UW_A_Inz_02	P6S_KR_A	P6S_KO_A	P6S_KK_A
Optical Fibers - Technology and Applications	POGJOS.A100000O.e50956f566d74e42860bbbb0c11e1e6c.23	21													
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li8O.8f67b761b206666bcb89425b613b4241.23	4s									x				
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	ECSCS.li8O.e59199a0d131cbf1fcb2df06288246bc.23	4s									x				
Distributed Control Systems	POGJOS.A100000O.e5389bc4a8d9e5d2898e87e52124e831.23	21													
Innovation for Engineers: Design Thinking and Business Model Generation	POGJOS.A200000O.acd3c14b2af485d387332c294de1684b.23	22													
Technology in Society	POGJOS.A100000O.8008664454b75ee55bb5458aeddce404.23	21													
Fundamentals of Data Science	POGJOS.A200000O.631dd7c4949d7680f11db9c8258044c7.23	22													
Fundamentals of Optimization	POGJOS.A200000O.777bddd8543130c93a829f73a1bd03a2.23	22													
Basics of Design in SolidWorks 3D CAD Software	POGJOS.A100000O.ce7ffcde3328545e011bec9d6b6b3482.23	21													
Databases II	ECSCS.li8O.692f9176145819252abe0933a6efa804.23	4s	x	x			x			x		x			
Introduction to Geoinformatics	POGJOS.A200000O.2ccd602bd84cf5fd5410279a98aaa3e5.23	22													
Python in Engineering Calculations	POGJOS.A100000O.d19a2814acf928b4d00bd879d5d64278.23	21													
Python Language	ECSCS.li78O.0ca57dd01071a89e81fe5d3559bc5b5a.23	4s lub 5s lub 6s lub 7s	x	x			x	x	x			x			
Software studio I	ECSCS.li8O.e0f77194fa95f5912cb9fe847a4726d5.23	4s	x	x	x	x	x	x	x	x			x		

Course	Code	Semestr	P6S_WG_A	P6S_WG_A_Inz	P6S_WK_A	P6S_WK_A_Inz	P6S_UW_A	P6S_UO_A	P6S_UU_A	P6S_UW_A_Inz_01	P6S_UK_A	P6S_UW_A_Inz_02	P6S_KR_A	P6S_KO_A	P6S_KK_A
Computer Networks	ECSCS.li8O.ddf71bd4a5b4ae28ab58253386e78e12.23	4s		x			x			x		x			
Software engineering	ECSCS.li8O.fca68aa1669c18f1464740d731a256e4.23	4s	x	x			x	x		x		x		x	x
AGH UST International Courses Elective Module sem 5	ECSCS.li10O.882c8713a57ce291031a0d06f0c228d6.23	5s	x	x			x			x		x			
Formal Languages and Compilers	ECSCS.li10O.fb9f7823c541196383b3b52dfc91b4c8.23	5s	x	x			x					x			x
Introduction to Artificial Intelligence	ECSCS.li10O.8668bac069f74b284f5cce3a7a3dee12.23	5s		x						x				x	
Software studio II	ECSCS.li10O.444eab118568829c0819cc1b5259de6f.23	5s	x	x			x	x	x	x			x	x	x
Introduction to the Semantic Web and Knowledge Graphs	ECSCS.li30O.6077f53df2e8d.23	5s lub 6s		x			x	x		x				x	x
Introduction to Process Mining	ECSCS.li10O.6077f3a31ec00.23	5s	x	x			x			x	x	x		x	
Introduction to Programming Language Theory	ECSCS.li50O.6077f40e8e59f.23	5s lub 7s	x	x			x			x		x		x	x
Constraint Programming	ECSCS.li50O.6245fa382b339.23	5s lub 7s	x	x			x			x		x	x		
Logic Programming	ECSCS.li50O.624614f2f0150.23	5s lub 7s	x	x			x		x	x		x			
Graphical Programming Languages	ECSCS.li50O.6246131d0da95.23	5s lub 7s	x	x			x	x				x	x		x
Digital Electronics and Microprocessors	ECSCS.li10O.cfb642ae2d5ae1ae377ed0a319e6f6e5.23	5s		x			x	x				x			
AGH UST International Courses Elective Module sem 6	ECSCS.li20O.2d028e347ea3c824fc2410a5a1749d82.23	6s	x	x			x			x		x			

Course	Code	Semestr	P6S_WG_A	P6S_WG_A_Inz	P6S_WK_A	P6S_WK_A_Inz	P6S_UW_A	P6S_UO_A	P6S_UU_A	P6S_UW_A_Inz_01	P6S_UK_A	P6S_UW_A_Inz_02	P6S_KR_A	P6S_KO_A	P6S_KK_A
Cybersecurity	ECSCS.li20O.e743fe8ce7708ddbc0f9bded2d81e2b0.23	6s	x	x			x		x	x		x		x	x
Web application technologies	ECSCS.li20O.48d365d31d17f6a0ba19f2e562e7e8da.23	6s		x			x	x	x						x
Embedded systems	ECSCS.li20O.228078523cb7f097ecc55879565d142c.23	6s		x			x					x		x	
Human-Computer Interaction	ECSCS.li20O.6077f3db7a765.23	6s		x	x		x	x		x			x	x	x
Professional practice	ECSCS.li20O.557aa2c67bc9c194cb3ea1eac55ffe27.23	6s					x	x	x	x		x	x	x	
AGH UST International Courses Elective Module sem 7	ECSCS.li40O.0e37c8e8db3d7d44ada69f5bba6ba5b4.23	7s	x	x			x			x		x			
Final Project	ECSCS.li40O.b2d85c6445cb4ca1ad39313aa3034376.23	7s	x	x	x	x	x	x	x	x	x	x	x	x	x
Diploma Seminar	ECSCS.li40O.113e607328fe3b1feac36d5c37a13bcd.23	7s			x		x	x					x		
Sum (obligatory):			22	25	4	5	30	21	11	13	10	18	17	11	16
Sum (elective):			10	12	2	0	13	5	3	10	16	10	4	5	5
Sum:			32	37	6	5	43	26	14	23	26	28	21	16	21

Matrix of learning outcomes prescribed to a field of study with related forms of classes and the method of testing

Major: Computer Science

2023/2024/S/Ii/EAIiIB/CSC/all

Name of the module	Activity	Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module	KEU references
Introduction to Computer Science	Lectures, Laboratory classes	Examination, Activity during classes, Completion of laboratory classes	CSC1A_W02, CSC1A_W05, CSC1A_W03, CSC1A_U01
Introduction to Unix systems	Lectures, Laboratory classes	Activity during classes, Test, Activity during classes, Test, Completion of laboratory classes	CSC1A_W02, CSC1A_U04, CSC1A_U07
Programming Languages I	Lectures, Laboratory classes	Activity during classes, Participation in a discussion, Activity during classes, Participation in a discussion, Execution of laboratory classes, Test	CSC1A_W02, CSC1A_W03, CSC1A_U07, CSC1A_K01
Higher algebra	Lectures, Auditorium classes	Activity during classes, Examination, Activity during classes, Examination	CSC1A_W01, CSC1A_W07, CSC1A_U01, CSC1A_U02, CSC1A_U03, CSC1A_U06, CSC1A_K01, CSC1A_K03
Mathematical Analysis	Lectures, Auditorium classes	Activity during classes, Test, Examination, Activity during classes, Test, Examination	CSC1A_W01, CSC1A_W07, CSC1A_U01, CSC1A_U02, CSC1A_U03, CSC1A_U06, CSC1A_W04
Discrete mathematics	Lectures, Auditorium classes	Activity during classes, Participation in a discussion, Test, Examination, Oral answer, Activity during classes, Participation in a discussion, Test, Examination, Oral answer	CSC1A_W01, CSC1A_W04, CSC1A_K01
Elective Humanistic Course 1	Lectures	Activity during classes	CSC1A_W06, CSC1A_U01, CSC1A_U02, CSC1A_U03, CSC1A_K01, CSC1A_K02, CSC1A_K03
Elective Humanistic Course 2	Lectures	Activity during classes	CSC1A_W06, CSC1A_U01, CSC1A_U02, CSC1A_U03, CSC1A_K01, CSC1A_K02, CSC1A_K03

Name of the module	Activity	Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module	KEU references
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06
Physics I	Lectures, Auditorium classes	Activity during classes, Participation in a discussion, Execution of exercises, Examination, Involvement in teamwork, Test results, Oral answer, Activity during classes, Execution of exercises, Test, Examination, Involvement in teamwork, Test results, Oral answer	CSC1A_W01, CSC1A_U01, CSC1A_U06, CSC1A_K01
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06
Algorithms and data structures	Lectures, Auditorium classes	Examination, Execution of exercises, Test, Examination	CSC1A_W02, CSC1A_W04, CSC1A_U04, CSC1A_K03, CSC1A_U05, CSC1A_U07, CSC1A_U01, CSC1A_K01
Logic in Computer Science	Lectures, Auditorium classes	Activity during classes, Test, Examination, Activity during classes, Test, Completion of laboratory classes	CSC1A_W01, CSC1A_W02, CSC1A_W03, CSC1A_W04, CSC1A_U01, CSC1A_U02, CSC1A_U03, CSC1A_U04, CSC1A_U05, CSC1A_U06, CSC1A_U07, CSC1A_K01, CSC1A_K03

Name of the module	Activity	Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module	KEU references
Programming Languages II	Lectures, Laboratory classes	Activity during classes, Execution of laboratory classes, Test, Project, Completion of laboratory classes, Activity during classes, Execution of laboratory classes, Test, Project, Completion of laboratory classes	CSC1A_W02, CSC1A_W03, CSC1A_W04, CSC1A_U01, CSC1A_U06, CSC1A_U02, CSC1A_U07, CSC1A_K01, CSC1A_K02, CSC1A_K03
Statistics	Lectures, Auditorium classes, Laboratory classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Activity during classes, Participation in a discussion, Execution of exercises, Execution of laboratory classes, Test, Project, Examination, Oral answer, Activity during classes, Participation in a discussion, Execution of exercises, Execution of laboratory classes, Test, Project, Examination, Oral answer	CSC1A_W01, CSC1A_W02, CSC1A_U01, CSC1A_U02, CSC1A_U06, CSC1A_K01, CSC1A_K03
Differential calculus	Lectures, Auditorium classes	Activity during classes, Examination, Activity during classes, Examination	CSC1A_W01, CSC1A_W07, CSC1A_W04, CSC1A_U01, CSC1A_U02, CSC1A_U06, CSC1A_K01, CSC1A_K03
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06
Physics II	Lectures, Auditorium classes	Activity during classes, Examination, Activity during classes, Examination	CSC1A_W01, CSC1A_U06, CSC1A_K01
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06

Name of the module	Activity	Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module	KEU references
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06
Physics lab	Lectures, Laboratory classes	Execution of laboratory classes, Report, Completion of laboratory classes, Activity during classes, Execution of laboratory classes, Test, Report, Involvement in teamwork, Completion of laboratory classes	CSC1A_W01, CSC1A_U01, CSC1A_U02, CSC1A_K01
Object Oriented Programming	Lectures, Laboratory classes	Activity during classes, Participation in a discussion, Execution of laboratory classes, Examination, Completion of laboratory classes, Activity during classes, Participation in a discussion, Execution of laboratory classes, Examination, Completion of laboratory classes	CSC1A_W02, CSC1A_W03, CSC1A_W05, CSC1A_U01, CSC1A_U03, CSC1A_U04, CSC1A_U06, CSC1A_U02, CSC1A_U05, CSC1A_U07, CSC1A_K02, CSC1A_K03
Databases I	Lectures, Laboratory classes	Activity during classes, Project, Examination, Activity during classes, Execution of a project, Execution of laboratory classes, Project, Examination	CSC1A_W03, CSC1A_U07
Operating Systems	Lectures, Laboratory classes	Test, Activity during classes, Execution of exercises	CSC1A_W02, CSC1A_U01, CSC1A_U07, CSC1A_K03
Introduction to Computer Graphics	Lectures, Laboratory classes, Project classes	Activity during classes, Test, Activity during classes, Execution of laboratory classes, Test, Activity during classes, Execution of a project	CSC1A_W02, CSC1A_W03, CSC1A_U07, CSC1A_K02, CSC1A_K03
AGH UST International Courses Elective Module sem 4	Control and transitional thesis		CSC1A_W02, CSC1A_W03, CSC1A_W04, CSC1A_U04, CSC1A_U05, CSC1A_U07
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06
Network Society & Technology	Discussion seminars	Activity during classes, Participation in a discussion, Project, Involvement in teamwork, Presentation	

Name of the module	Activity	Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module	KEU references
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06
Optical Fibers - Technology and Applications	Lectures	Examination	
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results, Essays written during classes, Presentation	CSC1A_U06
Distributed Control Systems	Lectures, Laboratory classes	Activity during classes, Execution of laboratory classes, Completion of laboratory classes, Execution of laboratory classes, Completion of laboratory classes	
Innovation for Engineers: Design Thinking and Business Model Generation	Workshop classes	Activity during classes, Project	
Technology in Society	Workshop classes	Activity during classes, Examination, Presentation	
Fundamentals of Data Science	Lectures, Laboratory classes, Project classes	Participation in a discussion, Examination, Execution of laboratory classes, Completion of laboratory classes, Execution of a project, Project, Report on completion of a practical placement, Presentation	
Fundamentals of Optimization	Lectures, Project classes	Examination, Project, Engineering project, Completion of laboratory classes	

Name of the module	Activity	Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module	KEU references
Basics of Design in SolidWorks 3D CAD Software	Laboratory classes	Activity during classes, Participation in a discussion, Execution of laboratory classes, Test, Involvement in teamwork, Test results, Oral answer, Completion of laboratory classes	
Databases II	Lectures, Laboratory classes, Project classes	Test, Project, Test, Project, Test, Project	CSC1A_W02, CSC1A_W03, CSC1A_U04, CSC1A_U05, CSC1A_U07
Introduction to Geoinformatics	Lectures, Laboratory classes	Examination, Participation in a discussion, Completion of laboratory classes	
Python in Engineering Calculations	Laboratory classes	Activity during classes, Execution of laboratory classes, Report, Completion of laboratory classes	
Python Language	Laboratory classes	Activity during classes, Execution of laboratory classes	CSC1A_W02, CSC1A_W03, CSC1A_U07, CSC1A_U01, CSC1A_U03
Software studio I	Project classes	Execution of a project, Case study, Completion of laboratory classes	CSC1A_W02, CSC1A_W03, CSC1A_W07, CSC1A_W06, CSC1A_U01, CSC1A_U03, CSC1A_U04, CSC1A_U05, CSC1A_K01
Computer Networks	Lectures, Laboratory classes	Examination, Test results, Execution of laboratory classes, Test results	CSC1A_W02, CSC1A_W05, CSC1A_U04, CSC1A_U05, CSC1A_U07
Software engineering	Lectures, Laboratory classes, Project classes	Project, Case study, Completion of laboratory classes, Project, Case study, Completion of laboratory classes, Project, Case study, Completion of laboratory classes	CSC1A_W02, CSC1A_W03, CSC1A_U01, CSC1A_U02, CSC1A_U04, CSC1A_U07, CSC1A_K02, CSC1A_K03
AGH UST International Courses Elective Module sem 5	Control and transitional thesis		CSC1A_W02, CSC1A_W03, CSC1A_W04, CSC1A_U04, CSC1A_U07
Formal Languages and Compilers	Lectures, Laboratory classes, Project classes	Test, Involvement in teamwork, Completion of laboratory classes, Test, Completion of laboratory classes	CSC1A_W01, CSC1A_W02, CSC1A_U07, CSC1A_K03
Introduction to Artificial Intelligence	Lectures, Laboratory classes	Activity during classes, Examination, Activity during classes, Test, Examination	CSC1A_W04, CSC1A_W02, CSC1A_U04, CSC1A_K02

Name of the module	Activity	Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module	KEU references
Software studio II	Project classes	Execution of a project, Project, Case study	CSC1A_W02, CSC1A_W03, CSC1A_W04, CSC1A_U01, CSC1A_U02, CSC1A_U04, CSC1A_U05, CSC1A_U03, CSC1A_K01, CSC1A_K02, CSC1A_K03
Introduction to the Semantic Web and Knowledge Graphs	Lectures, Laboratory classes	Test	CSC1A_W02, CSC1A_U01, CSC1A_U04, CSC1A_K02, CSC1A_K03
Introduction to Process Mining	Lectures, Laboratory classes	Participation in a discussion, Test, Report on completion of a practical placement, Completion of laboratory classes	CSC1A_W02, CSC1A_W03, CSC1A_U04, CSC1A_U06, CSC1A_U07, CSC1A_K02
Introduction to Programming Language Theory	Lectures, Laboratory classes	Participation in a discussion, Test, Activity during classes, Execution of a project, Involvement in teamwork, Completion of laboratory classes	CSC1A_W02, CSC1A_W03, CSC1A_W04, CSC1A_U07, CSC1A_U02, CSC1A_U05, CSC1A_K02, CSC1A_K03
Constraint Programming	Lectures, Laboratory classes	Presentation, Completion of laboratory classes, Execution of a project, Execution of laboratory classes, Test results	CSC1A_W03, CSC1A_W04, CSC1A_U04, CSC1A_U07, CSC1A_K01
Logic Programming	Lectures, Laboratory classes	Presentation, Completion of laboratory classes, Execution of laboratory classes, Test results	CSC1A_W04, CSC1A_W03, CSC1A_U03, CSC1A_U04, CSC1A_U07
Graphical Programming Languages	Lectures, Laboratory classes	Test, Test	CSC1A_W03, CSC1A_W04, CSC1A_U01, CSC1A_U02, CSC1A_U07, CSC1A_K01, CSC1A_K03
Digital Electronics and Microprocessors	Lectures, Auditorium classes, Laboratory classes	Activity during classes, Execution of laboratory classes, Test, Report, Oral answer, Activity during classes, Execution of laboratory classes, Test, Oral answer, Activity during classes, Execution of laboratory classes, Test, Report, Oral answer	CSC1A_W05, CSC1A_U02, CSC1A_U07, CSC1A_U01
AGH UST International Courses Elective Module sem 6	Control and transitional thesis		CSC1A_W02, CSC1A_W03, CSC1A_W04, CSC1A_U04, CSC1A_U07
Cybersecurity	Lectures, Laboratory classes, Project classes	Activity during classes, Project, Activity during classes, Participation in a discussion, Project, Presentation, Activity during classes, Participation in a discussion, Project, Presentation	CSC1A_W02, CSC1A_W03, CSC1A_U03, CSC1A_U04, CSC1A_K02, CSC1A_U05, CSC1A_U07, CSC1A_K03

Name of the module	Activity	Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module	KEU references
Web application technologies	Lectures, Laboratory classes, Project classes	Activity during classes, Execution of laboratory classes, Project, Examination, Activity during classes, Execution of laboratory classes, Project, Examination, Activity during classes, Execution of laboratory classes, Project, Examination	CSC1A_W02, CSC1A_U01, CSC1A_U03, CSC1A_K03
Embedded systems	Lectures, Laboratory classes, Project classes	Activity during classes, Execution of laboratory classes, Test, Activity during classes, Test, Activity during classes, Test	CSC1A_W05, CSC1A_U07, CSC1A_K02
Human-Computer Interaction	Lectures, Seminars	Examination, Oral answer, Participation in a discussion, Execution of a project, Essay, Case study, Presentation, Oral answer	CSC1A_W02, CSC1A_W06, CSC1A_U01, CSC1A_U02, CSC1A_U05, CSC1A_K01, CSC1A_K02, CSC1A_K03
Professional practice	Practical placement	Work done within the framework of a practical placement, Confirmation of completion of practical placement programme	CSC1A_U01, CSC1A_U02, CSC1A_U04, CSC1A_U05, CSC1A_U03, CSC1A_U07, CSC1A_K01, CSC1A_K02
AGH UST International Courses Elective Module sem 7	Control and transitional thesis		CSC1A_W02, CSC1A_W03, CSC1A_W04, CSC1A_U04, CSC1A_U07
Final Project	Diploma Thesis	Diploma thesis preparation	CSC1A_W01, CSC1A_W02, CSC1A_W03, CSC1A_W04, CSC1A_W05, CSC1A_W06, CSC1A_W07, CSC1A_U01, CSC1A_U02, CSC1A_U03, CSC1A_U04, CSC1A_U05, CSC1A_U06, CSC1A_U07, CSC1A_K01, CSC1A_K02, CSC1A_K03
Diploma Seminar	Seminars	Participation in a discussion, Diploma thesis preparation, Presentation	CSC1A_W06, CSC1A_U01, CSC1A_U02, CSC1A_K01

Study plans

Field of study: Computer Science

Semester 1

Course	Number of hours	ECTS credits	Form of verification	
Introduction to Computer Science	Lectures: 30 Laboratory classes: 30	5,0	Completing the classes	O
Introduction to Unix systems	Lectures: 15 Laboratory classes: 30	3,0	Completing the classes	O
Programming Languages I	Lectures: 30 Laboratory classes: 30	5,0	Completing the classes	O
Higher algebra	Lectures: 30 Auditorium classes: 30	5,0	Exam	O
Mathematical Analysis	Lectures: 45 Auditorium classes: 60	7,0	Exam	O
Discrete mathematics	Lectures: 15 Auditorium classes: 15	3,0	Exam	O
Elective Humanistic Course 1	Lectures: 30	2,0	Completing the classes	O
Physical Education 1	Physical education classes: 30	0,0	Completing the classes	O
Sum	**420**	**30,0**		

Semester 2

Course	Number of hours	ECTS credits	Form of verification	
Physics I	Lectures: 30 Auditorium classes: 30	5,0	Exam	O
Algorithms and data structures	Lectures: 30 Auditorium classes: 30	6,0	Exam	O
Logic in Computer Science	Lectures: 15 Auditorium classes: 15	2,0	Exam	O

Course	Number of hours	ECTS credits	Form of verification	
Programming Languages II	Lectures: 30 Laboratory classes: 45	6,0	Completing the classes	O
Statistics	Lectures: 30 Auditorium classes: 15 Laboratory classes: 15	5,0	Completing the classes	O
Differential calculus	Lectures: 15 Auditorium classes: 15	3,0	Exam	O
Physical Education 2	Physical education classes: 15	0,0	Completing the classes	O
Elective Humanistic Course		3,0	Completing the classes	O
The rules for selecting groups/modules: A student chooses humanistic course or courses for 3 ECTS in total.				
Elective Humanistic Course 2	Lectures: 30	3,0	Completing the classes	W
Foreign language I		0,0	Completing the classes	O
The rules for selecting groups/modules: Select one item from the offered modules.				
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 30	0,0	Completing the classes	W
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 30	0,0	Completing the classes	W
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 30	0,0	Completing the classes	W
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 30	0,0	Completing the classes	W
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 30	0,0	Completing the classes	W
Sum	**390**	**30,0**		

Semester 3

Course	Number of hours	ECTS credits	Form of verification	
Physics II	Lectures: 30 Auditorium classes: 30	5,0	Exam	O

Course	Number of hours	ECTS credits	Form of verification	
Physics lab	Lectures: 2 Laboratory classes: 15	2,0	Completing the classes	O
Object Oriented Programming	Lectures: 30 Laboratory classes: 30	6,0	Exam	O
Databases I	Lectures: 30 Laboratory classes: 30	6,0	Exam	O
Operating Systems	Lectures: 30 Laboratory classes: 30	6,0	Completing the classes	O
Introduction to Computer Graphics	Lectures: 30 Laboratory classes: 15 Project classes: 15	5,0	Completing the classes	O
Physical Education 3	Physical education classes: 15	0,0	Completing the classes	O
Foreign language II		0,0	Completing the classes	O
The rules for selecting groups/modules: Select one item from the offered modules.				
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 45	0,0	Completing the classes	W
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 45	0,0	Completing the classes	W
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 45	0,0	Completing the classes	W
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 45	0,0	Completing the classes	W
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 45	0,0	Completing the classes	W
Sum	**377**	**30,0**		

Semester 4

Course	Number of hours	ECTS credits	Form of verification	
Databases II	Lectures: 15 Laboratory classes: 15 Project classes: 30	5,0	Completing the classes	O
Software studio I	Project classes: 45	3,0	Completing the classes	O
Computer Networks	Lectures: 30 Laboratory classes: 30	5,0	Exam	O
Software engineering	Lectures: 30 Laboratory classes: 15 Project classes: 15	5,0	Exam	O
Computer Science Electives I		7,0	Completing the classes	O
The rules for selecting groups/modules: A student chooses computer science related courses for 7 ECTS in total (from the UBPO / AGH UST International Courses or the current Faculty offer).				
AGH UST International Courses Elective Module sem 4	Control and transitional thesis: 90	7,0	Completing the classes	W
Network Society & Technology	Discussion seminars: 30	4,0	Exam	W
Understanding GDPR - Ensuring personal data protection in the light of EU regulations	Lectures: 20 Laboratory classes: 14	4,0	Exam	W
Optical Fibers - Technology and Applications	Lectures: 30	4,0	Exam	W
Distributed Control Systems	Lectures: 28 Laboratory classes: 14	5,0	Exam	W
Innovation for Engineers: Design Thinking and Business Model Generation	Workshop classes: 30	4,0	Exam	W
Technology in Society	Workshop classes: 15	3,0	Exam	W
Fundamentals of Data Science	Lectures: 15 Laboratory classes: 15 Project classes: 15	5,0	Exam	W
Fundamentals of Optimization	Lectures: 28 Project classes: 14	5,0	Exam	W
Basics of Design in SolidWorks 3D CAD Software	Laboratory classes: 30	4,0	Exam	W
Introduction to Geoinformatics	Lectures: 15 Laboratory classes: 15	4,0	Exam	W

Course	Number of hours	ECTS credits	Form of verification	
Python in Engineering Calculations	Laboratory classes: 30	4,0	Exam	W
Python Language	Laboratory classes: 45	4,0	Completing the classes	W
Impact of cybersecurity on international security	Lectures: 20 Laboratory classes: 14	4,0	Exam	W
EU cybersecurity framework	Lectures: 20 Laboratory classes: 14	4,0	Exam	W
Foreign language III		5,0	Exam	O
The rules for selecting groups/modules: Select one item from the offered modules.				
French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 60	5,0	Exam	W
German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 60	5,0	Exam	W
Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 60	5,0	Exam	W
Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 60	5,0	Exam	W
English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)	Foreign language classes: 60	5,0	Exam	W
Sum	**375**	**30,0**		

Semester 5

Course	Number of hours	ECTS credits	Form of verification	
Formal Languages and Compilers	Lectures: 30 Laboratory classes: 15 Project classes: 15	5,0	Exam	O
Introduction to Artificial Intelligence	Lectures: 30 Laboratory classes: 30	5,0	Exam	O
Software studio II	Project classes: 45	3,0	Completing the classes	O
Computer Science Electives II		12,0	Completing the classes	O

Course	Number of hours	ECTS credits	Form of verification	
The rules for selecting groups/modules: A student chooses computer science related courses for 12 ECTS in total (from the UBPO / AGH UST International Courses or the current Faculty offer).				
AGH UST International Courses Elective Module sem 5	Control and transitional thesis: 150	12,0	Completing the classes	W
Network Society & Technology	Discussion seminars: 30	4,0	Exam	W
Understanding GDPR - Ensuring personal data protection in the light of EU regulations	Lectures: 20 Laboratory classes: 14	4,0	Exam	W
Optical Fibers - Technology and Applications	Lectures: 30	4,0	Exam	W
Distributed Control Systems	Lectures: 28 Laboratory classes: 14	5,0	Exam	W
Innovation for Engineers: Design Thinking and Business Model Generation	Workshop classes: 30	4,0	Exam	W
Technology in Society	Workshop classes: 15	3,0	Exam	W
Fundamentals of Data Science	Lectures: 15 Laboratory classes: 15 Project classes: 15	5,0	Exam	W
Fundamentals of Optimization	Lectures: 28 Project classes: 14	5,0	Exam	W
Basics of Design in SolidWorks 3D CAD Software	Laboratory classes: 30	4,0	Exam	W
Introduction to Geoinformatics	Lectures: 15 Laboratory classes: 15	4,0	Exam	W
Python in Engineering Calculations	Laboratory classes: 30	4,0	Exam	W
Python Language	Laboratory classes: 45	4,0	Completing the classes	W
Impact of cybersecurity on international security	Lectures: 20 Laboratory classes: 14	4,0	Exam	W
EU cybersecurity framework	Lectures: 20 Laboratory classes: 14	4,0	Exam	W
Introduction to the Semantic Web and Knowledge Graphs	Lectures: 14 Laboratory classes: 14	4,0	Completing the classes	W
Introduction to Process Mining	Lectures: 14 Laboratory classes: 14	4,0	Completing the classes	W

Course	Number of hours	ECTS credits	Form of verification	
Introduction to Programming Language Theory	Lectures: 14 Laboratory classes: 14	4,0	Completing the classes	W
Constraint Programming	Lectures: 14 Laboratory classes: 14	4,0	Completing the classes	W
Logic Programming	Lectures: 14 Laboratory classes: 14	3,0	Completing the classes	W
Graphical Programming Languages	Lectures: 14 Laboratory classes: 14	3,0	Completing the classes	W
Digital Electronics and Microprocessors	Lectures: 30 Auditorium classes: 15 Laboratory classes: 30	5,0	Completing the classes	O
Sum	**390**	**30,0**		

Semester 6

Course	Number of hours	ECTS credits	Form of verification	
Cybersecurity	Lectures: 15 Laboratory classes: 15 Project classes: 15	5,0	Exam	O
Web application technologies	Lectures: 15 Laboratory classes: 15 Project classes: 15	5,0	Completing the classes	O
Embedded systems	Lectures: 20 Laboratory classes: 25 Project classes: 15	5,0	Completing the classes	O
Professional practice	Practical placement: 0	4,0	Completing the classes	O
Computer Science Electives III		11,0	Completing the classes	O
The rules for selecting groups/modules: A student chooses computer science related courses for 11 ECTS in total (from the UBPO / AGH UST International Courses or the current Faculty offer).				
AGH UST International Courses Elective Module sem 6	Control and transitional thesis: 120	11,0	Completing the classes	W

Course	Number of hours	ECTS credits	Form of verification	
Network Society & Technology	Discussion seminars: 30	4,0	Exam	W
Understanding GDPR - Ensuring personal data protection in the light of EU regulations	Lectures: 20 Laboratory classes: 14	4,0	Exam	W
Optical Fibers - Technology and Applications	Lectures: 30	4,0	Exam	W
Distributed Control Systems	Lectures: 28 Laboratory classes: 14	5,0	Exam	W
Innovation for Engineers: Design Thinking and Business Model Generation	Workshop classes: 30	4,0	Exam	W
Technology in Society	Workshop classes: 15	3,0	Exam	W
Fundamentals of Data Science	Lectures: 15	5,0	Exam	W
Fundamentals of Optimization	Total number of contact hours: 0	0,0		
Basics of Design in SolidWorks 3D CAD Software	Laboratory classes: 30	4,0	Exam	W
Introduction to Geoinformatics	Lectures: 15 Laboratory classes: 15	4,0	Exam	W
Python in Engineering Calculations	Laboratory classes: 30	4,0	Exam	W
Python Language	Laboratory classes: 45	4,0	Completing the classes	W
Impact of cybersecurity on international security	Lectures: 20 Laboratory classes: 14	4,0	Exam	W
EU cybersecurity framework	Lectures: 20 Laboratory classes: 14	4,0	Exam	W
Introduction to the Semantic Web and Knowledge Graphs	Lectures: 14 Laboratory classes: 14	4,0	Completing the classes	W
Human-Computer Interaction	Lectures: 14 Seminars: 14	4,0	Completing the classes	W
Sum	**325**	**30,0**		

Semester 7

Course	Number of hours	ECTS credits	Form of verification	
Final Project	Diploma Thesis: 0	15,0	Completing the classes	O
Diploma Seminar	Seminars: 15	1,0	Completing the classes	O
Computer Science Electives IV		14,0	Completing the classes	O
The rules for selecting groups/modules: A student chooses computer science related courses for 14 ECTS in total (from the UBPO / AGH UST International Courses or the current Faculty offer).				
AGH UST International Courses Elective Module sem 7	Control and transitional thesis: 175	14,0	Completing the classes	W
Network Society & Technology	Discussion seminars: 30	4,0	Exam	W
Understanding GDPR - Ensuring personal data protection in the light of EU regulations	Lectures: 20 Laboratory classes: 14	4,0	Exam	W
Optical Fibers - Technology and Applications	Lectures: 30	4,0	Exam	W
Distributed Control Systems	Lectures: 28 Laboratory classes: 14	5,0	Exam	W
Innovation for Engineers: Design Thinking and Business Model Generation	Workshop classes: 30	4,0	Exam	W
Technology in Society	Workshop classes: 15	3,0	Exam	W
Fundamentals of Data Science	Lectures: 15 Laboratory classes: 15 Project classes: 15	5,0	Exam	W
Fundamentals of Optimization	Lectures: 28 Project classes: 14	5,0	Exam	W
Basics of Design in SolidWorks 3D CAD Software	Laboratory classes: 30	4,0	Exam	W
Introduction to Geoinformatics	Lectures: 15 Laboratory classes: 15	4,0	Exam	W
Python in Engineering Calculations	Laboratory classes: 30	4,0	Exam	W
Python Language	Laboratory classes: 45	4,0	Completing the classes	W
Impact of cybersecurity on international security	Lectures: 20 Laboratory classes: 14	4,0	Exam	W
EU cybersecurity framework	Lectures: 20 Laboratory classes: 14	4,0	Exam	W

Course	Number of hours	ECTS credits	Form of verification	
Constraint Programming	Lectures: 14 Laboratory classes: 14	4,0	Completing the classes	W
Logic Programming	Lectures: 14 Laboratory classes: 14	3,0	Completing the classes	W
Introduction to Programming Language Theory	Lectures: 14 Laboratory classes: 14	4,0	Completing the classes	W
Graphical Programming Languages	Lectures: 14 Laboratory classes: 14	3,0	Completing the classes	W
Sum	**190**	**30,0**		

O - Obligatory
W - Elective

ECTS credits calculations

Field of study: Computer Science

The total number of ECTS credits the student needs to obtain in the form of:

classes conducted with the direct participation of academic teachers or other persons conducting classes	147
core science classes relevant to a given major	127
practical classes, developing practical skills, including laboratory, design, practical and workshop classes	74
classes subject to choice by the student (in the amount of not less than 30% of the number of ECTS credits necessary to obtain qualifications corresponding to the level of education)	68
classes in the field of humanities or social sciences - in the case of fields of study assigned to disciplines within fields other than humanities or social sciences, respectively	5
foreign language classes	5
practical placements	4
classes related to the academic activity conducted at the University in the discipline or disciplines to which the field of study is assigned, in the amount greater than 50% of the number of ECTS credits required to complete studies at a given level, taking into account the participation of students in classes preparing to conduct scientific activity or participate in this activity (applies only to studies with a general academic profile)	127
classes shaping practical skills in the amount greater than 50% of the number of ECTS credits required to complete studies at a given level (applies only to studies with a practical profile)	

Introduction to Computer Science

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li1O.3482c650f6076ab4c8d2b37ba7aae2fc.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 1	Completing the classes **Activities and hours** Lectures: 30 Laboratory classes: 30	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student has general knowledge on computer science and related topics	CSC1A_W02	Examination
W2	Student has general knowledge on designing, bulding and analysis digital circuits and computer architectures.	CSC1A_W05	Examination
W3	Studen has general knowledge on low-level programming.	CSC1A_W03	Examination

Skills – Student can:			
U1	Student is prepared for the laboratory classes	CSC1A_U01	Activity during classes
U2	Student can design and analyse logic circuits and write programs in assembly language (relative simple ones)	CSC1A_U01	Completion of laboratory classes

Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lectures	30
Laboratory classes	30
Preparation for classes	30
Realization of independently performed tasks	20
Examination or final test/colloquium	2
Contact hours	2
Preparation of project, presentation, essay, report	12

Student workload	**Hours** 126
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	Course's learning outcomes	Program content ensuring the achievement of the learning outcomes prescribed to the module
Laboratory classes	U1, U2	This module includes material on fundamentals of computer science and related topics (logical circuits, computer arithmetic and architectures, data representation and alghoritms)
Lectures	W1, W2, W3	

Introduction to Unix systems

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li1O.2df7b31017c2537eaaee6dfbb863521a.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Tak

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 1	Completing the classes **Activities and hours** Lectures: 15 Laboratory classes: 30	3

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	knows the basics of principles and architecture of the UNIX operating systems	CSC1A_W02	Test
W2	has knowledge about the management of resources in the Unix operating system, including the management of file and process subsystems	CSC1A_W02	Activity during classes, Test
Skills – Student can:			

U1	can use basic commands and programs that are the part of the Unix operating system environment	CSC1A_U04	Activity during classes, Test, Completion of laboratory classes
U2	is able to perform the basic configuration of the Unix operating system	CSC1A_U04	Activity during classes, Test, Completion of laboratory classes
U3	can use the programming interface provided by the Unix operating system to create programs	CSC1A_U07	Activity during classes, Test, Completion of laboratory classes
U4	can use the basic tools provided by the Unix operating system, including cryptographic tools	CSC1A_U04	Activity during classes, Test, Completion of laboratory classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	15
Laboratory classes	30
Preparation for classes	15
Realization of independently performed tasks	15
Student workload	**Hours** 75
Workload involving teacher	**Hours** 45

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Laboratory classes	W1, W2, U1, U2, U3, U4	The course aims to introduce students to the basics of using and administering the Unix operating systems.
Lectures	W1, W2	

Programming Languages I

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li1O.b1e90f3c6ff45fc15aa61da4a2329ed6.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Tak

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 1	Completing the classes **Activities and hours** Lectures: 30 Laboratory classes: 30	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student knows and understands the principles of software development using procedural language C.	CSC1A_W02, CSC1A_W03	Activity during classes, Participation in a discussion
W2	Student knows the rules of memory management in C.	CSC1A_W02, CSC1A_W03	Activity during classes, Participation in a discussion
Skills – Student can:			

U1	Student is able to create scalar and aggregate variables statically and dynamically.	CSC1A_U07	Activity during classes, Execution of laboratory classes, Test
U2	Student can solve a simple programming problem using the C language expressions and statements, as well as user-defined functions.	CSC1A_U07	Activity during classes, Execution of laboratory classes, Test
Social competences – Student is ready to:			
K1	Student can clearly present a solution to a programming problem.	CSC1A_K01	Activity during classes, Participation in a discussion, Execution of laboratory classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Laboratory classes	30
Preparation for classes	40
Realization of independently performed tasks	30
Student workload	**Hours** 130
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2	Practical presentation of the procedural paradigm of software development using the C language, taking into account the dynamic and static model of memory management.
Laboratory classes	U1, U2, K1	

Higher algebra

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li1O.39914e74ca9214af32bbba8023907d84.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 1	Exam **Activities and hours** Lectures: 30 Auditorium classes: 30	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Students can assess their level of understanding of the problem and its possible solution methods. They understand the need for continuous training.	CSC1A_W01, CSC1A_W07, CSC1A_U01, CSC1A_U02, CSC1A_U03, CSC1A_U06, CSC1A_K01	Activity during classes, Examination
W2	Student is able to use the acquired knowledge of mathematics to describe and analyze the basic physical and technical problems	CSC1A_W01, CSC1A_W07, CSC1A_U01, CSC1A_U06, CSC1A_K01, CSC1A_K03	Activity during classes, Examination

W3	Student can obtain information from literature, databases and other sources, can make the selection, interpretation, and draw conclusions.	CSC1A_W01, CSC1A_W07, CSC1A_U01, CSC1A_U06	Activity during classes, Examination
Skills – Student can:			
U1	Student has ability to use the rules of strict, logical thinking in the analysis of physical and technical processes	CSC1A_W01, CSC1A_W07	Activity during classes, Examination

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Auditorium classes	30
Preparation for classes	30
Realization of independently performed tasks	45
Examination or final test/colloquium	2
Student workload	**Hours** 137
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2, W3	The goal of this course is to introduce the study of abstract algebra and to gain an understanding of the utility and importance of several algebraic structures
Auditorium classes	W1, W2, W3, U1	

Mathematical Analysis

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li1O.3a8db8b3d952ebece8dfaf621a34143c.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 1	Exam **Activities and hours** Lectures: 45 Auditorium classes: 60	7

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Students can assess their level of understanding of the problem and its possible solution methods. They understand the need for continuous training	CSC1A_W01, CSC1A_W07	Activity during classes, Test, Examination
W2	Student has ability to use the rules of strict, logical thinking in the analysis of physical and technical processes	CSC1A_W01, CSC1A_W07, CSC1A_U01, CSC1A_U02, CSC1A_U03, CSC1A_U06	Activity during classes, Test, Examination

W3	Student is able to use the acquired knowledge of mathematics to describe and analyze the basic physical and technical processes	CSC1A_W01, CSC1A_W04, CSC1A_W07	Activity during classes, Test, Examination
W4	Student can obtain information from literature, databases and other sources, can make the selection, interpretation, and draw conclusions	CSC1A_W01, CSC1A_W04, CSC1A_W07, CSC1A_U01, CSC1A_U03, CSC1A_U06	Activity during classes, Test, Examination

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	45
Auditorium classes	60
Preparation for classes	50
Realization of independently performed tasks	50
Examination or final test/colloquium	2
Student workload	**Hours** 207
Workload involving teacher	**Hours** 105

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Auditorium classes	W1, W2, W3, W4	This course is intended for students in computer science. It contains an introduction to differential and integral calculus of functions of one variable
Lectures	W1, W2, W3, W4	

Discrete mathematics

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li1O.fcac267d4c47fb6be51aad7f4d5aea55.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 1	Exam **Activities and hours** Lectures: 15 Auditorium classes: 15	3

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Has knowledge of modular arithmetic	CSC1A_W01	Test
W2	Has knowledge of planar graphs; knows the application of Euler's formula	CSC1A_W01	Test
W3	Has knowledge about recurrence relations	CSC1A_W01	Test

W4	Has knowledge of the basics of graph theory; students knows what Eulerian and Hamiltonian graphs are; knows the problems and algorithms associated with these concepts	CSC1A_W01, CSC1A_W04	Activity during classes, Test
W5	Has knowledge about flows in networks; knows the Ford-Fulkerson algorithm	CSC1A_W01	Activity during classes, Test
Skills – Student can:			
U1	The student is able to perform calculations in modular arithmetic.	CSC1A_W01	Activity during classes, Test, Examination, Oral answer
U2	Student is able to model real-life problems in graph theory language.	CSC1A_W01, CSC1A_W04	Activity during classes, Participation in a discussion
U3	The student can solve recursive equations.	CSC1A_W01	Activity during classes, Test, Examination, Oral answer
Social competences – Student is ready to:			
K1	Has an awareness of the mathematical culture; makes efforts to transfer the acquired knowledge in a clear way	CSC1A_K01	Oral answer

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	15
Auditorium classes	15
Preparation for classes	25
Realization of independently performed tasks	20
Student workload	**Hours** 75
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Auditorium classes	W1, W2, W3, W4, W5, U1, U2, U3, K1	Acquainting with the basic concepts, methods and problems of discrete mathematics.
Lectures	W1, W2, W3, W4, W5, U1, U2, U3, K1	

Elective Humanistic Course 1

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li1O.60ad307cb894e.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 1	Completing the classes **Activities and hours** Lectures: 30	2

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	According to the chosen humanistic course from the AGH UST Humanities Courses base.	CSC1A_W06	Activity during classes
Skills – Student can:			
U1	According to the chosen humanistic course from the AGH UST Humanities Courses base.	CSC1A_U01, CSC1A_U02	Activity during classes
U2	According to the chosen humanistic course from the AGH UST Humanities Courses base.	CSC1A_U03	Activity during classes

Social competences – Student is ready to:			
K1	According to the chosen humanistic course from the AGH UST Humanities Courses base.	CSC1A_K01, CSC1A_K02, CSC1A_K03	Activity during classes

Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lectures	30
Preparation for classes	25
Contact hours	5

Student workload	**Hours** 60
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	Course's learning outcomes	Program content ensuring the achievement of the learning outcomes prescribed to the module

Physics I

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li2O.f2428e5301d0765b1ce6c6548b060a8b.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 2	Exam **Activities and hours** Lectures: 30 Auditorium classes: 30	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	The student knows the basic theoretical and experimental methods used in classical physics	CSC1A_W01	Activity during classes, Participation in a discussion, Test, Oral answer
W2	The student understands physical phenomena encounterd in everyday life	CSC1A_W01	Activity during classes, Participation in a discussion, Test, Examination, Oral answer

W3	The student understands the key concepts of physics and the relationships between them.	CSC1A_W01	Participation in a discussion, Test, Test results, Oral answer
Skills – Student can:			
U1	The student can how to set and how to solve simple physical problems seeing the problems solved.	CSC1A_U01, CSC1A_U06	Execution of exercises, Test results
Social competences – Student is ready to:			
K1	The student knows that we are surrounded by things and phenomena that can be understood in terms of science.	CSC1A_K01	Involvement in teamwork

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Auditorium classes	30
Preparation for classes	58
Examination or final test/colloquium	2
Contact hours	5
Student workload	**Hours** 125
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2, W3, U1, K1	This course aims at providing the student an understanding of classical physics at the elementary level. It covers classical mechanics and thermodynamics together with several applications in each.
Auditorium classes	W1, W2, W3, U1, K1	

Algorithms and data structures

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li2O.fe1d983f2444dffe22c4014965205329.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 2	Exam **Activities and hours** Lectures: 30 Auditorium classes: 30	6

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Students know and understand basic data structures	CSC1A_W02	Examination
W2	Students know and understand the principles of algorithm theory	CSC1A_W02, CSC1A_W04	Examination
W3	Students know and understand basic algorithms	CSC1A_W02	Examination
W4	Students know and understand the basic strategies of constructing algorithms, and ways to assess their computational complexity	CSC1A_W02, CSC1A_U04, CSC1A_K03	Examination

Skills – Student can:			
U1	Students are able to choose and construct algorithms to solve basic problems	CSC1A_W02, CSC1A_U05	Examination
U2	Students are able to estimate the computational complexity of algorithms and data structures	CSC1A_W02, CSC1A_U04	Examination
U3	Student can choose the most adequate data structure for particular problems	CSC1A_U04, CSC1A_U07	Execution of exercises, Test
U4	Students understand and can use recursion	CSC1A_U01, CSC1A_U07	Examination
Social competences – Student is ready to:			
K1	Students know and understand the role of algorithmics in the modern world	CSC1A_K01, CSC1A_K03	Examination

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Auditorium classes	30
Preparation for classes	45
Realization of independently performed tasks	45
Student workload	**Hours** 150
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2, W3, W4, K1	The aim of the module is to provide the students principles of the algorithm theory.
Auditorium classes	U1, U2, U3, U4	

Logic in Computer Science

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li2O.cf369180a216a0366cc35975fd9841a3.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 2	Exam **Activities and hours** Lectures: 15 Auditorium classes: 15	2

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Knowledge and understanding of basic concepts and languages of logic as applied in Computer Science.	CSC1A_W01, CSC1A_W02, CSC1A_W03, CSC1A_W04	Activity during classes, Test, Examination, Completion of laboratory classes
W2	Knowledge and understanding of logical implication, logical inference and theorem proving	CSC1A_W01, CSC1A_W02, CSC1A_W03, CSC1A_W04	Activity during classes, Test, Examination, Completion of laboratory classes

W3	Knowledge and understanding of logical modeling and analysis	CSC1A_W01, CSC1A_W02, CSC1A_W03, CSC1A_W04	Activity during classes, Test, Examination, Completion of laboratory classes
Skills – Student can:			
U1	Can use basic logical concepts and languages in practice	CSC1A_U01, CSC1A_U02, CSC1A_U03, CSC1A_U04, CSC1A_U05, CSC1A_U06, CSC1A_U07	Activity during classes, Test, Examination, Completion of laboratory classes
U2	Can perform logical reasoning, check properties of logical formulas and prove simple theorems	CSC1A_U01, CSC1A_U02, CSC1A_U03, CSC1A_U04, CSC1A_U05, CSC1A_U06, CSC1A_U07	Activity during classes, Test, Examination, Completion of laboratory classes
Social competences – Student is ready to:			
K1	Can perform simple analysis of logical models	CSC1A_U01, CSC1A_U02, CSC1A_U04, CSC1A_U05, CSC1A_U06, CSC1A_U07	Activity during classes, Completion of laboratory classes
K2	Is aware of the role of logic in computer science practice, in economy, society and law. Can use logic for improving communication skills, argumentation, discussion and documentation	CSC1A_K01, CSC1A_K03	Activity during classes, Completion of laboratory classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	15
Auditorium classes	15
Preparation for classes	28
Examination or final test/colloquium	2
Student workload	**Hours** 60
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**

Auditorium classes	W1, W2, W3, U1, U2, K1, K2	Introduction to formal knowledge representation and reasoning. Propositional Calculus: syntax, semantics, inference, CNF, DNF, resolution, SAT. First-Order Predicate Calculus: syntax, semantics, inference, resolution. Introduction to Logic Programming and Constraint Programming.
Lectures	W1, W2, W3, U1, U2, K1, K2	

Programming Languages II

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li2O.fdc6d61032fe9acf5802953ca19c99c7.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 2	Completing the classes **Activities and hours** Lectures: 30 Laboratory classes: 45	6

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student knows the use of the following important elements of C++ language: statements, variable types, and the structure of classes.	CSC1A_W02	Test
W2	Student knows the basic structures of C++ language.	CSC1A_W02, CSC1A_W03	Completion of laboratory classes
W3	Student knows and understands fundamental rules of algorithm development.	CSC1A_W04	Test

Skills – Student can:			
U1	Student uses the documentation during the work.	CSC1A_U01, CSC1A_U06	Activity during classes
U2	Student can code algorithms in C++ language.	CSC1A_U02, CSC1A_U07	Activity during classes, Execution of laboratory classes, Test, Project, Completion of laboratory classes
U3	Student is able to search for information for self-education and problem solving.	CSC1A_U01, CSC1A_U02	Activity during classes
Social competences – Student is ready to:			
K1	Student can define problems and search for solutions during the discussions in class. Understands necessity of self-learning (progress).	CSC1A_K01, CSC1A_K02, CSC1A_K03	Activity during classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Laboratory classes	45
Preparation for classes	40
Realization of independently performed tasks	49
Examination or final test/colloquium	2
Preparation of project, presentation, essay, report	14
Student workload	**Hours** 180
Workload involving teacher	**Hours** 75

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2, W3, U1, U2, U3, K1	Learning object-oriented programming in the modern C++ (C++14).
Laboratory classes	W1, W2, W3, U1, U2, U3, K1	

Statistics

Course description sheet

Basic information

Field of study Computer Science **Major** - **Organisational unit** Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering **Study level** First-cycle (engineer) programme **Form of study** Full-time studies **Profile** General academic	**Didactic cycle** 2023/2024 **Course code** ECSCS.li2O.0bb9ced98effdb433e3e2fafd98932fd.23 **Lecture languages** english **Mandatoriness** Obligatory **Block** General Modules **Course related to scientific research** Yes **Course shaping practical skills** Nie

Period	**Method of verification of the learning outcomes**	**Number of ECTS credits**
Semester 2	Completing the classes **Activities and hours** Lectures: 30 Auditorium classes: 15 Laboratory classes: 15	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student knows how to calculate (assign) the probability of a random event in simple and medium-complex scenarios	CSC1A_W01, CSC1A_W02	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination

W2	Student knows how to answer basic statistical questions concerning the expected value, variance and their confidence limits for a given random variable from a series of measurements	CSC1A_W01, CSC1A_W02	Activity during classes, Participation in a discussion, Execution of exercises
W3	Student can apply statistical inference in data analysis	CSC1A_W01, CSC1A_W02	Activity during classes, Participation in a discussion, Test, Oral answer
Skills – Student can:			
U1	Student is capable of performing tests of typical statistical hypotheses	CSC1A_U01, CSC1A_U02, CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises
U2	Student is able to perform statistical data analysis using a computer	CSC1A_U01, CSC1A_U02, CSC1A_U06	Activity during classes, Execution of laboratory classes, Project
Social competences – Student is ready to:			
K1	Students should acquire an understanding of how to read and interpret everyday media communications containing quantitative data and perform their critical analysis	CSC1A_K01, CSC1A_K03	Activity during classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Auditorium classes	15
Laboratory classes	15
Preparation for classes	30
Realization of independently performed tasks	30
Examination or final test/colloquium	2
Contact hours	5
Student workload	**Hours** 127
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	Course's learning outcomes	Program content ensuring the achievement of the learning outcomes prescribed to the module
Laboratory classes	W1, W2, W3, U1, U2, K1	The lecture is aimed at giving students a comprehensive view on modern data analysis using statistical methods. We also show a close connection between statistics and machine learning.
Auditorium classes	W1, W2, W3, U1, U2, K1	
Lectures	W1, K1	

Differential calculus

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li2O.24783dd7cc4ac0cafa1b4a631f89e345.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Tak

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 2	Exam **Activities and hours** Lectures: 15 Auditorium classes: 15	3

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student can assess their level of understanding of the problem and its possible solution methods. They understand the need for continuous training	CSC1A_W01, CSC1A_W07	Activity during classes, Examination
W2	Student has ability to use the rules of strict, logical thinking in the analysis of physical and technical processes	CSC1A_W01, CSC1A_W04, CSC1A_W07, CSC1A_U01, CSC1A_U02, CSC1A_U06	Activity during classes, Examination

W3	Student is able to use the acquired knowledge of mathematics to describe and analyze the basic physical and technical problems	CSC1A_W01, CSC1A_W04, CSC1A_W07, CSC1A_U01, CSC1A_U02, CSC1A_U06	Activity during classes, Examination
W4	Student can obtain information from literature, databases and other sources, can make the selection, interpretation, and draw conclusions	CSC1A_W01, CSC1A_W04, CSC1A_W07, CSC1A_U01, CSC1A_U02, CSC1A_U06, CSC1A_K01, CSC1A_K03	Activity during classes, Examination

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	15
Auditorium classes	15
Preparation for classes	15
Realization of independently performed tasks	30
Examination or final test/colloquium	2
Student workload	**Hours** 77
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2, W3, W4	This course focuses on ordinary differential equations and their applications in science and engineering.
Auditorium classes	W1, W2, W3, W4	

Elective Humanistic Course 2

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li2O.60ad309c44253.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 2	Completing the classes **Activities and hours** Lectures: 30	3

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	According to the chosen humanistic course from the AGH UST Humanities Courses base.	CSC1A_W06	Activity during classes
Skills – Student can:			
U1	According to the chosen humanistic course from the AGH UST Humanities Courses base.	CSC1A_U01, CSC1A_U02	Activity during classes
U2	According to the chosen humanistic course from the AGH UST Humanities Courses base.	CSC1A_U03	Activity during classes

Social competences – Student is ready to:			
K1	According to the chosen humanistic course from the AGH UST Humanities Courses base.	CSC1A_K01, CSC1A_K02, CSC1A_K03	Activity during classes

Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lectures	30
Preparation for classes	45
Contact hours	5

Student workload	Hours 80
Workload involving teacher	Hours 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	Course's learning outcomes	Program content ensuring the achievement of the learning outcomes prescribed to the module
Lectures	W1, U1, U2, K1	A student chooses a humanistic course from the university-wide offer of the AGH UST Humanities Courses base for 3 ECTS

English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li2O.a8eea28ed793685c0f9e3473cf83b620.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 2	Completing the classes **Activities and hours** Foreign language classes: 30	0

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Can write a clear, informative and argumentative text related to general issues, as well as the field of study. Can write letters and other types of correspondence typical of work environment. Can effectively use educational and learning materials.	CSC1A_U06	Execution of exercises, Examination, Essays written during classes

U2	Can prepare an oral presentation on academic and professional topics. Can take an active part in discussions with a suitable degree of fluency and spontaneity, also in the professional environment.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation
U3	Can understand extensive, even detailed texts and oral statements, for example, lectures and presentations, when they relate to the field of study and contemporary issues. Can interpret obtained data and information.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U4	Can clearly present conclusions and opinions related to general, academic and professional issues in a written and oral form.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes
U5	Can use grammatical structures, phraseology and vocabulary necessary to understand general interest texts, contemporary socio-economic texts, academic texts and special interest texts related to the field of study, and ones that enable interaction with a degree of fluency and spontaneity for academic and professional purposes.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	30
Student workload	**Hours** 30
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)

French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii2O.8cde28af23df9f7ab255c368305e9d08.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 2	Completing the classes **Activities and hours** Foreign language classes: 30	0

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Can clearly present conclusions and opinions related to general, academic and professional issues in a written and oral form.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes

U2	Can understand extensive, even detailed texts and oral statements, for example, lectures and presentations, when they relate to the field of study and contemporary issues. Can interpret obtained data and information.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U3	Can prepare an oral presentation on academic and professional topics. Can take an active part in discussions with a suitable degree of fluency and spontaneity, also in the professional environment.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation
U4	Can write a clear, informative and argumentative text related to general issues, as well as the field of study. Can write letters and other types of correspondence typical of work environment. Can effectively use educational and learning materials.	CSC1A_U06	Execution of exercises, Examination, Essays written during classes
U5	Can use grammatical structures, phraseology and vocabulary necessary to understand general interest texts, contemporary socio-economic texts, academic texts and special interest texts related to the field of study, and ones that enable interaction with a degree of fluency and spontaneity for academic and professional purposes.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	30
Student workload	**Hours** 30
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)

German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study Computer Science **Major** - **Organisational unit** Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering **Study level** First-cycle (engineer) programme **Form of study** Full-time studies **Profile** General academic	**Didactic cycle** 2023/2024 **Course code** ECSCS.Ii2O.4e7283329845414c8997480d3bea5b29.23 **Lecture languages** english **Mandatoriness** Elective **Block** General Modules **Course related to scientific research** No **Course shaping practical skills** Nie

Period	**Method of verification of the learning outcomes**	**Number of ECTS credits**
Semester 2	Completing the classes **Activities and hours** Foreign language classes: 30	0

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Can prepare an oral presentation on academic and professional topics. Can take an active part in discussions with a suitable degree of fluency and spontaneity, also in the professional environment.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation

U2	Can write a clear, informative and argumentative text related to general issues, as well as the field of study. Can write letters and other types of correspondence typical of work environment. Can effectively use educational and learning materials.	CSC1A_U06	Execution of exercises, Examination, Essays written during classes
U3	Can clearly present conclusions and opinions related to general, academic and professional issues in a written and oral form.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes
U4	Can understand extensive, even detailed texts and oral statements, for example, lectures and presentations, when they relate to the field of study and contemporary issues. Can interpret obtained data and information.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U5	Can use grammatical structures, phraseology and vocabulary necessary to understand general interest texts, contemporary socio-economic texts, academic texts and special interest texts related to the field of study, and ones that enable interaction with a degree of fluency and spontaneity for academic and professional purposes.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	30
Student workload	**Hours** 30
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)

Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii2O.4f8b27be3def6751b9ffceb4796be96b.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 2	Completing the classes **Activities and hours** Foreign language classes: 30	0

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Can write a clear, informative and argumentative text related to general issues, as well as the field of study. Can write letters and other types of correspondence typical of work environment. Can effectively use educational and learning materials.	CSC1A_U06	Execution of exercises, Examination, Essays written during classes

U2	Can prepare an oral presentation on academic and professional topics. Can take an active part in discussions with a suitable degree of fluency and spontaneity, also in the professional environment.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation
U3	Can understand extensive, even detailed texts and oral statements, for example, lectures and presentations, when they relate to the field of study and contemporary issues. Can interpret obtained data and information.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U4	Can clearly present conclusions and opinions related to general, academic and professional issues in a written and oral form.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes
U5	Can use grammatical structures, phraseology and vocabulary necessary to understand general interest texts, contemporary socio-economic texts, academic texts and special interest texts related to the field of study, and ones that enable interaction with a degree of fluency and spontaneity for academic and professional purposes.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	30
Student workload	**Hours** 30
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)

Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 1/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii2O.d79e2a7b04d11cb631da8c41ede0d9dd.23

Lecture languages
russian

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 2	Completing the classes **Activities and hours** Foreign language classes: 30	0

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Potrafi napisać zrozumiały tekst informacyjny i argumentacyjny	CSC1A_U06	Execution of exercises, Examination, Essays written during classes
U2	Potrafi przedstawiać w sposób przejrzysty swoje wnioski i opinie dotyczące tematów ogólnych, akademickich i zawodowych w formie pisemnej i ustnej.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes

U3	Rozumie dłuższe, nawet skomplikowane wypowiedzi pisemne i ustne np. wykłady i prezentacje pod warunkiem, że dotyczą kwestii branżowych i spraw bieżących oraz potrafi interpretować uzyskane wiadomości.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U4	Potrafi wykorzystywać konstrukcje gramatyczne, frazeologię i słownictwo pozwalające na zrozumienie tekstów o charakterze ogólnym, opisujących współczesne zjawiska ekonomiczno-społeczne, o charakterze akademickim i branżowym oraz pozwalające na dość płynne i spontaniczne porozumiewanie się w środowisku akademickim i zawodowym.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U5	Potrafi przygotować prezentację ustną na tematy akademickie i branżowe oraz dość płynnie i spontanicznie brać udział w dyskusjach, również w środowisku zawodowym.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	30

Student workload	**Hours** 30
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	ęzyk rosyjski B-2 – kurs obowiązkowy 135 godzin - semestr 1/3 (STUDY PROGRAMME IN ENGLISH)

Physics II

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li4O.b7a2fffbc9cd3de32f129c4482c3144a.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 3	Exam **Activities and hours** Lectures: 30 Auditorium classes: 30	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	The student acquires basic knowledge about main topics of modern physics, understands the key concepts of physics and the relationships between them.	CSC1A_W01	Examination
W2	The student knows the basic theoretical and experimental methods used in modern physics	CSC1A_W01	Activity during classes

W3	The student understands physical phenomena encounterd in everyday life, sees similarities between objects, shared mechanisms and recurring themes that are reused by nature or by people.	CSC1A_W01	Activity during classes
Skills – Student can:			
U1	The student can how to set and how to solve simple physical problems form electrodynamics and quantum mechanics seeing the problems solved	CSC1A_U06	Examination
Social competences – Student is ready to:			
K1	The student knows that we are surrounded by things and phenomena that can be understood in terms of science, much of them is within students reach.	CSC1A_K01	Activity during classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Auditorium classes	30
Preparation for classes	58
Examination or final test/colloquium	2
Contact hours	5
Student workload	**Hours** 125
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2, W3, U1, K1	This part of physics course covers electrodynamics and modern physics concentrating on introducing the basic concepts, formulas, and terminology of a broad spectrum of modern physics topics.
Auditorium classes	W1, W2, W3, U1, K1	

Physics lab

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li4O.37bcdb9baedab585ebddaa360ff65cd3.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 3	Completing the classes **Activities and hours** Lectures: 2 Laboratory classes: 15	2

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student acquires knowledge on the physical basis of performed experiments.	CSC1A_W01	Activity during classes, Test, Completion of laboratory classes
W2	Student is acquainted with the instruments necessary to perform experiments and has knowledge on their proper use.	CSC1A_W01	Activity during classes, Execution of laboratory classes, Completion of laboratory classes

W3	Student knows how to analyse the experimental data, including estimation of the uncertainty of measurement, and how to prepare an experimental report.	CSC1A_W01	Execution of laboratory classes, Report, Completion of laboratory classes
Skills – Student can:			
U1	Student gets skills in operating laboratory instruments and carrying out experiments.	CSC1A_U01, CSC1A_U02	Activity during classes, Execution of laboratory classes, Completion of laboratory classes
U2	Student gets familiar with taking record of all observations taken, analysing the data and writing experimental report.	CSC1A_U01, CSC1A_U02	Execution of laboratory classes, Report, Completion of laboratory classes
Social competences – Student is ready to:			
K1	Student can cooperate with a colleague in a small team.	CSC1A_K01	Activity during classes, Execution of laboratory classes, Involvement in teamwork

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	2
Laboratory classes	15
Preparation for classes	15
Preparation of project, presentation, essay, report	28
Student workload	**Hours** 60
Workload involving teacher	**Hours** 17

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W3, U2	A course in practical physics is designed to allow students acquire the skill and technique in the manipulation of scientific instruments and equipment as well as the ability to analyse the experimental data.
Laboratory classes	W1, W2, W3, U1, U2, K1	

Object Oriented Programming

Course description sheet

Basic information

Field of study Computer Science **Major** - **Organisational unit** Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering **Study level** First-cycle (engineer) programme **Form of study** Full-time studies **Profile** General academic	**Didactic cycle** 2023/2024 **Course code** ECSCS.li4O.f30a24686c3e538a20d6893f38490a0a.23 **Lecture languages** english **Mandatoriness** Obligatory **Block** General Modules **Course related to scientific research** No **Course shaping practical skills** Tak

Period	**Method of verification of the learning outcomes**	**Number of ECTS credits**
Semester 3	Exam **Activities and hours** Lectures: 30 Laboratory classes: 30	6

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Students know the object programming paradigm and how to implement it using mechanisms available in Java, and what are the differences in relation to other object-oriented languages.	CSC1A_W02, CSC1A_W03	Activity during classes, Execution of laboratory classes, Examination, Completion of laboratory classes

W2	Students know and understand the Java language syntax, know how the runtime environment works, and what is the difference between compiling to the form of byte code and binary code, and between the launch and operation of both solutions, including differences in memory management.	CSC1A_W02, CSC1A_W03, CSC1A_W05	Activity during classes, Participation in a discussion, Execution of laboratory classes, Examination
Skills – Student can:			
U1	Students are able to independently search for detailed information in the available documentation resources and use popular programming environments such as NetBeans, IntelliJ IDEA or Eclipse.	CSC1A_U01, CSC1A_U03, CSC1A_U04, CSC1A_U06	Activity during classes, Execution of laboratory classes, Completion of laboratory classes
U2	Students can develop applications using Java, apply basic object-oriented techniques (encapsulation, inheritance, polymorphism), and prepare source code documentation using javadoc.	CSC1A_U01, CSC1A_U02, CSC1A_U05, CSC1A_U06, CSC1A_U07	Activity during classes, Participation in a discussion, Execution of laboratory classes
U3	Students are able to use additional libraries and tools for Java in order to perform the tasks as effectively as possible, including debugging and software testing.	CSC1A_U01, CSC1A_U03, CSC1A_U04, CSC1A_U05	Activity during classes, Participation in a discussion, Execution of laboratory classes
Social competences – Student is ready to:			
K1	Students have the ability to concisely and precisely describe their own solutions and to identify possible applications.	CSC1A_K02, CSC1A_K03	Participation in a discussion, Execution of laboratory classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Laboratory classes	30
Preparation for classes	45
Realization of independently performed tasks	45
Examination or final test/colloquium	2
Student workload	**Hours** 152
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**

Laboratory classes	W1, W2, U1, U2, U3, K1	The aim of the course is to get acquainted with object-oriented programming techniques based on Java language, including software testing, thread usage or network support.
Lectures	W1, W2, U1, U2, U3	

Databases I

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li4O.56fff4b7990dab877d307b8e7162bfe8.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 3	Exam **Activities and hours** Lectures: 30 Laboratory classes: 30	6

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Knowledge of Databases theoretical background	CSC1A_W03	Examination
W2	Knowledge of modern database systems (SQL and NoSQL)	CSC1A_W03	Examination
W3	Knowledge of database programming	CSC1A_W03	Activity during classes, Project, Examination
W4	Knowledge of databases' interfaces	CSC1A_W03	Activity during classes, Project, Examination

Skills – Student can:			
U1	Practical skills in databases design	CSC1A_U07	Activity during classes, Execution of a project, Execution of laboratory classes

Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lectures	30
Laboratory classes	30
Preparation for classes	32
Realization of independently performed tasks	31
Examination or final test/colloquium	2
Contact hours	5
Preparation of project, presentation, essay, report	20
Student workload	**Hours** 150
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	Course's learning outcomes	Program content ensuring the achievement of the learning outcomes prescribed to the module
Lectures	W1, W2, W3, W4	This course gives the basic knowledge of modern databases. Both relational and non-relational databses are discussed. Practical part includes designing and implementing of SQL and noSQL databases.
Laboratory classes	W1, W2, W3, W4, U1	

Operating Systems

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li4O.76cff58f85a90981008842c821b82002.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 3	Completing the classes **Activities and hours** Lectures: 30 Laboratory classes: 30	6

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student knows and understands fundamental notions of operating systems classifications, their functionalities and general architectures of popular operating systems (Unix, Linux, Windows)	CSC1A_W02	Test
W2	Student knows and understands a structure and execution of processes and threads and their management by the operating systems	CSC1A_W02	Test

W3	Student knows and understands the basic notions of synchronisation problems and deadlods, as well as methods of solving these problems.	CSC1A_W02	Test
W4	Student knows and understands organisation schemas of the memory and virtual memory in computer systems.	CSC1A_W02	Test
W5	Student knows and understands fundamentals of organisation and functioning of filesystems in computer systems.	CSC1A_W02	Test
W6	Student knows and understands fundaments of functioning of drivers of input-output devices in computer systems.	CSC1A_W02	Test
Skills – Student can:			
U1	Student can efficiently use system mechanisms providing by functions in the standard libraries.	CSC1A_U01	Execution of exercises
U2	Student can design and implement a software which uses system mechanisms.	CSC1A_U07	Execution of exercises
Social competences – Student is ready to:			
K1	Students can present and explain created solutions and developed software.	CSC1A_K03	Activity during classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Laboratory classes	30
Preparation for classes	90
Realization of independently performed tasks	28
Examination or final test/colloquium	2
Student workload	**Hours** 180
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**

Laboratory classes	U1, U2, K1	The student acquires knowledge about the organization and functions of modern operating systems and possesses the ability to use basic system mechanisms at the user level to develop a simple software.
Lectures	W1, W2, W3, W4, W5, W6	

Introduction to Computer Graphics

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li4O.21b5f11441d4bb6a2f6ec78a7ae497a3.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 3	Completing the classes **Activities and hours** Lectures: 30 Laboratory classes: 15 Project classes: 15	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student has knowledge about the structure and capabilities of OpenGL library	CSC1A_W02, CSC1A_W03	Activity during classes, Test
W2	Student knows and understands basic ideas of computer graphics	CSC1A_W02, CSC1A_W03	Activity during classes, Test
W3	Student knows and understands geometry transformations in 3D, illumination models, and texture mapping	CSC1A_W02, CSC1A_W03	Activity during classes, Test

W4	Student knows and understands advanced real-time rendering techniques	CSC1A_W02, CSC1A_W03	Activity during classes, Test
Skills – Student can:			
U1	Student can implement OpenGL illumination model	CSC1A_U07	Activity during classes, Execution of a project, Execution of laboratory classes
U2	Student can prepare a graphics program with moving camera and moving independent hierarchical objects	CSC1A_U07	Activity during classes, Execution of a project, Execution of laboratory classes
U3	Student can implement different types of texture mapping	CSC1A_U07	Activity during classes, Execution of a project, Execution of laboratory classes
U4	Student can implement interactive graphics program which handles external events from different devices.	CSC1A_U07	Execution of a project, Execution of laboratory classes
Social competences – Student is ready to:			
K1	Student understands the role of computer graphics and its influence on different areas of everyday life	CSC1A_K02, CSC1A_K03	Activity during classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Laboratory classes	15
Project classes	15
Preparation for classes	15
Examination or final test/colloquium	2
Preparation of project, presentation, essay, report	50
Student workload	**Hours** 127
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	Course's learning outcomes	Program content ensuring the achievement of the learning outcomes prescribed to the module
Lectures	W1, W2, W3, W4	Students will learn how to develop basic 3D graphics programs containing geometry object generation, texture mapping, illumination models, transformations, interactions and shaders programming. Tools used are: OpenGL/WebGL and Three.js libraries.
Laboratory classes	W1, W2, W3, W4, U1, U2, U3, U4, K1	
Project classes	W1, W2, W3, W4, U1, U2, U3, U4, K1	

English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii4O.300ee33abb9652455b508d9d45af9e79.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 3	Completing the classes **Activities and hours** Foreign language classes: 45	0

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Can write a clear, informative and argumentative text related to general issues, as well as the field of study. Can write letters and other types of correspondence typical of work environment. Can effectively use educational and learning materials.	CSC1A_U06	Execution of exercises, Examination, Essays written during classes

U2	Can prepare an oral presentation on academic and professional topics. Can take an active part in discussions with a suitable degree of fluency and spontaneity, also in the professional environment.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation
U3	Can understand extensive, even detailed texts and oral statements, for example, lectures and presentations, when they relate to the field of study and contemporary issues. Can interpret obtained data and information.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U4	Can clearly present conclusions and opinions related to general, academic and professional issues in a written and oral form.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes
U5	Can use grammatical structures, phraseology and vocabulary necessary to understand general interest texts, contemporary socio-economic texts, academic texts and special interest texts related to the field of study, and ones that enable interaction with a degree of fluency and spontaneity for academic and professional purposes.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	45
Student workload	**Hours** 45
Workload involving teacher	**Hours** 45

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)

French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii4O.5a3c75c8fac2b5a0783ceb3b9c7d9c98.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 3	Completing the classes **Activities and hours** Foreign language classes: 45	0

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Can clearly present conclusions and opinions related to general, academic and professional issues in a written and oral form.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes

U2	Can understand extensive, even detailed texts and oral statements, for example, lectures and presentations, when they relate to the field of study and contemporary issues. Can interpret obtained data and information.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U3	Can prepare an oral presentation on academic and professional topics. Can take an active part in discussions with a suitable degree of fluency and spontaneity, also in the professional environment.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation
U4	Can write a clear, informative and argumentative text related to general issues, as well as the field of study. Can write letters and other types of correspondence typical of work environment. Can effectively use educational and learning materials.	CSC1A_U06	Execution of exercises, Examination, Essays written during classes
U5	Can use grammatical structures, phraseology and vocabulary necessary to understand general interest texts, contemporary socio-economic texts, academic texts and special interest texts related to the field of study, and ones that enable interaction with a degree of fluency and spontaneity for academic and professional purposes.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	45
Student workload	**Hours** 45
Workload involving teacher	**Hours** 45

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)

German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii4O.9a331200fa654c821d96ad5434aa09a8.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 3	Completing the classes **Activities and hours** Foreign language classes: 45	0

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Can prepare an oral presentation on academic and professional topics. Can take an active part in discussions with a suitable degree of fluency and spontaneity, also in the professional environment.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes

U2	Can write a clear, informative and argumentative text related to general issues, as well as the field of study. Can write letters and other types of correspondence typical of work environment. Can effectively use educational and learning materials.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U3	Can clearly present conclusions and opinions related to general, academic and professional issues in a written and oral form.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation
U4	Can understand extensive, even detailed texts and oral statements, for example, lectures and presentations, when they relate to the field of study and contemporary issues. Can interpret obtained data and information.	CSC1A_U06	Execution of exercises, Examination, Essays written during classes
U5	Can use grammatical structures, phraseology and vocabulary necessary to understand general interest texts, contemporary socio-economic texts, academic texts and special interest texts related to the field of study, and ones that enable interaction with a degree of fluency and spontaneity for academic and professional purposes.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	45
Student workload	**Hours** 45
Workload involving teacher	**Hours** 45

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)

Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii4O.2792ec57b99b0f28f75f1125b9839b34.23

Lecture languages
polish

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 3	Completing the classes **Activities and hours** Foreign language classes: 45	0

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Potrafi napisać zrozumiały tekst informacyjny i argumentacyjny o tematyce ogólnej i branżowej, prowadzić korespondencję typową dla środowiska pracy oraz korzystać samodzielnie z materiałów dydaktycznych.	CSC1A_U06	Execution of exercises, Examination, Essays written during classes

U2	Potrafi przedstawiać w sposób przejrzysty swoje wnioski i opinie dotyczące tematów ogólnych, akademickich i zawodowych w formie pisemnej i ustnej.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes
U3	Rozumie dłuższe, nawet skomplikowane wypowiedzi pisemne i ustne np. wykłady i prezentacje pod warunkiem, że dotyczą kwestii branżowych i spraw bieżących oraz potrafi interpretować uzyskane wiadomości.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U4	Potrafi wykorzystywać konstrukcje gramatyczne, frazeologię i słownictwo pozwalające na zrozumienie tekstów o charakterze ogólnym, opisujących współczesne zjawiska ekonomiczno-społeczne, o charakterze akademickim i branżowym oraz pozwalające na dość płynne i spontaniczne porozumiewanie się w środowisku akademickim i zawodowym.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U5	Potrafi przygotować prezentację ustną na tematy akademickie i branżowe oraz dość płynnie i spontanicznie brać udział w dyskusjach, również w środowisku zawodowym.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	45
Student workload	**Hours** 45
Workload involving teacher	**Hours** 45

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	Język rosyjski B-2 – kurs obowiązkowy 135 godzin - semestr 2/3 (STUDY PROGRAMME IN ENGLISH)

Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii4O.3c852f86c53eb5f1f214c902c1d613d0.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 3	Completing the classes **Activities and hours** Foreign language classes: 45	0

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Can write a clear, informative and argumentative text related to general issues, as well as the field of study. Can write letters and other types of correspondence typical of work environment. Can effectively use educational and learning materials.	CSC1A_U06	Execution of exercises, Examination, Essays written during classes

U2	Can prepare an oral presentation on academic and professional topics. Can take an active part in discussions with a suitable degree of fluency and spontaneity, also in the professional environment.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation
U3	Can understand extensive, even detailed texts and oral statements, for example, lectures and presentations, when they relate to the field of study and contemporary issues. Can interpret obtained data and information.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U4	Can clearly present conclusions and opinions related to general, academic and professional issues in a written and oral form.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes
U5	Can use grammatical structures, phraseology and vocabulary necessary to understand general interest texts, contemporary socio-economic texts, academic texts and special interest texts related to the field of study, and ones that enable interaction with a degree of fluency and spontaneity for academic and professional purposes.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	45
Student workload	**Hours** 45
Workload involving teacher	**Hours** 45

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 2/3 (STUDY PROGRAMME IN ENGLISH)

Databases II

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li8O.692f9176145819252abe0933a6efa804.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 4	Completing the classes **Activities and hours** Lectures: 15 Laboratory classes: 15 Project classes: 30	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student has a deepened knowledge of database normalization and denormalization and query optimization.	CSC1A_W02, CSC1A_W03	Test, Project
W2	Student has knowledge of the problems associated with the efficient management of large amounts of data, including distributed and non-relational databases.	CSC1A_W02, CSC1A_W03	Test, Project

W3	Student has a deepened knowledge of data warehouses including common implementation schemes, OLAP operations and ETL process.	CSC1A_W02, CSC1A_W03	Test, Project
W4	Student understands the issues related to the database systems security.	CSC1A_W02, CSC1A_W03	Test, Project
W5	Student understands issues related to geo-spatial data storage and processing.	CSC1A_W02, CSC1A_W03	Test, Project
Skills – Student can:			
U1	Student is able to design a database system that meets the performance requirements.	CSC1A_U04, CSC1A_U05, CSC1A_U07	Test, Project
U2	Student is able to assess the security of a database system.	CSC1A_U04, CSC1A_U05, CSC1A_U07	Test, Project
U3	Student is able to develop suitable ETL process for different types of data.	CSC1A_U04, CSC1A_U07	Test, Project
U4	Student is able to program geo-spatial analysis.	CSC1A_U04, CSC1A_U07	Test, Project

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	15
Laboratory classes	15
Project classes	30
Preparation of project, presentation, essay, report	65
Student workload	**Hours** 125
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2, W3, W4, W5	The course recaps relational database models and their implementations, and goes beyond them towards: geo-spatial data processing, data warehouses, and non-relational models.
Project classes	W1, W2, W3, W4, U1, U2, U3, U4	
Laboratory classes	W1, W2, W3, W4, U1, U2, U3, U4	

Software studio I

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li8O.e0f77194fa95f5912cb9fe847a4726d5.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 4	Completing the classes **Activities and hours** Project classes: 45	3

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student understands software engineering processes	CSC1A_W02, CSC1A_W03, CSC1A_W07	Execution of a project
W2	Student understands the scope of software engineering and methods of basic processes of software development	CSC1A_W02, CSC1A_W06, CSC1A_W07	Execution of a project
Skills – Student can:			
U1	Student is able to define project goals, decompose them	CSC1A_U01, CSC1A_U03, CSC1A_U04, CSC1A_U05	Completion of laboratory classes

Social competences – Student is ready to:			
K1	Student cooperates within a project team	CSC1A_K01	Case study

Student workload

Activity form	Average amount of hours* needed to complete each activity form
Project classes	45
Preparation of project, presentation, essay, report	45
Student workload	**Hours** 90
Workload involving teacher	**Hours** 45

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	Course's learning outcomes	Program content ensuring the achievement of the learning outcomes prescribed to the module
Project classes	W1, W2, U1, K1	The module aims to familiarize students with software engineering processes and cooperation within a project team.

Computer Networks

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li8O.ddf71bd4a5b4ae28ab58253386e78e12.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 4	Exam **Activities and hours** Lectures: 30 Laboratory classes: 30	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Has practical knowledge of the use of network technologies and services in various information systems.	CSC1A_W02, CSC1A_W05	Test results
W2	Has extensive knowledge about technologies and solutions used in computer networks design.	CSC1A_W02	Examination

W3	Has extensive knowledge of the theoretical foundations of the functioning of computer networks, including communication protocols and technologies that enable devices to communicate.	CSC1A_W02, CSC1A_W05	Test results
Skills – Student can:			
U1	Can build and configure computer network installations.	CSC1A_U04, CSC1A_U05	Test results
U2	Can design and build new solutions within network technologies.	CSC1A_U04, CSC1A_U07	Test results
U3	Can manage the infrastructure of computer networks, including configuration of specialized devices supporting network communication.	CSC1A_U04	Test results
U4	Can use network services and implement it in IT projects.	CSC1A_U04, CSC1A_U07	Execution of laboratory classes, Test results

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Laboratory classes	30
Preparation for classes	42
Realization of independently performed tasks	42
Student workload	**Hours** 144
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2, W3	The module aims to familiarize you in intensive mode with all technologies related to computer networks - from hardware infrastructure to services.
Laboratory classes	U1, U2, U3, U4	

Software engineering

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li8O.fca68aa1669c18f1464740d731a256e4.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 4	Exam **Activities and hours** Lectures: 30 Laboratory classes: 15 Project classes: 15	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Understands the scope of software engineering and methods of basic processes of software development	CSC1A_W02, CSC1A_W03	Case study
W2	Knows and understands software engineering processes	CSC1A_W02	Completion of laboratory classes
Skills – Student can:			

U1	Decomposes project goals according to needs and knows how to create documentation	CSC1A_U01, CSC1A_U02, CSC1A_U04, CSC1A_U07	Project
Social competences – Student is ready to:			
K1	Cooperates within a project team according to the formulated tasks	CSC1A_K02, CSC1A_K03	Case study

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Laboratory classes	15
Project classes	15
Realization of independently performed tasks	30
Preparation of project, presentation, essay, report	60
Student workload	**Hours** 150
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Project classes	W1, W2, U1, K1	Knows and understands software engineering processes, cooperates within a project team
Laboratory classes	W1, W2, U1, K1	
Lectures	W1, W2, U1, K1	

AGH UST International Courses Elective Module sem 4

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li8O.3e128b1656d7f7e4847596a9954ce907.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 4	Completing the classes **Activities and hours** Control and transitional thesis: 90	7

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	According to the chosen courses from the AGH UST International Courses base.	CSC1A_W02	
W2	According to the chosen courses from the AGH UST International Courses base.	CSC1A_W03	
W3	According to the chosen courses from the AGH UST International Courses base.	CSC1A_W04	
Skills – Student can:			

U1	According to the chosen courses from the AGH UST International Courses base.	CSC1A_U04, CSC1A_U05, CSC1A_U07	

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Control and transitional thesis	90
Realization of independently performed tasks	85
Student workload	**Hours** 175
Workload involving teacher	**Hours** 90

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Control and transitional thesis	W1, W2, W3, U1	A student chooses ICT related courses from the university-wide offer of the AGH UST International Courses base for 7 ECTS in total.

Network Society & Technology

Course description sheet

Basic information

Field of study
AGH UST International Courses

Major
All

Organisational unit
AGH University Database of Electives

Study level
University database of electives

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
UBPOJOS.A200000O.a7c76f59f555e3215d634878b698ddcc.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

USOS code
430-INT-xS-117

Period	Method of verification of the learning outcomes	Number of ECTS credits
Summer semester	Exam **Activities and hours** Discussion seminars: 30	4

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student knows the theory of network society		Activity during classes, Participation in a discussion, Presentation
W2	Student is able to interrelate technological and social changes		Activity during classes, Project

Skills – Student can:			
U1	Students learn how to work in heterogenic project groups		Activity during classes, Project, Involvement in teamwork, Presentation
U2	Students could make analysis of development of network societies		Activity during classes, Project, Involvement in teamwork, Presentation
Social competences – Student is ready to:			
K1	Students are aware of being members of network societies		Activity during classes, Participation in a discussion, Project, Involvement in teamwork, Presentation

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Discussion seminars	30
Preparation for classes	32
Preparation of project, presentation, essay, report	40
Student workload	**Hours** 102
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Discussion seminars	W1, W2, U1, U2, K1	Network organization become more and more present in today's societies. Those who will have university degree most probably will work in network organization. So they have to understand them.

Optical Fibers - Technology and Applications

Course description sheet

Basic information

Field of study
AGH UST International Courses

Major
All

Organisational unit
AGH University Database of Electives

Study level
University database of electives

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
UBPOJOS.A100000O.e50956f566d74e42860bbbb0c11e1e6c.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

USOS code
160-INT-xS-123

Period	Method of verification of the learning outcomes	Number of ECTS credits
Winter semester	Exam **Activities and hours** Lectures: 30	4

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	knowledge of the properties of optical fibers		Examination
W2	knowledge of optical fibers technology		Examination
Skills – Student can:			

U1	choose the method of manufacturing of optical fibers and discuss applications of optical fiberes in lasers and amplifiers		Examination
Social competences – Student is ready to:			
K1	understand the role of photonics in modern society		Examination

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Preparation for classes	20
Realization of independently performed tasks	15
Examination or final test/colloquium	2
Contact hours	5
Preparation of project, presentation, essay, report	10
Other	20

Student workload	**Hours** 102
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2, U1, K1	1. Optic fibers - introduction and characterisation. 2. Technology of optical fibers - telecommunication and rare earth doped. 3. Applications - main directions.

Distributed Control Systems

Course description sheet

Basic information

Field of study AGH UST International Courses	**Didactic cycle** 2023/2024
Major All	**Course code** UBPOJOS.A100000O.e5389bc4a8d9e5d2898e87e52124e831.23
Organisational unit AGH University Database of Electives	**Lecture languages** english
Study level University database of electives	**Mandatoriness** Obligatory
Form of study Full-time studies	**Block** General Modules
Profile General academic	**Course related to scientific research** Yes
	Course shaping practical skills Nie
	USOS code 120-INT-xS-045

Period	**Method of verification of the learning outcomes**	**Number of ECTS credits**
Winter semester	Exam **Activities and hours** Lectures: 28 Laboratory classes: 14	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student knows terminology and understands links with other disciplines of knowledge		Activity during classes, Execution of laboratory classes

W2	The student is able to select communication protocols and drives which allow cooperation of hardware and software items of a distributed control system		Execution of laboratory classes, Completion of laboratory classes
W3	The student is able to design the architecture of a distributed control system including hardware and software components		Execution of laboratory classes
W4	The laboratory sessions include configuration of the networks, integration of the nodes, performance analyses and application of control algorithms in distributed environment. The student understands the operating principle of an example of an industrial distributed control system. He is student is familiar with basic programming techniques implemented for a given laboratory set-up.		Execution of laboratory classes, Completion of laboratory classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	28
Laboratory classes	14
Preparation for classes	28
Realization of independently performed tasks	40
Examination or final test/colloquium	5
Participation in classes / practical placement	14
Student workload	**Hours** 129
Workload involving teacher	**Hours** 42

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2, W3	
Laboratory classes	W1, W2, W3, W4	

Innovation for Engineers: Design Thinking and Business Model Generation

Course description sheet

Basic information

Field of study
AGH UST International Courses

Major
All

Organisational unit
AGH University Database of Electives

Study level
University database of electives

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
UBPOJOS.A200000O.acd3c14b2af485d387332c294de1684b.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

USOS code
430-INT-xS-081

Period	Method of verification of the learning outcomes	Number of ECTS credits
Summer semester	Exam **Activities and hours** Workshop classes: 30	4

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student knows the basics of design thinking and business model generation methodologies.		Activity during classes, Project
W2	Student understands why it is neccessary to do learn about clients expectations, needs and experiences while developing new products.		Project

Skills – Student can:			
U1	Student can apply business model generation methodology in developing new businesses.		Project
U2	Student can apply design thinking methodology in developing new products and services.		Project
Social competences – Student is ready to:			
K1	creative thinking (brainstorming, metaphors), team-work and presentation skills		Activity during classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Workshop classes	30
Preparation for classes	22
Preparation of project, presentation, essay, report	50
Student workload	**Hours** 102
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Workshop classes	W1, W2, U1, U2, K1	

Technology in Society

Course description sheet

Basic information

Field of study AGH UST International Courses **Major** All **Organisational unit** AGH University Database of Electives **Study level** University database of electives **Form of study** Full-time studies **Profile** General academic	**Didactic cycle** 2023/2024 **Course code** UBPOJOS.A100000O.8008664454b75ee55bb5458aeddce4 04.23 **Lecture languages** english **Mandatoriness** Obligatory **Block** General Modules **Course related to scientific research** Yes **Course shaping practical skills** Nie **USOS code** 430-INT-xS-155

Period	**Method of verification of the learning outcomes**	**Number of ECTS credits**
Winter semester	Exam **Activities and hours** Workshop classes: 15	3

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Understands the mutual relationship between technology and society.		Examination
W2	Understands the role of the social and cultural factors responsible for success of failure of innovation activities.		Presentation

W3	Understands the way scientific knowledge is produced and utilized in innovation-related processes.		Examination
Skills – Student can:			
U1	Can actively participate in designing organization and social enviroments that foster innovativeness and user-centered development of products and services.		Activity during classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Workshop classes	15
Preparation for classes	30
Preparation of project, presentation, essay, report	30
Student workload	**Hours** 75
Workload involving teacher	**Hours** 15

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Workshop classes	W1, W2, W3, U1	The aim of this course is for students to gain the up-to-date and comprehensive understanding of the ways in which technology impacts and is impacted by societal and cultural factors.

Fundamentals of Data Science

Course description sheet

Basic information

Field of study
AGH UST International Courses

Major
All

Organisational unit
AGH University Database of Electives

Study level
University database of electives

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
UBPOJOS.A200000O.631dd7c4949d7680f11db9c8258044c7.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

USOS code
220-INT-xS-067

Period	Method of verification of the learning outcomes	Number of ECTS credits
Summer semester	Exam **Activities and hours** Lectures: 15 Laboratory classes: 15 Project classes: 15	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	The student is familiarized with data preprocessing methods.		Participation in a discussion, Examination
W2	The student is familiarized with basic unsupervised and supervised data analysis procedures.		Participation in a discussion, Examination

Skills – Student can:			
U1	Student is able to select, configure, and use a suitable data preprocessing method for a given problem.		Participation in a discussion, Execution of a project, Execution of laboratory classes, Project, Report on completion of a practical placement, Presentation, Completion of laboratory classes
U2	Student is able to select, configure, and use a suitable data analysis algorithm for a given problem.		Participation in a discussion, Execution of a project, Execution of laboratory classes, Project, Report on completion of a practical placement, Presentation, Completion of laboratory classes
Social competences – Student is ready to:			
K1	Student is capable of working in a team on solving a data analysis problem.		Execution of a project, Project, Report on completion of a practical placement, Presentation
K2	Student is able to describe and present results of his experiments - using appropriate terminology and indicators.		Execution of a project, Project, Report on completion of a practical placement, Presentation, Completion of laboratory classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	15
Laboratory classes	15
Project classes	15
Preparation for classes	30
Contact hours	5
Preparation of project, presentation, essay, report	45
Student workload	**Hours** 125
Workload involving teacher	**Hours** 45

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	Course's learning outcomes	Program content ensuring the achievement of the learning outcomes prescribed to the module
Laboratory classes	U1, U2	This course aims at presenting fundamental problems of contemporary data science, namely: data reduction, outlier detection, cluster analysis and classification along with their real-world instances.
Project classes	U1, U2, K1, K2	
Lectures	W1, W2	

Fundamentals of Optimization

Course description sheet

Basic information

Field of study
AGH UST International Courses

Major
All

Organisational unit
AGH University Database of Electives

Study level
University database of electives

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
UBPOJOS.A200000O.777bddd8543130c93a829f73a1bd03a2.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

USOS code
110-INT-xS-069

Period	Method of verification of the learning outcomes	Number of ECTS credits
Summer semester	Exam **Activities and hours** Lectures: 14 Project classes: 28	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student has theoretical knowledge of the theory and methods of optimization which allows the analysis and modeling of data and processes		Examination
Skills – Student can:			

U1	Student knows chosen methods and software tools for deterministic and non-deterministic optimization and knows how to use them in solving optimization problems in engineering field.		Completion of laboratory classes
U2	Student knows how to formulate optimization problems and how to select a proper optimization method.		Engineering project
Social competences – Student is ready to:			
K1	Student can solve simple task in a group project		Project

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	14
Project classes	28
Preparation for classes	15
Realization of independently performed tasks	26
Examination or final test/colloquium	2
Preparation of project, presentation, essay, report	40
Student workload	**Hours** 125
Workload involving teacher	**Hours** 42

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1	Students will learn about the optimization methods (classical and bio-inspired), optimization strategies and can solve engineering non-linear and/or linear optimization problems.
Project classes	U1, U2, K1	

Basics of Design in SolidWorks 3D CAD Software

Course description sheet

Basic information

Field of study
AGH UST International Courses

Major
All

Organisational unit
AGH University Database of Electives

Study level
University database of electives

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
UBPOJOS.A100000O.ce7ffcde3328545e011bec9d6b6b3482.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Tak

USOS code
170-INT-xS-017

Period	Method of verification of the learning outcomes	Number of ECTS credits
Winter semester	Exam **Activities and hours** Laboratory classes: 30	4

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	The student has basic knowledge of various methods used in SolidWorks during the design of 3D bodies		Activity during classes
W2	The student knows what fully defined sketches are and why they are important in order to create proper 3D parts		Oral answer

Skills – Student can:			
U1	The student can use features in SolidWorks which add and remove material such as: Extruded boss/base; Revolved boss/base; Swept boss/base; Lofted boss/base; Extruded cut; Revolved cut; Swept cut; Lofted cut		Execution of laboratory classes, Test, Test results
U2	The student can create an assembly made up of single parts		Execution of laboratory classes, Test, Test results, Completion of laboratory classes
U3	The student can create 2D drawings based on files containing single parts and assemblies		Execution of laboratory classes, Test, Test results, Completion of laboratory classes
Social competences – Student is ready to:			
K1	The student understands how important a role CAD software plays in an engineer's work		Activity during classes
K2	The student can consult with other sutdents on how to solve a problem		Participation in a discussion
K3	The stuendt can work in a team		Activity during classes, Participation in a discussion, Execution of laboratory classes, Involvement in teamwork

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Laboratory classes	30
Preparation for classes	30
Realization of independently performed tasks	30
Examination or final test/colloquium	2
Contact hours	5
Preparation of project, presentation, essay, report	10
Student workload	**Hours** 107
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to

the module

Activities	Course's learning outcomes	Program content ensuring the achievement of the learning outcomes prescribed to the module
Laboratory classes	W1, W2, U1, U2, U3, K1, K2, K3	The course allows students to achieve basic skills in using the SolidWork 3D CAD software. It puts emphasis on such areas as creating 3D parts, assemblies and 2D drawings.

Introduction to Geoinformatics

Course description sheet

Basic information

Field of study
AGH UST International Courses

Major
All

Organisational unit
AGH University Database of Electives

Study level
University database of electives

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
UBPOJOS.A200000O.2ccd602bd84cf5fd5410279a98aaa3e5.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Tak

USOS code
150-INT-xS-088

Period	Method of verification of the learning outcomes	Number of ECTS credits
Summer semester	Exam **Activities and hours** Lectures: 15 Laboratory classes: 15	4

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student knows and understands principles of spatial database systems		Examination
W2	Students know and understand how to design, implement and query spatial databases		Examination

Skills – Student can:			
U1	Students can design and implement spatial database schema in Geographic Information Systems		Completion of laboratory classes
Social competences – Student is ready to:			
K1	Student is aware of the responsibility for their own work and willingness to comply with the principles of working in a team and bearing responsibility for cooperative tasks		Participation in a discussion

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	15
Laboratory classes	15
Preparation for classes	12
Realization of independently performed tasks	18
Examination or final test/colloquium	2
Contact hours	5
Preparation of project, presentation, essay, report	30
Other	3
Student workload	**Hours** 100
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2	Students will learn how to design, implement and presenting spatial data in different data formats and environments including spatial databases, exchange spatial information and using it in Internet.
Laboratory classes	U1, K1	

Python in Engineering Calculations

Course description sheet

Basic information

Field of study AGH UST International Courses **Major** All **Organisational unit** AGH University Database of Electives **Study level** University database of electives **Form of study** Full-time studies **Profile** General academic	**Didactic cycle** 2023/2024 **Course code** UBPOJOS.A100000O.d19a2814acf928b4d00bd879d5d64278.23 **Lecture languages** english **Mandatoriness** Obligatory **Block** General Modules **Course related to scientific research** Yes **Course shaping practical skills** Tak **USOS code** 150-INT-xS-135

Period	**Method of verification of the learning outcomes**	**Number of ECTS credits**
Winter semester	Exam **Activities and hours** Laboratory classes: 30	4

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Has knowledge about available libraries for the Python language.		Activity during classes, Execution of laboratory classes, Report, Completion of laboratory classes

W2	Has knowledge about popular data exchange file formats.		Activity during classes, Execution of laboratory classes, Report, Completion of laboratory classes
W3	Has knowledge about how to use scripts to outomatize tasks.		Activity during classes, Execution of laboratory classes, Report, Completion of laboratory classes
Skills – Student can:			
U1	The ability to use interactive programming environments like text console and Jupyter Notebook.		Activity during classes, Execution of laboratory classes, Report, Completion of laboratory classes
U2	The ability to create virtual environments for projects.		Activity during classes, Execution of laboratory classes, Report, Completion of laboratory classes
U3	The ability to use Python language for data processing and analysis.		Activity during classes, Execution of laboratory classes, Report, Completion of laboratory classes
Social competences – Student is ready to:			
K1	The ability to cooperate in teams conducting data processing.		Activity during classes, Execution of laboratory classes, Report, Completion of laboratory classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Laboratory classes	30
Preparation for classes	30
Realization of independently performed tasks	60
Student workload	**Hours** 120
Workload involving teacher	**Hours** 30

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	Course's learning outcomes	Program content ensuring the achievement of the learning outcomes prescribed to the module
Laboratory classes	W1, W2, W3, U1, U2, U3, K1	The curriculum content covers the process of installing the Python distribution, loading and processing data in engineering issues, and automating tasks.

Python Language

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii78O.0ca57dd01071a89e81fe5d3559bc5b5a.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Periods	**Method of verification of the learning outcomes**	**Number of ECTS credits**
Semester 4, Semester 5, Semester 6, Semester 7	Completing the classes **Activities and hours** Laboratory classes: 45	4

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student knows and understands the scope of the Python language	CSC1A_W02, CSC1A_W03	Activity during classes, Execution of laboratory classes
W2	Student knows and understands object oriented aspects of the Python language	CSC1A_W02, CSC1A_W03	Activity during classes, Execution of laboratory classes
W3	Student knows and understands procedural aspects of the Python language	CSC1A_W02, CSC1A_W03	Activity during classes, Execution of laboratory classes

Skills – Student can:			
U1	Student has ability to analyze given problem algorithmically and choose best suited programming paradigm	CSC1A_U07	Activity during classes, Execution of laboratory classes
U2	Student has ability to find the necessary information in the language documentation	CSC1A_U01, CSC1A_U03	Activity during classes, Execution of laboratory classes

Student workload

Activity form	Average amount of hours* needed to complete each activity form
Laboratory classes	45
Preparation for classes	60
Student workload	**Hours** 105
Workload involving teacher	**Hours** 45

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	Course's learning outcomes	Program content ensuring the achievement of the learning outcomes prescribed to the module
Laboratory classes	W1, W2, W3, U1, U2	The goal of the module is to learn one of the modern programming languages, Python.

French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii8O.643f4f5964a211a7f803d34132079fa3.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 4	Exam **Activities and hours** Foreign language classes: 60	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Can clearly present conclusions and opinions related to general, academic and professional issues in a written and oral form.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes

U2	Can understand extensive, even detailed texts and oral statements, for example, lectures and presentations, when they relate to the field of study and contemporary issues. Can interpret obtained data and information.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U3	Can prepare an oral presentation on academic and professional topics. Can take an active part in discussions with a suitable degree of fluency and spontaneity, also in the professional environment.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation
U4	Can write a clear, informative and argumentative text related to general issues, as well as the field of study. Can write letters and other types of correspondence typical of work environment. Can effectively use educational and learning materials.	CSC1A_U06	Execution of exercises, Examination, Essays written during classes
U5	Can use grammatical structures, phraseology and vocabulary necessary to understand general interest texts, contemporary socio-economic texts, academic texts and special interest texts related to the field of study, and ones that enable interaction with a degree of fluency and spontaneity for academic and professional purposes.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	60
Preparation for classes	18
Realization of independently performed tasks	10
Examination or final test/colloquium	2
Student workload	**Hours** 90
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	French B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)

German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii8O.143e7db5678a2d393271a64a452dac7c.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 4	Exam **Activities and hours** Foreign language classes: 60	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Can prepare an oral presentation on academic and professional topics. Can take an active part in discussions with a suitable degree of fluency and spontaneity, also in the professional environment.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results

U2	Can write a clear, informative and argumentative text related to general issues, as well as the field of study. Can write letters and other types of correspondence typical of work environment. Can effectively use educational and learning materials.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes
U3	Can clearly present conclusions and opinions related to general, academic and professional issues in a written and oral form.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation
U4	Can understand extensive, even detailed texts and oral statements, for example, lectures and presentations, when they relate to the field of study and contemporary issues. Can interpret obtained data and information.	CSC1A_U06	Execution of exercises, Examination, Essays written during classes
U5	Can use grammatical structures, phraseology and vocabulary necessary to understand general interest texts, contemporary socio-economic texts, academic texts and special interest texts related to the field of study, and ones that enable interaction with a degree of fluency and spontaneity for academic and professional purposes.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	60
Preparation for classes	18
Realization of independently performed tasks	10
Examination or final test/colloquium	2
Student workload	**Hours** 90
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	German B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)

Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii8O.ef4b74e20166ac972af4bb4a15c9afae.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 4	Exam **Activities and hours** Foreign language classes: 60	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Can write a clear, informative and argumentative text related to general issues, as well as the field of study. Can write letters and other types of correspondence typical of work environment. Can effectively use educational and learning materials.	CSC1A_U06	Execution of exercises, Examination, Essays written during classes

U2	Can prepare an oral presentation on academic and professional topics. Can take an active part in discussions with a suitable degree of fluency and spontaneity, also in the professional environment.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation
U3	Can understand extensive, even detailed texts and oral statements, for example, lectures and presentations, when they relate to the field of study and contemporary issues. Can interpret obtained data and information.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U4	Can clearly present conclusions and opinions related to general, academic and professional issues in a written and oral form.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes
U5	Can use grammatical structures, phraseology and vocabulary necessary to understand general interest texts, contemporary socio-economic texts, academic texts and special interest texts related to the field of study, and ones that enable interaction with a degree of fluency and spontaneity for academic and professional purposes.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	60
Preparation for classes	18
Realization of independently performed tasks	10
Examination or final test/colloquium	2
Student workload	**Hours** 90
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	Spanish B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)

Russian B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii8O.8f67b761b206666bcb89425b613b4241.23

Lecture languages
polish

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 4	Exam **Activities and hours** Foreign language classes: 60	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Potrafi napisać zrozumiały tekst informacyjny i argumentacyjny o tematyce ogólnej i branżowej, prowadzić korespondencję typową dla środowiska pracy oraz korzystać samodzielnie z materiałów dydaktycznych.	CSC1A_U06	Execution of exercises, Examination, Essays written during classes

U2	Potrafi przedstawiać w sposób przejrzysty swoje wnioski i opinie dotyczące tematów ogólnych, akademickich i zawodowych w formie pisemnej i ustnej.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes
U3	Rozumie dłuższe, nawet skomplikowane wypowiedzi pisemne i ustne np. wykłady i prezentacje pod warunkiem, że dotyczą kwestii branżowych i spraw bieżących oraz potrafi interpretować uzyskane wiadomości.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U4	Potrafi wykorzystywać konstrukcje gramatyczne, frazeologię i słownictwo pozwalające na zrozumienie tekstów o charakterze ogólnym, opisujących współczesne zjawiska ekonomiczno-społeczne, o charakterze akademickim i branżowym oraz pozwalające na dość płynne i spontaniczne porozumiewanie się w środowisku akademickim i zawodowym.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U5	Potrafi przygotować prezentację ustną na tematy akademickie i branżowe oraz dość płynnie i spontanicznie brać udział w dyskusjach, również w środowisku zawodowym.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	60
Preparation for classes	18
Realization of independently performed tasks	10
Examination or final test/colloquium	2
Student workload	**Hours** 90
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	Język rosyjski B-2 – kurs obowiązkowy 135 godzin - semestr 3/3 (STUDY PROGRAMME IN ENGLISH)

English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii8O.e59199a0d131cbf1fcb2df06288246bc.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 4	Exam **Activities and hours** Foreign language classes: 60	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Can write a clear, informative and argumentative text related to general issues, as well as the field of study. Can write letters and other types of correspondence typical of work environment. Can effectively use educational and learning materials.	CSC1A_U06	Execution of exercises, Examination, Essays written during classes

U2	Can prepare an oral presentation on academic and professional topics. Can take an active part in discussions with a suitable degree of fluency and spontaneity, also in the professional environment.	CSC1A_U06	Activity during classes, Participation in a discussion, Presentation
U3	Can understand extensive, even detailed texts and oral statements, for example, lectures and presentations, when they relate to the field of study and contemporary issues. Can interpret obtained data and information.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results
U4	Can clearly present conclusions and opinions related to general, academic and professional issues in a written and oral form.	CSC1A_U06	Activity during classes, Participation in a discussion, Essays written during classes
U5	Can use grammatical structures, phraseology and vocabulary necessary to understand general interest texts, contemporary socio-economic texts, academic texts and special interest texts related to the field of study, and ones that enable interaction with a degree of fluency and spontaneity for academic and professional purposes.	CSC1A_U06	Activity during classes, Participation in a discussion, Execution of exercises, Test, Examination, Test results

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Foreign language classes	60
Preparation for classes	18
Realization of independently performed tasks	10
Examination or final test/colloquium	2
Student workload	**Hours** 90
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Foreign language classes	U1, U2, U3, U4, U5	English B2 course – compulsory course of 135 hours for students of FIRST-CYCLE studies – semester 3/3 (STUDY PROGRAMME IN ENGLISH)

Formal Languages and Compilers

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li10O.fb9f7823c541196383b3b52dfc91b4c8.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 5	Exam **Activities and hours** Lectures: 30 Laboratory classes: 15 Project classes: 15	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student has basic knowledge of the theory of formal languages and automata, as well as of building compilers.	CSC1A_W01, CSC1A_W02	Test
Skills – Student can:			
U1	Student can build a lexical analyzer.	CSC1A_U07	Completion of laboratory classes

U2	Student can build a syntactic analyzer.	CSC1A_U07	Completion of laboratory classes
Social competences – Student is ready to:			
K1	Student is able to properly determine the priorities for the tasks of compiler construction and adequately plan the work.	CSC1A_K03	Involvement in teamwork

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Laboratory classes	15
Project classes	15
Preparation for classes	29
Realization of independently performed tasks	29
Examination or final test/colloquium	2
Contact hours	5

Student workload	**Hours** 125
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Project classes	W1, U1	Students will learn how to design a finite automaton and lexical analyzer, design a context-free grammar, construct an abstract syntax , implement a parser and an interpreter.
Laboratory classes	U1, U2	
Lectures	W1, K1	

Introduction to Artificial Intelligence

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li10O.8668bac069f74b284f5cce3a7a3dee12.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 5	Exam **Activities and hours** Lectures: 30 Laboratory classes: 30	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student knows fundamentals theory of AI and possibilities of its applications.	CSC1A_W04	Activity during classes, Examination
W2	Student knows numerical tools and packages widely used in AI	CSC1A_W02, CSC1A_W04	Activity during classes, Examination
Skills – Student can:			
U1	Student knows how to modell processes by using tools and algorithms of AI	CSC1A_U04	Activity during classes, Test

U2	Student can assess the usefulness of various paradigms and related programming environments to solve various types of artificial intelligence problems	CSC1A_U04	Activity during classes, Test, Examination
Social competences – Student is ready to:			
K1	Student knows how to find commercial applications for designed and implemented software and methods	CSC1A_K02	Activity during classes, Test

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Laboratory classes	30
Preparation for classes	20
Realization of independently performed tasks	30
Contact hours	2
Preparation of project, presentation, essay, report	20
Student workload	**Hours** 132
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2, U1, U2, K1	Subject gives information on the most popular methods developed and applied in the area of Artificial Intelligence and Machine Learning
Laboratory classes	W1, W2, U1, U2, K1	

Software studio II

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li10O.444eab118568829c0819cc1b5259de6f.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 5	Completing the classes **Activities and hours** Project classes: 45	3

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student understands the scope of Software Engineering and methods of basic processes of software development	CSC1A_W02, CSC1A_W03, CSC1A_W04	Execution of a project, Project, Case study
Skills – Student can:			
U1	Student is able to define project goals, decompose them	CSC1A_U01, CSC1A_U02, CSC1A_U04, CSC1A_U05	Execution of a project, Project
U2	Student is able to define project goals	CSC1A_U01, CSC1A_U02, CSC1A_U03	Execution of a project, Project, Case study

Social competences – Student is ready to:			
K1	Student is able to take part in the software development process	CSC1A_K01, CSC1A_K02, CSC1A_K03	Execution of a project, Project, Case study

Student workload

Activity form	Average amount of hours* needed to complete each activity form
Project classes	45
Preparation of project, presentation, essay, report	45
Student workload	**Hours** 90
Workload involving teacher	**Hours** 45

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	Course's learning outcomes	Program content ensuring the achievement of the learning outcomes prescribed to the module
Project classes	W1, U1, U2, K1	The module aims to familiarize students with software engineering processes and cooperation within a project team when participating in software projects.

AGH UST International Courses Elective Module sem 5

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii10O.882c8713a57ce291031a0d06f0c228d6.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 5	Completing the classes **Activities and hours** Control and transitional thesis: 150	12

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	According to the chosen courses from the AGH UST International Courses base.	CSC1A_W02	
W2	According to the chosen courses from the AGH UST International Courses base.	CSC1A_W03	
W3	According to the chosen courses from the AGH UST International Courses base.	CSC1A_W04	
Skills – Student can:			

U1	According to the chosen courses from the AGH UST International Courses base.	CSC1A_U04	
U2	According to the chosen courses from the AGH UST International Courses base.	CSC1A_U07	

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Control and transitional thesis	150
Realization of independently performed tasks	210
Student workload	**Hours** 360
Workload involving teacher	**Hours** 150

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Control and transitional thesis	W1, W2, W3, U1, U2	A student chooses ICT related courses from the university-wide offer of the AGH UST International Courses base for 12 ECTS in total.

Introduction to the Semantic Web and Knowledge Graphs

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li30O.6077f53df2e8d.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Tak

Periods	Method of verification of the learning outcomes	Number of ECTS credits
Semester 5, Semester 6	Completing the classes **Activities and hours** Lectures: 14 Laboratory classes: 14	4

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student knows and understands the concepts of the Semantic Web	CSC1A_W02	Test
W2	Student knows and understands the concepts of ontologies	CSC1A_W02	Test
Skills – Student can:			
U1	Student can use semantic technologies for modelling and querying metadata	CSC1A_U01	Test

U2	Student can model simple ontologies and perform basic ontological reasoning tasks	CSC1A_U04	Test
Social competences – Student is ready to:			
K1	Student knows and understands the applications of the semantic technologies and knowledge graphs	CSC1A_K02, CSC1A_K03	Test

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	14
Laboratory classes	14
Preparation for classes	24
Preparation of project, presentation, essay, report	24
Other	24
Student workload	**Hours** 100
Workload involving teacher	**Hours** 28

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, U1, W2, U2, K1	1. Main concepts of the Semantic Web and knowledge graphs 2. Modeling metadata 3. Querying metadata 4. Modeling knowledge with taxonomies and ontologies 5. Basics of ontology engineering 6. Ontological reasoning 7. Applications of the Semantic Web and knowledge graphs
Laboratory classes	W1, U1, W2, U2, K1	

Introduction to Process Mining

Course description sheet

Basic information

Field of study Computer Science **Major** - **Organisational unit** Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering **Study level** First-cycle (engineer) programme **Form of study** Full-time studies **Profile** General academic	**Didactic cycle** 2023/2024 **Course code** ECSCS.li10O.6077f3a31ec00.23 **Lecture languages** english **Mandatoriness** Elective **Block** General Modules **Course related to scientific research** Yes **Course shaping practical skills** Tak

Period	**Method of verification of the learning outcomes**	**Number of ECTS credits**
Semester 5	Completing the classes **Activities and hours** Lectures: 14 Laboratory classes: 14	4

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	A student has basic knowledge about process modelling notation and how to model business processes.	CSC1A_W02	Participation in a discussion, Test, Report on completion of a practical placement
W2	A student knows and understands basic process mining methods.	CSC1A_W02, CSC1A_W03	Participation in a discussion, Test, Report on completion of a practical placement

Skills – Student can:			
U1	A student is able to correctly model a business process taking into account business requirements and available data.	CSC1A_U04, CSC1A_U06, CSC1A_U07	Report on completion of a practical placement, Completion of laboratory classes
U2	A student is able to implement simple algorithms of process model discovery.	CSC1A_U04, CSC1A_U06, CSC1A_U07	Report on completion of a practical placement, Completion of laboratory classes
Social competences – Student is ready to:			
K1	A student is able to indicate business applications of the selected process mining methods.	CSC1A_K02	Participation in a discussion, Test, Report on completion of a practical placement

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	14
Laboratory classes	14
Preparation for classes	30
Preparation of project, presentation, essay, report	40
Examination or final test/colloquium	2
Student workload	**Hours** 100
Workload involving teacher	**Hours** 28

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2, K1	process mining methods (model discovery and conformance checking), methods for discovering different perspectives (social networks, decisions), process simulation and prediction based on historical data
Laboratory classes	W1, W2, U1, U2, K1	

Introduction to Programming Language Theory

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li50O.6077f40e8e59f.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Tak

Periods	Method of verification of the learning outcomes	Number of ECTS credits
Semester 5, Semester 7	Completing the classes **Activities and hours** Lectures: 14 Laboratory classes: 14	4

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student understands the role of lambda calculus in computer science.	CSC1A_W02, CSC1A_W03, CSC1A_W04	Activity during classes, Participation in a discussion, Test
W2	Student knows the difference between syntactic and semantic features of a programming language.	CSC1A_W02, CSC1A_W03, CSC1A_W04	Activity during classes, Participation in a discussion, Test
Skills – Student can:			

U1	Student is able to define recursive computations in the lambda calculus	CSC1A_U07	Execution of a project, Test, Involvement in teamwork, Completion of laboratory classes
U2	Student can define the formal semantics of a strongly typed programming language.	CSC1A_U02, CSC1A_U05	Execution of a project, Test, Involvement in teamwork, Completion of laboratory classes
Social competences – Student is ready to:			
K1	Student is ready to use formal definitions to communicate within research and development teams.	CSC1A_K02, CSC1A_K03	Activity during classes, Participation in a discussion, Execution of a project, Involvement in teamwork, Completion of laboratory classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	14
Laboratory classes	14
Examination or final test/colloquium	2
Preparation of project, presentation, essay, report	72
Preparation for classes	14

Student workload	**Hours** 116
Workload involving teacher	**Hours** 28

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, W2, U1, U2, K1	The course will cover the operational semantics approach to defining programming languages. First, the lambda calculus will be introduced as a basic example of a Turing-complete language. Next, it will be extended with types and various programming concepts. The lectures will be accompanied by corresponding programming exercises.
Laboratory classes	W1, U1, U2, K1, W2	

Constraint Programming

Course description sheet

Basic information

Field of study Computer Science **Major** - **Organisational unit** Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering **Study level** First-cycle (engineer) programme **Form of study** Full-time studies **Profile** General academic	**Didactic cycle** 2023/2024 **Course code** ECSCS.li50O.6245fa382b339.23 **Lecture languages** english **Mandatoriness** Elective **Block** General Modules **Course related to scientific research** Yes **Course shaping practical skills** Tak

Periods	**Method of verification of the learning outcomes**	**Number of ECTS credits**
Semester 5, Semester 7	Completing the classes **Activities and hours** Lectures: 14 Laboratory classes: 14	4

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student has basic knowledge about various programming paradigms (especially declarative) and knows when to apply them	CSC1A_W03	Execution of laboratory classes, Test results, Presentation, Completion of laboratory classes

W2	Student knows how to apply formal logic and algebra to model combinatorial problems	CSC1A_W04	Execution of laboratory classes, Presentation, Completion of laboratory classes
W3	Student knows how to use Constraint (Logic) Programming — how to represent and solve problems in this paradigm.	CSC1A_W03	Execution of laboratory classes, Test results, Presentation, Completion of laboratory classes
Skills – Student can:			
U1	Student can recognize applicability of different programming paradigms and tools.	CSC1A_U04	Execution of a project, Execution of laboratory classes, Test results, Completion of laboratory classes
U2	Student can write and understand Constraint Programming programs.	CSC1A_U07	Execution of a project, Execution of laboratory classes, Test results, Completion of laboratory classes
U3	Student can write and understand Logic Programming programs.	CSC1A_U07	Execution of a project, Execution of laboratory classes, Test results, Completion of laboratory classes
Social competences – Student is ready to:			
K1	Student can independently study and learn to rise their qualifications; is able to communicate and transfer their knowledge	CSC1A_K01	Execution of a project, Presentation, Completion of laboratory classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	14
Laboratory classes	14
Preparation of project, presentation, essay, report	40
Realization of independently performed tasks	52

Student workload	**Hours** 120
Workload involving teacher	**Hours** 28

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	Course's learning outcomes	Program content ensuring the achievement of the learning outcomes prescribed to the module
Lectures	W1, W2, W3, K1, U2, U1, U3	The course will cover Constraint Programming — a declarative programming paradigm aiming at precise description of the real life problems. Such a formal description is later used to automatically find satisfactory solutions.
Laboratory classes	W1, W2, W3, U2, U1, U3, K1	

Logic Programming

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li50O.624614f2f0150.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Tak

Periods	Method of verification of the learning outcomes	Number of ECTS credits
Semester 5, Semester 7	Completing the classes **Activities and hours** Lectures: 14 Laboratory classes: 14	3

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student has basic knowledge about various programming paradigms (especially declarative) and knows when to apply them	CSC1A_W04	Presentation
W2	Student knows how to apply formal logic in programming tasks	CSC1A_W04	Presentation

W3	Student knows how to use Prolog to solve various programming tasks	CSC1A_W03, CSC1A_W04	Execution of laboratory classes, Test results, Presentation, Completion of laboratory classes
Skills – Student can:			
U1	Student can recognize applicability of different programming paradigms and tools.	CSC1A_U03, CSC1A_U04	Execution of laboratory classes, Test results, Presentation, Completion of laboratory classes
U2	Student can write and understand Prolog programs.	CSC1A_U03, CSC1A_U07	Execution of laboratory classes, Test results, Completion of laboratory classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	14
Laboratory classes	14
Realization of independently performed tasks	62
Student workload	**Hours** 90
Workload involving teacher	**Hours** 28

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, U1, W2, W3, U2	The course will cover Logic Programming — a declarative programming paradigm aiming at logical and clean view of computer. Student will use Prolog as a dominant Logic Programming representative.
Laboratory classes	W1, W2, W3, U1, U2	

Graphical Programming Languages

Course description sheet

Basic information

Field of study Computer Science **Major** - **Organisational unit** Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering **Study level** First-cycle (engineer) programme **Form of study** Full-time studies **Profile** General academic	**Didactic cycle** 2023/2024 **Course code** ECSCS.li50O.6246131d0da95.23 **Lecture languages** english **Mandatoriness** Elective **Block** General Modules **Course related to scientific research** No **Course shaping practical skills** Tak

Periods	**Method of verification of the learning outcomes**	**Number of ECTS credits**
Semester 5, Semester 7	Completing the classes **Activities and hours** Lectures: 14 Laboratory classes: 14	3

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	knows simple and complex data structures, knows the methods of building algorithms operating on this data	CSC1A_W03	Test
W2	knows the basic structures of programs and design patterns	CSC1A_W03, CSC1A_W04	Test
Skills – Student can:			

U1	write the software documentation in a way that is readable by other programmers	CSC1A_U01, CSC1A_U02, CSC1A_U07	Test
U2	correctly and consciously use known design patterns to build a program in accordance with the specification	CSC1A_U01, CSC1A_U02, CSC1A_U07	Test
U3	write a program that runs according to the specification	CSC1A_U01, CSC1A_U02, CSC1A_U07	Test
Social competences – Student is ready to:			
K1	He is aware of the responsibility for his own and team work, and is ready to submit to the principles of teamwork	CSC1A_K01, CSC1A_K03	Test

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	14
Laboratory classes	14
Realization of independently performed tasks	40
Preparation for classes	20
Student workload	**Hours** 88
Workload involving teacher	**Hours** 28

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Laboratory classes	W1, W2, U1, U2, U3, K1	As part of the course, the student will learn the basics of programming with the use of a graphical programming language.
Lectures	W1, W2, U1, U2, U3, K1	

Digital Electronics and Microprocessors

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li10O.cfb642ae2d5ae1ae377ed0a319e6f6e5.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 5	Completing the classes **Activities and hours** Lectures: 30 Auditorium classes: 15 Laboratory classes: 30	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student knows the basics of combinational digital electronics and basic logic gates. The student knows how to build systems for practical applications (adders, subtractors, etc ...) from basic combinational gates.	CSC1A_W05	Activity during classes, Execution of laboratory classes, Test, Report, Oral answer

W2	Student knows the basics of sequential digital electronics. The student knows how to build systems for practical applications (counters, registers, etc ...) from basic combinational and sequential logic gates.	CSC1A_W05	Activity during classes, Execution of laboratory classes, Test, Report, Oral answer
Skills – Student can:			
U1	The student is able to design and build basic digital electronics circuits, such as combining gates, counters, adders, etc ...	CSC1A_U02, CSC1A_U07	Activity during classes, Execution of laboratory classes, Test, Report
U2	The student can cooperate in a team performing a laboratory exercise and preparing report of the completed work	CSC1A_U01, CSC1A_U02	Execution of laboratory classes, Report

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	30
Auditorium classes	15
Laboratory classes	30
Preparation for classes	25
Realization of independently performed tasks	25
Preparation of project, presentation, essay, report	24
Student workload	**Hours** 149
Workload involving teacher	**Hours** 75

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Laboratory classes	W1, W2, U1, U2	The above classes should enable the student to understand the operation of basic digital electronic circuits and microprocessors.
Lectures	W1, W2	
Auditorium classes	W1, W2, U1	

Cybersecurity

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li20O.e743fe8ce7708ddbc0f9bded2d81e2b0.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 6	Exam **Activities and hours** Lectures: 15 Laboratory classes: 15 Project classes: 15	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student is familiar with security-oriented software assessment	CSC1A_W02	Activity during classes, Project
W2	Student knows how to apply cryptography to secure data storage and transmission.	CSC1A_W02, CSC1A_W03	Activity during classes, Project
W3	Student is familiar with current trends and methods in systems' security	CSC1A_U03, CSC1A_U04, CSC1A_K02	Activity during classes, Project

Skills – Student can:			
U1	Student is able to perform basic security assessment	CSC1A_U04, CSC1A_U05, CSC1A_U07	Activity during classes, Project
U2	Student knows how to utilize existing tools and solutions to provide systems' and applications' protection	CSC1A_U04, CSC1A_U07	Activity during classes, Project
Social competences – Student is ready to:			
K1	Student is able to anticipate possible, non-obvious attack vectors against systems and applications.	CSC1A_K02, CSC1A_K03	Activity during classes, Participation in a discussion, Project, Presentation

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	15
Laboratory classes	15
Project classes	15
Preparation for classes	30
Examination or final test/colloquium	1
Contact hours	5
Preparation of project, presentation, essay, report	50
Student workload	**Hours** 131
Workload involving teacher	**Hours** 45

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Project classes	W1, W2, W3, U1, U2, K1	The course will cover various aspects of systems’ security. Students who complete the course will be aware of various threats and protection/prevention techniques and basics of risk management.
Lectures	W1, W2, W3	
Laboratory classes	U1, U2, K1	

Web application technologies

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li20O.48d365d31d17f6a0ba19f2e562e7e8da.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 6	Completing the classes **Activities and hours** Lectures: 15 Laboratory classes: 15 Project classes: 15	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Knows and understands modern technologies, patterns and programming languages used in web applications.	CSC1A_W02	Activity during classes, Project, Examination
Skills – Student can:			
U1	Can create web applications using modern languages and frameworks.	CSC1A_U01	Project

U2	Can create, configure and use services available through different providers.	CSC1A_U03	Execution of laboratory classes, Project
Social competences – Student is ready to:			
K1	Can think and act in a creative manner, can cooperate with teammates during project work	CSC1A_K03	Execution of laboratory classes, Project

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	15
Laboratory classes	15
Project classes	15
Preparation for classes	20
Examination or final test/colloquium	2
Preparation of project, presentation, essay, report	60
Student workload	**Hours** 127
Workload involving teacher	**Hours** 45

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Project classes	W1, U1, U2, K1	The course focuses on practical aspects of creating web apps. Students will learn modern technologies on laboratories and later will practice it in their projects deployed on the cloud.
Laboratory classes	W1, U1, U2, K1	
Lectures	W1, U1, U2	

Embedded systems

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li20O.228078523cb7f097ecc55879565d142c.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
Yes

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 6	Completing the classes **Activities and hours** Lectures: 20 Laboratory classes: 25 Project classes: 15	5

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student knows fundamental standards used in embedded systems	CSC1A_W05	Execution of laboratory classes
W2	Student knows architecture of typical microcontroller with peripherical devices	CSC1A_W05	Activity during classes, Test
W3	Student knows tools required for safe and efficient work with microcotrollers with embedded system.	CSC1A_W05	Activity during classes, Test

Skills – Student can:			
U1	Student knows how to use tools to compile a source code and upload ist compiled version on the device	CSC1A_U07	Activity during classes, Test
U2	Student knows how to implement the source code for specific type of microcontroller using peripherical devices and at least one communication standard	CSC1A_U07	Activity during classes, Test
Social competences – Student is ready to:			
K1	Student knows how to work in a team to realize a common part of the project and how to put it into practice.	CSC1A_K02	Activity during classes

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	20
Laboratory classes	25
Project classes	15
Preparation for classes	25
Realization of independently performed tasks	40
Examination or final test/colloquium	2
Contact hours	2
Student workload	**Hours** 129
Workload involving teacher	**Hours** 60

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Laboratory classes	U1, U2, K1	Subject gives information on design of devices based on the most popular microcontrollers on the market. The part of the lectures and classes is focused on software implementation aspects.
Lectures	W1, W2, W3	
Project classes	U1, U2, K1	

Professional practice

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li20O.557aa2c67bc9c194cb3ea1eac55ffe27.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Tak

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 6	Completing the classes **Activities and hours** Practical placement: 0	4

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Skills – Student can:			
U1	Student can estimate the time needed for the implementation of the assigned task and develop and implement a schedule to meet deadlines, properly documenting the work	CSC1A_U01, CSC1A_U02, CSC1A_U04, CSC1A_U05	Work done within the framework of a practical placement, Confirmation of completion of practical placement programme
U2	Student has the ability to self-education and to improve professional skills	CSC1A_U03	Work done within the framework of a practical placement, Confirmation of completion of practical placement programme

U3	Student is able to assess the suitability of software environments and IT tools in terms of their usefulness for the purpose of solving various types of problems that arise during the course of the internship	CSC1A_U04, CSC1A_U05, CSC1A_U07	Work done within the framework of a practical placement, Confirmation of completion of practical placement programme
U4	Student is able to solve various types of IT problems that he may encounter during the professional practice	CSC1A_U04, CSC1A_U05, CSC1A_U07	Work done within the framework of a practical placement, Confirmation of completion of practical placement programme
Social competences – Student is ready to:			
K1	The student is aware of the importance of professional behavior, raising professional competence, adherence to the principles of professional ethics and respect for diversity	CSC1A_K01, CSC1A_K02	Work done within the framework of a practical placement
K2	Student is able to work in a programming team and comply with the instructions given by the team management	CSC1A_K01	Work done within the framework of a practical placement

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Other	120
Student workload	**Hours** 120

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Practical placement	U1, U2, U3, U4, K1, K2	Student will have the opportunity to use the knowledge gained during the studies in professional practice.

AGH UST International Courses Elective Module sem 6

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii20O.2d028e347ea3c824fc2410a5a1749d82.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 6	Completing the classes **Activities and hours** Control and transitional thesis: 120	11

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	According to the chosen courses from the AGH UST International Courses base.	CSC1A_W02	
W2	According to the chosen courses from the AGH UST International Courses base.	CSC1A_W03	
W3	According to the chosen courses from the AGH UST International Courses base.	CSC1A_W04	
Skills – Student can:			

U1	According to the chosen courses from the AGH UST International Courses base.	CSC1A_U04	
U2	According to the chosen courses from the AGH UST International Courses base.	CSC1A_U07	

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Control and transitional thesis	120
Realization of independently performed tasks	200
Student workload	**Hours** 320
Workload involving teacher	**Hours** 120

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Control and transitional thesis	W1, W2, W3, U1, U2	A student chooses ICT related courses from the university-wide offer of the AGH UST International Courses base for 16 ECTS in total.

Human-Computer Interaction

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li20O.6077f3db7a765.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 6	Completing the classes **Activities and hours** Lectures: 14 Seminars: 14	4

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	Student understands the scope and methods of Human-Computer Interaction.	CSC1A_W02, CSC1A_W06	Participation in a discussion, Execution of a project, Examination, Essay, Case study, Presentation, Oral answer
Skills – Student can:			

U1	Student can design and implement Human-Computer Interaction systems.	CSC1A_U01, CSC1A_U02, CSC1A_U05	Execution of a project, Examination, Case study, Oral answer
Social competences – Student is ready to:			
K1	Student is aware of the consequences of popularization of Human-Computer Interaction systems.	CSC1A_K01, CSC1A_K02, CSC1A_K03	Participation in a discussion, Examination, Essay, Presentation, Oral answer

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Lectures	14
Seminars	14
Preparation for classes	60
Examination or final test/colloquium	5
Preparation of project, presentation, essay, report	15
Contact hours	5
Realization of independently performed tasks	5
Student workload	**Hours** 118
Workload involving teacher	**Hours** 28

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Lectures	W1, U1, K1	The module aims to familiarize students with Human-Computer Interaction and discussion within seminar group when designing systems.
Seminars	W1, U1, K1	

Final Project

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li40O.b2d85c6445cb4ca1ad39313aa3034376.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 7	Completing the classes **Activities and hours** Diploma Thesis: 0	15

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	has the knowledge of Computer Science necessary to carry out the tasks defined in the subject of the diploma thesis	CSC1A_W01, CSC1A_W02, CSC1A_W03, CSC1A_W04, CSC1A_W05, CSC1A_W06, CSC1A_W07	Diploma thesis preparation

W2	has the structured knowledge of phenomena, processes, and objects related to the implementation of the topic of the thesis	CSC1A_W01, CSC1A_W02, CSC1A_W03, CSC1A_W04, CSC1A_W05, CSC1A_W06, CSC1A_W07	Diploma thesis preparation
Skills – Student can:			
U1	is able to independently solve the project task formulated in the subject of the diploma thesis	CSC1A_U01, CSC1A_U02, CSC1A_U03, CSC1A_U04, CSC1A_U05, CSC1A_U06, CSC1A_U07	Diploma thesis preparation
U2	is able to prepare the implementation description of the task formulated in the subject of the diploma thesis	CSC1A_U01, CSC1A_U02, CSC1A_U03, CSC1A_U04, CSC1A_U05, CSC1A_U06, CSC1A_U07	Diploma thesis preparation
U3	can estimate the time needed for the implementation of the task assigned, as well as develop and implement a schedule of tasks to ensure that deadlines are met	CSC1A_U01, CSC1A_U02, CSC1A_U03, CSC1A_U04, CSC1A_U05, CSC1A_U06, CSC1A_U07	Diploma thesis preparation
U4	has the ability to self-education and to improve professional skills	CSC1A_U01, CSC1A_U02, CSC1A_U03, CSC1A_U04, CSC1A_U05, CSC1A_U06, CSC1A_U07	Diploma thesis preparation
Social competences – Student is ready to:			
K1	is aware of the importance of his or her task for the university or company in cooperation with which the task is carried out	CSC1A_K01, CSC1A_K02, CSC1A_K03	Diploma thesis preparation

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Other	450
Student workload	**Hours** 450

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Diploma Thesis	W1, W2, U1, U2, U3, U4, K1	Diploma thesis is an independent development of a solution for a specific scientific problem related to the field of study, an engineering task with a clearly defined goal with a strong practical aspect.

Diploma Seminar

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.li40O.113e607328fe3b1feac36d5c37a13bcd.23

Lecture languages
english

Mandatoriness
Obligatory

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 7	Completing the classes **Activities and hours** Seminars: 15	1

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	knows the requirements regarding the preparation of an engineering diploma thesis (or engineering project) as well as the presentation of the diploma thesis results	CSC1A_W06	Diploma thesis preparation, Presentation
W2	knows the principles of citing source works	CSC1A_W06, CSC1A_U01	Diploma thesis preparation, Presentation
Skills – Student can:			

U1	can prepare a presentation of the results of the diploma thesis	CSC1A_U02	Diploma thesis preparation, Presentation
Social competences – Student is ready to:			
K1	is able to work in a group to assess the quality of the presentations regarding the engineering projects	CSC1A_U01, CSC1A_K01	Participation in a discussion, Presentation

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Seminars	15
Preparation of project, presentation, essay, report	15
Student workload	**Hours** 30
Workload involving teacher	**Hours** 15

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Seminars	W1, W2, U1, K1	The aim of the seminar is to prepare students for the diploma exam.

AGH UST International Courses Elective Module sem 7

Course description sheet

Basic information

Field of study
Computer Science

Major
-

Organisational unit
Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering

Study level
First-cycle (engineer) programme

Form of study
Full-time studies

Profile
General academic

Didactic cycle
2023/2024

Course code
ECSCS.Ii40O.0e37c8e8db3d7d44ada69f5bba6ba5b4.23

Lecture languages
english

Mandatoriness
Elective

Block
General Modules

Course related to scientific research
No

Course shaping practical skills
Nie

Period	Method of verification of the learning outcomes	Number of ECTS credits
Semester 7	Completing the classes **Activities and hours** Control and transitional thesis: 175	14

Course's learning outcomes

Code	Outcomes in terms of	Learning outcomes prescribed to a field of study	Methods of verification
Knowledge – Student knows and understands:			
W1	According to the chosen courses from the AGH UST International Courses base.	CSC1A_W02	
W2	According to the chosen courses from the AGH UST International Courses base.	CSC1A_W03	
W3	According to the chosen courses from the AGH UST International Courses base.	CSC1A_W04	
Skills – Student can:			

U1	According to the chosen courses from the AGH UST International Courses base.	CSC1A_U04	
U2	According to the chosen courses from the AGH UST International Courses base.	CSC1A_U07	

Student workload

Activity form	**Average amount of hours* needed to complete each activity form**
Control and transitional thesis	175
Realization of independently performed tasks	175
Student workload	**Hours** 350
Workload involving teacher	**Hours** 175

* hour means 45 minutes

Program content ensuring the achievement of the learning outcomes prescribed to the module

Activities	**Course's learning outcomes**	**Program content ensuring the achievement of the learning outcomes prescribed to the module**
Control and transitional thesis	W1, W2, W3, U1, U2	A student chooses ICT related courses from the university-wide offer of the AGH UST International Courses base for 14 ECTS in total.

Detailed rules of the implementation of the curriculum estabilished by the Dean of the Faculty (the so-called Study Rules)

Field of study: Computer Science

Enrollment rules for the next semester

The entry rules for the next semester are defined in the AGH University regulations, taking into account the condition of the acceptable deficit of the ECTS points and conditions of the control semesters. The condition for entry into the seventh semester is the selection of the subject of engineering work.

Enrollment rules for the next semester as a part of the so-called ECTS credits debt ceiling

The semester VII is the reference semester, which is impossible to enter with any ECTS deficit. In addition, at the EAIiIB faculty, the semester V is also the reference semester, for which it is not possible to enter with a deficit of ECTS points from the 1st-year courses (from semesters I and II).

ECTS credits debt ceiling

15

Organization of classes within the so-called blocks of classes (i.e. such organization of subjects or individual forms of classes that creates exceptions to the cyclical nature of classes in particular weeks of a given semester of studies)

With the consent of a dean, it is possible to implement selected modules of classes in the so-called blocks of classes.

Monitoring semesters

5,7

Study rules in case of the individual organization of studies approved for a specific student

Student can get permission to study according to an individual study program, including a study plan. In the application, the student should present his qualifications to undertake such studies, interests, and motivations. The student may also indicate a scientific and didactic supervisor who will exercise substantive supervision over the student's individual program and plan. A requirement for undertaking studies according to an individual study program, including a study plan in the scope of §9 para. 2.1-2.3 of the Regulations of the AGH University, is to pass the first year without an ECTS points deficit and to obtain an average grade from the previous course of studies not lower than 4.7 (in the case of students who start studies qualify for the program promoting the best candidates for AGH). In the case of an individual study program only within the scope of §9 para. 2.4 and 2.5 of the Regulations of the AGH University (change of the schedule of classes and credits), not changing the semester curriculum, the research and teaching supervisor is not required.

Details on the rules for completing studies according to an individual study program including the study plan at the Faculty of Electrical, Automation, Computer Science and Biomedical Engineering are set out in Resolution No. 142/rw/2017 of the Council of the Faculty.

Implementation of practical placements including monitoring system and completion rules

The appointed Dean’s Plenipotentiary for student internships supervises the course of the internship process. The Plenipotentiary manages the process of concluding agreements between the Faculty and the company, as well as assesses and approves student internships.

Rules of elective modules taking

In semesters 4-7, a student should choose ICT related elective courses from the university-wide offer of the AGH UST International Courses base. Courses to choose for the student will be limited to these courses that are not implemented as part of the compulsory program and were not included in the previous semesters by the student.

Rules of education paths, graduation paths, major choice/eligibility

Due to a large number of elective subjects, the program does not envisage learning paths. However, in general, the decision on assigning a given student to the learning path is made by a Deputy Dean based on a student's declaration, the average from studies, as well as additional activities such as activities in scientific circles, research projects, etc.

Rules related to the preparation of diploma projects and theses as well as the implementation of the degree granting

The rules for the diploma procedure are specified in the Regulations of the AGH University. Additional regulations are introduced by the decision of the Dean of the Faculty No. 9/2018, which discusses in detail the rules of conducting the diploma dissertation at the faculty. Current information on the diploma exam and diploma theses can be found on the faculty website:
https://www.eaiib.agh.edu.pl/studia,egzamin-dyplomowy.html

Principles for determining the overall evaluation of graduation (the final grade)

The graduation result is a weighted average of the following grades:
1) the average grade of the whole degree programme (0.6),
2) the final grade of the diploma thesis (0.2),
3) the diploma examination grade (0.2).

The diploma examination covers:
1) a presentation of the diploma thesis;
2) a discussion over the diploma thesis;
3) verification of student's knowledge and skills within the scope of Computer Science studies.

The verbal descriptor of grades are determined depending on the numeric value:
1) from 3,00 verbal descriptor: dostateczny (3.0) [Polish equivalent of satisfactory],
2) from 3,21 verbal descriptor: plus dostateczny (3.5) [Polish equivalent of satisfactory plus],
3) from 3,71 verbal descriptor: dobry (4.0), good [Polish equivalent of good],
4) from 4,21 verbal descriptor: plus dobry (4.5) [Polish equivalent of good plus],
5) from 4,71 verbal descriptor: bardzo dobry (5.0) [Polish equivalent of very good]

Other requirements related to the implementation of the curriculum resulting from the AGH University Study Regulations or other regulations in force at the University

After graduating from these studies, it is possible to continue education at the second-cycle (graduate) level in related fields (currently AGH University offers one Computer Science specialization in English: Systems Modeling and Data Analysis).