



Program studiów

Kierunek: Computer Physics

Learning outcomes

Major: Computer Physics

Knowledge

KEU symbol	Directional learning outcomes	CEU symbol
CMP1A_W01	student knows and understands mathematical methods used in science and engineering, particularly in: scientific computing and data handling	P6S_WG_A
CMP1A_W02	student knows and understands basic concepts of general, applied and modern physics and technology	P6S_WG_A, P6S_WG_A_Inz
CMP1A_W03	student knows and understands algorithms, numerical methods, programming techniques and IT tools used for computer physics	P6S_WG_A
CMP1A_W04	student knows and understands the role of science and engineering for socio-economic environment and knowledge-based society, taking into account ethical and legal paradigms	P6S_WK_A_Inz, P6S_WK_A

Skills

KEU symbol	Directional learning outcomes	CEU symbol
CMP1A_U01	student can handle complex problems of science and technology using appropriate tools of scientific computing	P6S_UW_A, P6S_UW_A_Inz_0 1
CMP1A_U02	student can undertake new approaches for non-typical or novel scientific and technological problems	P6S_UW_A
CMP1A_U03	student can perform analytical breakdown of technical or physical problem to propose cost and time-efficient solutions	P6S_UW_A, P6S_UW_A_Inz_0 2
CMP1A_U04	student can share knowledge with scientific community using clear and concise communications methods using native or foreign languages on B2 level	P6S_UK_A
CMP1A_U05	student can lead a scientific, interdisciplinary project alone or in collaboration, with the awareness of the role of self-directed and lifelong learning for success	P6S_UO_A, P6S_UU_A

Social competence

KEU symbol	Directional learning outcomes	CEU symbol
CMP1A_K01	student is ready for reviewing their own competences and external content, gathered from various sources, in context of the state-of-the-art in science and technology	P6S_KK_A
CMP1A_K02	student is ready to transfer and share their professional expertise to the industry and society for the sake of science commercialization and public interest	P6S_KO_A
CMP1A_K03	student is ready to take responsibility for his professional activity and to obey legal and ethical rules pertinent to professional environment	P6S_KR_A

Study plans

Major name: Computer Physics

Semester 1

Subject	Number of hours	ECTS points	Form of verification
Introduction to scientific English	Project classes: 15 Foreign language classes: 30	3,0	Assessment 0
Introduction to physics	Workshop classes: 45	4,0	Assessment 0
Mathematical Analysis 1	Lecture: 45 Auditorium classes: 60	7,0	Exam 0
Higher algebra	Lecture: 30 Auditorium classes: 30	5,0	Exam 0
Introduction to Unix systems	Lecture: 15 Laboratory classes: 30	3,0	Assessment 0
Programming languages 1	Lecture: 30 Laboratory classes: 30	5,0	Assessment 0
Physical Education 1	Physical Education: 30	0,0	Assessment 0
Sum	390	27,0	

Semester 2

Subject	Number of hours	ECTS points	Form of verification
Mechanics	Lecture: 60 Auditorium classes: 60	9,0	Exam 0
Mathematical Analysis 2	Lecture: 45 Auditorium classes: 60	8,0	Exam 0
Linear algebra	Lecture: 15 Auditorium classes: 15	2,0	Assessment 0
Differential calculus	Lecture: 15 Auditorium classes: 15	3,0	Exam 0

Subject	Number of hours	ECTS points	Form of verification	
Programming languages 2	Lecture: 30 Laboratory classes: 45	6,0	Assessment	O
Algorithms and data structures	Lecture: 30 Auditorium classes: 30	5,0	Exam	O
Physical Education 2	Physical Education: 15	0,0	Assessment	O
Foreign languages CMP1.2		0,0	Assessment	O
The student chooses one course from the group				
English B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 1/3	Foreign language classes: 30	0,0	Assessment	W
Russian B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 1/3	Foreign language classes: 30	0,0	Assessment	W
Spanish B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 1/3	Foreign language classes: 30	0,0	Assessment	W
French B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 1/3	Foreign language classes: 30	0,0	Assessment	W
German B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 1/3	Foreign language classes: 30	0,0	Assessment	W
Sum	465	33,0		

Semester 3

Subject	Number of hours	ECTS points	Form of verification	
Electromagnetism and optics	Lecture: 45 Auditorium classes: 60	8,0	Exam	O
Object oriented programming 1	Lecture: 30 Laboratory classes: 30	6,0	Assessment	O
Discrete mathematics	Lecture: 15 Auditorium classes: 15	3,0	Exam	O
Introduction to statistical physics	Lecture: 15 Auditorium classes: 30	3,0	Assessment	O

Subject	Number of hours	ECTS points	Form of verification	
Statistics	Lecture: 30 Auditorium classes: 15 Laboratory classes: 15	5,0	Assessment	O
Physical Education 3	Physical Education: 15	0,0	Assessment	O
Foreign languages CMP1.3		0,0	Assessment	O
The student chooses one course from the group				
English B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 2/3	Foreign language classes: 45	0,0	Assessment	W
Russian B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 2/3	Foreign language classes: 45	0,0	Assessment	W
Spanish B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 2/3	Foreign language classes: 45	0,0	Assessment	W
French B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 2/3	Foreign language classes: 45	0,0	Assessment	W
German B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 2/3	Foreign language classes: 45	0,0	Assessment	W
Humanities Electives (Faculty of Humanities)		2,0	Exam	O
The student chooses courses from AGH-UST Database of Electives for at least 2 ECTS				
Humanities Electives (Faculty of Humanities)	Total number of contact hours: 30	2,0	Exam	W
Sum	390	27,0		

Semester 4

Subject	Number of hours	ECTS points	Form of verification	
Introduction to quantum physics	Lecture: 15 Auditorium classes: 30	4,0	Exam	O
Physics lab	Laboratory classes: 45	4,0	Assessment	O
Numerical methods in physics	Lecture: 15 Laboratory classes: 30	4,0	Assessment	O

Subject	Number of hours	ECTS points	Form of verification	
Humanities Electives (Faculty of Management)		3,0	Exam	O
The student chooses courses from AGH-UST Database of Electives for at least 3 ECTS				
Humanities Electives (Faculty of Management)	Total number of contact hours: 30	3,0	Exam	W
Foreign languages CMP1.4		5,0	Exam	O
The student chooses one course from the group				
English B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 3/3	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	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	Foreign language classes: 60	5,0	Exam	W
French B2 course - compulsory course of 135 hours for students of FIRST-CYCLE studies - semester 3/3	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	Foreign language classes: 60	5,0	Exam	W
Elective Modules CMP1.4		13,0	Assessment	O
The student chooses courses from the offer in the curriculum or AGH-UST Database of Electives for at least 13 ECTS				
Fundamentals of analog circuits	Workshop classes: 45	4,0	Assessment	W
Introduction to video editing and computer animation	Workshop classes: 30	2,0	Assessment	W
AGH UST International Courses Elective Module 1	Total number of contact hours: 110	11,0	Assessment	W
Sum	420	33,0		

Semester 5

Subject	Number of hours	ECTS points	Form of verification	
Introduction to Artificial Intelligence	Lecture: 30 Laboratory classes: 30	5,0	Exam	O

Subject	Number of hours	ECTS points	Form of verification	
Introduction to theoretical physics	Lecture: 20 Auditorium classes: 10 Laboratory classes: 10	4,0	Exam	O
Computer physics 1	Lecture: 15 Laboratory classes: 30	4,0	Assessment	O
Elective Modules CMP1.5		17,0	Assessment	O
The student chooses courses from the offer in the curriculum or AGH-UST Database of Electives for at least 17 ECTS				
Fundamentals of microelectronics and digital circuits	Workshop classes: 45	4,0	Assessment	W
Scripting Languages	Lecture: 10 Laboratory classes: 20 Project classes: 10	4,0	Assessment	W
Fundamentals of Data Science	Lecture: 15 Laboratory classes: 15 Project classes: 15	5,0	Assessment	W
Python in the Enterprise	Lecture: 15 Laboratory classes: 20 Project classes: 10	5,0	Assessment	W
Agile methodologies and tools	Lecture: 10 Laboratory classes: 15 Project classes: 15	3,0	Assessment	W
AGH UST International Courses Elective Module 2	Total number of contact hours: 60	6,0	Assessment	W
Sum	400	30,0		

Semester 6

Subject	Number of hours	ECTS points	Form of verification	
Introduction to solid state physics	Workshop classes: 40	3,0	Exam	O
Modern scientific computing	Lecture: 15 Project classes: 30	4,0	Assessment	O

Subject	Number of hours	ECTS points	Form of verification	
Computer physics 2	Lecture: 15 Laboratory classes: 30	4,0	Exam	O
Professional practice	Practical placement: 0	6,0	Assessment	O
Elective Modules CMP1.6		13,0	Assessment	O
The student chooses courses from the offer in the curriculum or AGH-UST Database of Electives for at least 13 ECTS				
Digital systems and microprocessors	Workshop classes: 45	4,0	Assessment	W
Deep learning with massively parallel acceleration	Lecture: 20 Laboratory classes: 20 Project classes: 5	4,0	Assessment	W
Introduction to video editing and computer animation	Workshop classes: 30	2,0	Assessment	W
Introduction to Virtual Reality	Workshop classes: 30	2,0	Assessment	W
AGH UST International Courses Elective Module 3	Total number of contact hours: 60	6,0	Assessment	W
Sum	325	30,0		

Semester 7

Subject	Number of hours	ECTS points	Form of verification	
Final Project	Diploma project: 0	15,0	Assessment	O
Introduction to environmental physics	Lecture: 20 Auditorium classes: 10 Laboratory classes: 10	3,0	Assessment	O
Introduction to nuclear physics	Lecture: 15 Auditorium classes: 15 Laboratory classes: 15	4,0	Exam	O
Monte Carlo methods in physics	Lecture: 15 Laboratory classes: 30	4,0	Assessment	O
Computer simulations in physics	Lecture: 15 Laboratory classes: 30	4,0	Assessment	O
Sum	175	30,0		

O - Obligatory
W - Elective