Wrocław University of Science and Technology

Study programme

Organizational unit:	Faculty of Information and Communication Technology
Field of study:	Applied Computer Science
Level of study:	second degree 3 semesters
Form of study:	full-time studies
Education cycle:	2025/2026

Table of contents

Field of study characteristics

Basic information

Organizational unit:	Faculty of Information and Communication Technology
Field of study:	Applied Computer Science
Study level:	second degree 3 semesters
Study form:	full-time studies
Education profile:	general academic profile
Language of study:	English
Valid from the education cycle:	2025/2026
Number of semesters:	3
Total number of hours of classes:	directional: 300 Computer Engineering: 795
Total number of ECTS points required to complete a given level of study:	90
Professional title awarded to graduates:	magister inżynier

Fields of science and scientific disciplines

Scientific disciplines to which the field of study is assigned:

Field engineering and technical sciences

Assigning the major to the fields and disciplines to which the learning outcomes relate:

Discipline	Percentage
Technical computing and telecommunications	100%

Main discipline: Technical computing and telecommunications

Description of the field, profile of the graduate and possibilities of continuing studies

The second cycle of the Applied Computer Science degree lasts three semesters and is divided into four specialisations:

- Software Engineering (IO),
- Design of Information Systems (PSI),
- Applications of Specialised Information Technologies (ZSTI),
- Computer Engineering (CE) - specialisation conducted in English.

Graduates of the second cycle in Applied Computer Science find employment mainly in IT companies dealing with the production and implementation of software. A very good command of English and the ability to interact easily with people from different cultural backgrounds predestine them to work in international companies such as Capgemini, Nokia Volvo IT Polska, Asseco Poland or Comarch. They also work in IT outsourcing companies such as PGS, ClearCode or Fingo, or in Polish market leaders such as Insert. A separate group of companies employing applied IT graduates are large companies with their own IT departments, such as banks.

Graduates are employed in positions such as software architect or engineer, project manager, staff and quality manager, database designer, data analyst, security designer and others.

Many computing students combine their studies with work. This allows them to put the knowledge and skills they have acquired at university into practice and to achieve and test their learning outcomes more quickly.

Students interested in the theoretical aspects of computer science can pursue their passion in research clubs, research teams and, after completing their second degree, continue their studies at the Doctoral School.

Currentness of the study programme

Concept and goals of education

The educational concept of the Second Degree in Applied Computer Science focuses on two fundamental aspects and is expressed in the following objectives

1. Preparing students for professional work: providing specialised knowledge and learning practical skills at an in-depth level in the four specialisations offered.
2. Preparing students for research and academic work.
3. To develop soft skills such as teamwork, problem solving, creativity, the ability to present oneself and the results of one's work, etc.
4. To shape the need for self-education in the sense of lifelong learning (up-skilling).
5. Developing a flexible approach and the ability to adapt to changes in the professional environment that require retraining (reskilling).
6. The use of modern teaching models, methods and techniques in the teaching process, flexibility and adaptability in their application to specific situations.
7. Increase the proportion of teaching carried out in cooperation with representatives of the business world.
8. Increase student participation in projects and research carried out at the Faculty.

Information regarding the inclusion of socio-economic needs in the study programme and the compliance of the major learning outcomes with these needs

The study program takes into account the socio-economic needs expressed in the studies of the current situation on the labor market in the IT industry and the prospects for its development:

- Salary and Trends in the IT Industry Report, 2024 edition; https://pl.grafton.com/pl/raport-wynagrodzen-i-trendow-w-it-2024,
- IT market in Poland: challenges and prospects for development until 2030; https://www.raportbranzyit.pl/,
- IT Community Survey Report 2024; https://bulldogjob.pl/it-report,
- IT industry - trends and challenges in 2024 (13.12.2023); https://cmt-advisory.pl/publikacje/branza-it-trendy-oraz-wyzwania/,
- Future trends in the IT industry (04.10.2023); https://cmt-advisory.pl/publikacje/branza-it-trendy-oraz-wyzwania/,
- IT industry in Poland in 2024 - trends and predictions; https://obserwatorgospodarczy.pl/2024/04/23/branza-it-w-polsce-w-roku-2024-trendy-i-przewidywania/,
- State of the IT industry. Ew0rk Group survey results; https://www.isbtech.pl/2024/03/stan-branzy-it-wyniki-badania-ework-group/,
- What will be most important in the IT industry in the future. There is the latest research; https://www.rp.pl/biznes/art38398331-co-w-przyszlosci-bedzie-najwazniejsze-w-branzy-it-sa-najnowsze-badania.

In addition, the program is consulted with members of the Social Council of the Department of Computer Science and Telecommunications. The assumed learning outcomes correspond to current and prospective socio-economic needs resulting from the analysis of research results and the needs reported by employers in the Lower Silesia region.

Other important factors determining the validity of the study programme

The validity of the study program is guaranteed by:

- Accreditation by the Polish Accreditation Commission,
- Systematic updating of the taught content taking into account the latest scientific research results in the discipline of technical informatics and telecommunications,
- Adaptation of the subject matter of practical classes to current technological developments, - Providing students with access to modern laboratories, equipment and the latest software.
- Emphasis on students' acquisition of soft skills, such as the ability to work in a group, present their own results or debate and participate in discussions, which is in line with employers' expectations,
- Education and improvement of teaching staff.

The connection of the programme with the University's mission and its development strategy

The direction is in line with the mission and strategy of Wroclaw University of Technology for 2023-30. In particular, it fits into the priority research area: 1. "Information Technology, Data Science and Artificial Intelligence," which includes, but is not limited to: computer science, algorithmics and software engineering, artificial intelligence and machine learning, human-computer interaction, data analysis and visualization methods, classification and prediction, natural language processing, data storage and transmission engineering, information processing and privacy, cyber security and cryptography, computer and mobile networks, Internet of Things, virtualization, augmented and virtual reality, multimedia techniques, and medical informatics. [Strategy of Wroclaw University of Technology 2023-2030, p. 17, Priority Research Areas, https://pwr.edu.pl/fcp/LGBUKOQtTKlQhbx08SlkTUhZeUTgtCgg9ACFDC0RGS3xSFVZpCFghUHcKVigEQUw/1/public/2023/docs/strategia__pwr_2023_22-06-23.pdf].

Learning outcomes

Code	Description of the directional learning outcome	Characteristics for qualifications at level 6 or 7 of the Polish Qualifications Framework	Characteristics for qualifications at level 6 or 7 of the Polish Qualifications Framework, enabling the acquisition of engineering competences
Knowledge			
K2_IST_W01	Has a broad and deep knowledge of mathematics and physics, useful for formulating and solving complex problems in applied computer science.	P7U_W, P7S_WG	
K2_IST_W02	Knows and understands the processes involved in the lifecycle of information objects and systems.	P7U_W, P7S_WG	P7S_WG_INŻ
K2_IST_W03	Is familiar with the most important trends in the development of the discipline of information and communication technology.	P7U_W, P7S_WG	
K2_IST_W04	Is familiar with research methods and tools.	P7U_W, P7S_WG	
K2_IST_W05	Is familiar with various methods and techniques of data representation and analysis.	P7U_W, P7S_WG	
K2_IST_W06	Has in-depth knowledge of the design and management of complex information systems projects.	P7U_W, P7S_WG	P7S_WG_INŻ
K2_IST_W07	Is familiar with the representation of models used in computer science.	P7U_W, P7S_WG	
K2_IST_W08	Knows and understands the principles for the creation, operation and development of various forms of business, taking into account economic, legal and other non-technical considerations, including the principles for the protection of industrial property and copyright.	P7U_W, P7S_WK	P7S_WK_INŻ
K2_IST_W09	Understands the fundamental dilemmas of modern civilisation.	P7U_W, P7S_WK	
Skills			
K2_IST_U01	Can retrieve, critically analyse, synthesise, creatively interpret and present information from a range of sources, using information and communication technologies.	P7U_U, P7S_UW	
K2_IST_U02	Is able to formulate and test hypotheses about simple research problems in the field of information and communication technology.	P7U_U, P7S_UW	
K2_IST_U03	Is able to plan and carry out experiments, analyse and interpret results and draw conclusions.	P7U_U, P7S_UW	
K2_IST_U04	Is able to plan and carry out experiments, analyse and interpret the results and draw conclusions.	P7U_U, P7S_UW	P7S_UW_INŻ
K2_IST_U05	Is able to select and apply different methods and techniques for data representation and analysis.	P7U_U, P7S_UW	P7S_UW_INŻ
K2_IST_U06	Is able to design (to specification, including non-technical aspects) and implement an information system or its components in selected environments, taking into account quality features such as security, usability, efficiency. He/she is able to assess the usefulness and possibility of using new technologies.	P7U_U, P7S_UW	P7S_UW_INŻ
K2_IST_U07	Is able to manage an IT project and estimate the cost of proposed solutions and/or activities.	P7U_U, P7S_UW	P7S_UW_INŻ
K2_IST_U08	Understands how to develop a model to a given specification.	P7U_U, P7S_UW	

Code	Description of the directional learning outcome	Characteristics for qualifications at level 6 or 7 of the Polish Qualifications Framework	Characteristics for qualifications at level 6 or 7 of the Polish Qualifications Framework, enabling the acquisition of engineering competences
K2_IST_U09	Is able to critically analyse existing technical solutions and suggest how to improve where necessary.	P7U_U, P7S_UW	P7S_UW_INŻ
K2_IST_U10	Is able to communicate on specialised topics with a variety of audiences.	P7U_U, P7S_UK	
K2_IST_U11	Can lead a debate.	P7U_U, P7S_UK	
K2_IST_U12	Can plan and implement a process of self-education, identify possible directions for further lifelong learning and guide others in doing so.	P7U_U, P7S_UU	
K2_IST_U13	Ability to lead and collaborate with others on team projects.	P7U_U, P7S_UO	
Social competence			
K2_IST_K01	Is prepared to critically evaluate the information received. He/she is aware of the importance of knowledge in solving problems.	P7U_K, P7S_KK	
K2_IST_K02	Is able to think and act creatively and enterprisingly.	P7U_K, P7S_KO	
K2_IST_K03	Is prepared to act to serve the public interest.	P7U_K, P7S_KO	
K2_IST_K04	Is prepared to fulfil professional duties responsibly. Is aware of and adheres to the principles of professional ethics.	P7U_K, P7S_KR	
Language outcomes			
SJO_S2_U01	Be able to use a foreign language at B2+ ESCJ level and specialised terminology	P7S_UK	

Detailed information on ECTS points

Applied Computer Science

Name	Computer Engineering
Total ECTS	90
Total number of hours of classes	1095
Number of ECTS points assigned to classes related to scientific activities conducted at the university in the discipline or disciplines to which the field of study is assigned (DN)	79/90 (87.78%)
Number of ECTS points allocated to classes developing practical skills (including laboratory, project) (P)	58.2
The number of ECTS points that a student will receive by completing classes that require the direct participation of academic teachers or other persons conducting classes and students (BU)	45.5
Percentage of ECTS for elective courses	61/90 (67.78%)
The number of ECTS points that a student will receive by completing classes in the humanities or social sciences appropriate for a given field of study	5
The number of ECTS points that a student will receive by completing classes in basic sciences (mathematics, physics/chemistry)	2

Organization of studies

Implementation of the study programme

Allowable ECTS deficit

Semester	Allowable deficit of ECTS points after a semester
Semester 1	9 ECTS
Semester 2	8 ECTS
Semester 3	0 ECTS

Detailed requirements

Subjects should be completed in accordance with the curriculum and the ECTS deficit allowed for each semester.

Methods of verifying the intended learning outcomes

Activity form	Methods of verifying the intended learning outcomes
Seminar	Multimedia presentations given and prepared individually or in groups; paper; case study analysis, class activity
Classes	Credit - colloquium - oral, written: test, on-line test, solving tasks, open questions; paper test; evaluation of solutions to tasks presented in classoral, written; short test, input task, evaluation of the sub-tasks; practical exam, model, essay, paper
Project	Project preparation, project implementation, project documentation, case study analysis, reporting on project progress, presentation of applied solutions, presentation of the finished project.
Diploma thesis	Assessment of thesis preparation work; diploma examination; review of master's thesis
Laboratory	Completion of laboratory exercises, completion of exercise reports; oral statements, activity in class; evaluation of partial assignments
Lecture	Exam - oral, written: test, on-line test, open questions; colloquium - oral, written: test, on-line test, open questions; active participation in lecture

Description of the process leading to achieving learning outcomes

The process leading to the achievement of the assumed directional learning outcomes includes:

- active participation in organised classes at the university: lectures, exercises, laboratories, projects and seminars,
- realization of tasks which are to be performed outside organized classes, e.g. preparation for classes, colloquiums, examinations, preparation of reports, presentations, papers, collection, analysis and synthesis of literature on a given topic, solving tasks, realization of project tasks,
- independent studies allowing to consolidate, complete and extend knowledge.

If necessary, the student may benefit from individual consultations.

Internships

Not applicable.

Diploma exam

The diploma exam is held according to the rules stated in the Study Regulations of the Wroclaw University of Technology. The scope of the diploma exam is updated annually and made available to students no later than the end of the 2nd semester of study on the website of the Department of Computer Science and Telecommunications.

Study plan

Applied Computer Science

Semester 1

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Methods for Experiment Design and Analysis	Lecture: 15	Graded credit	1	Obligatory
Physical Foundations of Modern Computing	Lecture: 15	Graded credit	1	Obligatory
Lectorate 2.2	Classes: 60	Graded credit	3	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.2	Classes: 60	Graded credit	3	Elective
Sum	**90**		**5**	

Specialty: Computer Engineering

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Software System Development	Lecture: 30 Project: 30 Seminar: 15	Exam	6	Obligatory in specialty
Foundations of Knowledge Engineering	Lecture: 30 Classes: 15 Seminar: 30	Graded credit	4	Obligatory in specialty
Advanced Databases	Lecture: 30 Project: 30	Exam	6	Obligatory in specialty
Advanced Topics in Cybersecurity	Lecture: 30 Project: 15 Seminar: 30	Graded credit	5	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Analysis of Web-based Systems	Lecture: 30, including sub-activities: • Synchronous lecture: 30 Project: 30	Graded credit	4	Obligatory in specialty
Sum	**345**		**25**	

Semester 2

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Business Fundamentals and Intellectual Property Protection	Lecture: 30	Graded credit	3	Obligatory
Lectorate 2.1	Classes: 30	Graded credit	2	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.1	Classes: 30	Graded credit	2	Elective
Monographic Project	Project: 30, including sub-activities: • Synchronous project activities: 30	Graded credit	2	Obligatory
Sum	**90**		**7**	

Specialty: Computer Engineering

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
User Experience	Lecture: 30, including sub-activities: • Synchronous lecture: 30 Project: 45	Exam	5	Obligatory in specialty
Project Management	Lecture: 30 Project: 30 Seminar: 15	Graded credit	5	Obligatory in specialty
Advanced Topics in Artificial Intelligence	Lecture: 30 Project: 30 Seminar: 15	Exam	6	Obligatory in specialty
Recent Advances in Computer Science	Seminar: 30	Graded credit	2	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Research Methodology	Lecture: 30 Laboratory: 30 Seminar: 15	Graded credit	5	Obligatory in specialty
Sum	**330**		**23**	

Semester 3

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Ethics of New Technologies	Seminar: 15	Graded credit	2	Obligatory
Diploma Seminar	Seminar: 30, including sub-activities: • Synchronous seminar: 30	Graded credit	2	Obligatory
Master Thesis	Diploma thesis: 75	Graded credit	18	Obligatory
Sum	**120**		**22**	

Specialty: Computer Engineering

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Mobile and Multimedia Systems	Lecture: 30 Project: 30	Graded credit	4	Obligatory in specialty
Video Game Design	Lecture: 30 Project: 30	Graded credit	4	Obligatory in specialty
Sum	**120**		**8**	

Syllabuses

Wrocław University of Science and Technology

Software System Development

Educational subject description sheet

Basic information

Field of study Applied Computer Science **Speciality** Computer Engineering **Organizational unit** Faculty of Information and Communication Technology **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Group of classes** Yes **Lecture languages** English **Mandatoriness** Obligatory in specialty **Block** Specialty subjects **Subject related to scientific research** Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Exam **Activities and hours** Lecture: 30 Project: 30 Seminar: 15	6.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Knows different models used during software system development and understands the role of modelling.	K2_IST_W07
PEU_W02	Knows typical processes (phases) of software development, their work products, and relationships among them.	K2_IST_W02, K2_IST_W06, K2_IST_W07
PEU_W03	Knows methods used for quality assessment of software projects (and particular work products).	K2_IST_W02, K2_IST_W06
In terms of skills		

PEU_U01	Designs an architecture of distributed software system using appropriate languages and tools according to the selected development process.	K2_IST_U01, K2_IST_U06, K2_IST_U08
PEU_U02	Implements a software system in accordance to the project.	K2_IST_U10, K2_IST_U11, K2_IST_U13
PEU_U03	Defines tasks aiming at realization of specific engineering problems, and estimates their duration.	K2_IST_U01, K2_IST_U10, K2_IST_U11, K2_IST_U13
In terms of social competences		
PEU_K01	Appreciates responsibility as an important feature of performing professional roles, and knows and adheres to the principles of professional ethics.	K2_IST_K04

Program content ensuring learning outcomes

1. To familiarize students with modern software development processes.
2. To allow students to gain practical experience from application of a selected process (resulting with at least a minimal set of documents) to the development of a software system.
3. To develop students' skills that will enable them to assess the quality of a software product at early stages of development.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Seminar	15
Preparaton for classes	15
Preparation of a report/summary/presentation/paper	25
Preparation for an exam/credit	8
Credit/Exam	4
Preparation of a project	20
Conducting literature research	3
Student workload	**Hours** 150

Wrocław University of Science and Technology

Methods for Experiment Design and Analysis

Educational subject description sheet

Basic information

Field of study Applied Computer Science **Speciality** - **Organizational unit** Faculty of Information and Communication Technology **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Obligatory **Block** Subjects of basic education - mathematics

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Knows the principles of planning a statistical survey	K2_IST_W01
PEU_W02	Knows methods of descriptive analysis of empirical data. Selects and determines appropriate descriptive statistics for experimental data. Graphically presents the results of the study and formulates conclusions on the basis of the obtained summaries.	K2_IST_W01
PEU_W03	Knows statistical tests along with the assumptions necessary for their use. Selects appropriate tests to develop experimental results.	K2_IST_W01
PEU_W04	Has knowledge of analyzing the relationship of quantitative variables as well as building and interpreting linear regression models.	K2_IST_W01

Program content ensuring learning outcomes

1. Knowledge of the principles of planning a statistical study and selecting the appropriate methods of descriptive analysis and statistical tests necessary to develop the results of experiments.
2. Knowledge of how to create and correctly interpret basic statistical models.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Credit/Exam	2
Preparation for an exam/credit	4
Preparaton for classes	4
Student workload	**Hours** 25

Wrocław University of Science and Technology

Foundations of Knowledge Engineering

Educational subject description sheet

Basic information

Field of study Applied Computer Science **Speciality** Computer Engineering **Organizational unit** Faculty of Information and Communication Technology **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Group of classes** Yes **Lecture languages** English **Mandatoriness** Obligatory in specialty **Block** Specialty subjects **Subject related to scientific research** Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Graded credit **Activities and hours** Lecture: 30 Classes: 15 Seminar: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Defines a knowledge representation (KR) using relations or logical formulas. Formulates analysis problem (AP), diagnostic problem (DP), and decision-making problem (DMP) based on these KRs.	K2_IST_W05
PEU_W02	Explains specific concepts of knowledge validation and updating devoted to a relational KR and to a logical KR.	K2_IST_W05
PEU_W03	Characterizes the process of knowledge discovery in databases. Presents data mining problems and methods useful in knowledge extraction.	K2_IST_W05
In terms of skills		

PEU_U01	Can apply knowledge processing algorithms to solve analysis problems (AP), diagnostic problems (DP) and decision-making problems (DMP).	K2_IST_U05
PEU_U02	Can apply knowledge validation and updating algorithms to relational and logical knowledge representations (KR).	K2_IST_U05
PEU_U03	Knows how to process data for knowledge discovery. Uses existing software to accomplish this task.	K2_IST_U05

Program content ensuring learning outcomes

The subject covers the foundations of knowledge engineering, focusing on the use of knowledge representations for solving analysis, diagnostic, and decision-making problems. It introduces classical models alongside relational and logical knowledge representations, including issues of computational complexity. The subject explores probabilistic reasoning with Bayesian networks and methods for validating and updating knowledge. Students learn how to formulate problems based on relational or logical models and apply corresponding solution algorithms. The subject also presents techniques for discovering knowledge from data through data mining, such as pattern mining, association rules, decision trees, and clustering. Emphasis is placed on the practical application of theoretical concepts using programming, numerical examples, and software tools. Additionally, students engage in group work and presentations to consolidate their understanding and improve communication skills. The subject ensures the development of both analytical and practical skills essential for knowledge-based system design.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Classes	15
Seminar	30
Credit/Exam	4
Preparation of a report/summary/presentation/paper	5
Preparation for an exam/credit	6
Self-study of class topics	8
Conducting literature research	2
Student workload	**Hours** 100

Wrocław University of Science and Technology

Physical Foundations of Modern Computing

Educational subject description sheet

Basic information

Field of study
Applied Computer Science

Speciality
-

Organizational unit
Faculty of Information and Communication Technology

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Subjects of basic education - physics

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Describes the physical nature of information and the thermodynamics of information media.	K2_IST_W01
PEU_W02	Identifies and characterises the physical phenomena used to create memory devices.	K2_IST_W01
PEU_W03	Defines quantum information and quantum information processing.	K2_IST_W01
PEU_W04	Distinguishes between classical and quantum gates. Explains the quantum computer.	K2_IST_W01

Program content ensuring learning outcomes

The physical nature of information. The thermodynamics of information media. Computer physics and software.
Quantum physics. Quantum computers and quantum software.
Biophysics and bioinformatics

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Preparation for an exam/credit	4
Self-study of class topics	4
Credit/Exam	2
Student workload	**Hours** 25

Wrocław University of Science and Technology

Advanced Databases

Educational subject description sheet

Basic information

Field of study Applied Computer Science **Speciality** Computer Engineering **Organizational unit** Faculty of Information and Communication Technology **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Group of classes** Yes **Lecture languages** English **Mandatoriness** Obligatory in specialty **Block** Specialty subjects **Subject related to scientific research** Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Exam **Activities and hours** Lecture: 30 Project: 30	6.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Has knowledge of advanced data storage and processing.	K2_IST_W05
PEU_W02	Presents and evaluates applications of extended data models.	K2_IST_W07
In terms of skills		
PEU_U01	Can apply modern methods to improve the efficiency of data storage and processing.	K2_IST_U05
PEU_U02	Can use advanced data models when designing and building database applications.	K2_IST_U03, K2_IST_U08

Program content ensuring learning outcomes

This subject explores advanced methods of data storage and processing used in modern database systems. It covers relational databases, NoSQL technologies, and cloud-based systems. Topics include physical data organization, transaction processing, and query optimization. The course also addresses current trends and emerging techniques in data storage and processing.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparaton for classes	10
Preparation of a project	44
Self-study of class topics	30
Credit/Exam	2
Preparation for an exam/credit	4
Student workload	**Hours** 150

Wrocław University of Science and Technology

Foreign Language 2.2

Educational subject description sheet

Basic information

Field of study lektoraty	**Education cycle** 2025/2026
Speciality -	**Subject code** SJO000-25SM02690C
Organizational unit Wrocław University of Science and Technology	**Lecture languages** English
Study level second degree	**Mandatoriness** Elective
Study form full-time studies	**Block** Foreign languages
Education profile general academic profile	

Semesters	**Activities, hours, ECTS and examination**
Semester 1, Semester 2, Semester 3	• Classes: 60 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	Student has knowledge, skills and competences consistent with the requirements specified for the appropriate language level; knows, understands and uses linguistic means (grammatical, lexical and stylistic) defined at a certain level from everyday life with selected elements of academic, specialist and technical language used in the field of study and in the academic and professional environment; communicates in a family, social and intercultural environment, practicing communication skills; appreciates the need to improve their skills in effective communication, develops competences in the area of communication language, basics of specialist and academic language	SJO_S2_U01

Program content ensuring learning outcomes

A1; A2; B1 French, Spanish, Japanese, German, Polish as a foreign language, Russian
General educational content
Formation and deepening of communicative competence in a family, social and intercultural environment and for a specific level for academic and professional needs.
Interaction appropriate to the appropriate level of language competence, e.g., the student's own profile and interests; presenting oneself, one's interests and ideas in environmental, academic and professional contexts. Developing creative, receptive and interactive competence in a group.
Language in communication in the modern world. Verbal and non-verbal communication - sensitivity to cultural differences, starting a conversation, joining in a discussion, moving on to the next points, summarizing statements, using characteristic phrases and expressions for a certain language level; taking part in various forms of interaction.

Calculation of ECTS points

Activity form	**Activity hours**
Classes	60
Preparaton for classes	30
Student workload	**Hours** 90

Wrocław University of Science and Technology

Advanced Topics in Cybersecurity

Educational subject description sheet

Basic information

Field of study Applied Computer Science **Speciality** Computer Engineering **Organizational unit** Faculty of Information and Communication Technology **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Group of classes** Yes **Lecture languages** English **Mandatoriness** Obligatory in specialty **Block** Specialty subjects **Subject related to scientific research** Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Graded credit **Activities and hours** Lecture: 30 Project: 15 Seminar: 30	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Has structured, theoretically based knowledge of the most important issues related to threats and security of IT systems.	K2_IST_W06
PEU_W02	Has advanced knowledge of methods and tools for increasing security and ensuring accessibility to web and mobile resources, services and systems for users, social and business processes in cyberspace.	K2_IST_W06
In terms of skills		

PEU_U01	Has the ability to search for information on computer security from various sources, is able to critically analyze, synthesize, and interpret it creatively and is able to present it using information and communication techniques.	K2_IST_U01
PEU_U02	Is able to communicate on specialized topics with diverse audiences	K2_IST_U10
PEU_U03	Leads discussion and actively participates.	K2_IST_U11

Program content ensuring learning outcomes

Acquiring knowledge about cybersecurity. Issues related to threats to system and web services, communication services, hardware and system communication infrastructure, information resources and databases.
Learning about advanced methods of preventing attacks and minimizing the threats resulting from them.
Acquiring the ability to detect security incidents in cyberspace and eliminate the effects and causes of these incidents. Basic principles of computer forensics.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	15
Seminar	30
Self-study of class topics	10
Credit/Exam	4
Preparation for an exam/credit	6
Preparation of a report/summary/presentation/paper	10
Preparation of a project	15
Conducting literature research	5
Student workload	**Hours** 125

Wrocław University of Science and Technology

Analysis of Web-based Systems

Educational subject description sheet

Basic information

Field of study Applied Computer Science **Speciality** Computer Engineering **Organizational unit** Faculty of Information and Communication Technology **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Group of classes** Yes **Lecture languages** English **Mandatoriness** Obligatory in specialty **Block** Specialty subjects **Subject related to scientific research** Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Graded credit **Activities and hours** Lecture: 30, including sub-activities: • Synchronous lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Demonstrates approaches and methods for predicting the performance of web-based systems	K2_IST_W02
PEU_W02	Mentions and descriptions of web data mining methods	K2_IST_W07
In terms of skills		
PEU_U01	Is able to develop and analyse web performance data	K2_IST_U03

Program content ensuring learning outcomes

Familiarize students with current knowledge in the field of Internet and Web-based systems. Presentation of Web-based systems performance approaches and methods. Familiarize students with web data mining methods. Obtaining skills in the development and analysis of web performance data.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Conducting empirical studies	8
Credit/Exam	2
Preparation of a project	10
Preparation of a report/summary/presentation/paper	10
Preparation for an exam/credit	6
Self-study of class topics	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

User Experience

Educational subject description sheet

Basic information

Field of study Applied Computer Science **Speciality** Computer Engineering **Organizational unit** Faculty of Information and Communication Technology **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Group of classes** Yes **Lecture languages** English **Mandatoriness** Obligatory in specialty **Block** Specialty subjects **Subject related to scientific research** Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Exam **Activities and hours** Lecture: 30, including sub-activities: • Synchronous lecture: 30 Project: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Describes ways of designing and managing complex information systems, in particular interacting with the information system taking into account the user experience.	K2_IST_W02, K2_IST_W06
PEU_W02	Presents usability testing methods and methods for testing user experience in interaction with the system dedicated to various stages of the life cycle of IT objects and systems.	K2_IST_W06
In terms of skills		

PEU_U01	Designs an IT system in accordance with a given specification, including user interaction and integration with other systems; implements this project, at least in part.	K2_IST_U06
PEU_U02	Plans and conducts usability tests and user experience tests during users interaction with the system, evaluates the proposed solution and recommends improvements.	K2_IST_U09

Program content ensuring learning outcomes

The subject will present content related to the design and management of complex IT systems, in particular interaction with the IT system taking into account the user's experience. Usability testing methods and methods for testing user experience in interaction with the system dedicated to different stages of the life cycle of objects and IT systems will be discussed.
The knowledge acquired will be practiced during the implementation of the project, the aim of which will be to design and implement an example mobile or web service and conduct usability tests, both heuristic and with the participation of users

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	45
Preparaton for classes	10
Preparation of a project	25
Preparation for an exam/credit	5
Self-study of class topics	6
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Project Management

Educational subject description sheet

Basic information

Field of study Applied Computer Science **Speciality** Computer Engineering **Organizational unit** Faculty of Information and Communication Technology **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Group of classes** Yes **Lecture languages** English **Mandatoriness** Obligatory in specialty **Block** Specialty subjects **Subject related to scientific research** Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Graded credit **Activities and hours** Lecture: 30 Project: 30 Seminar: 15	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Names, classifies, identifies, characterizes, explains, describes the basic processes of an IT project life cycle.	K2_IST_W02, K2_IST_W06
PEU_W02	Identifies, finds, selects, classifies, names, defines, describes, compares, differentiates, justifies choice of methods for software project management.	K2_IST_W02, K2_IST_W06
PEU_W03	Identifies, finds, selects, classifies, names, defines, describes, compares, and distinguishes concepts related to risk and quality management in an IT project.	K2_IST_W02, K2_IST_W06

PEU_W04	Identifies, finds, selects, classifies, names, defines, describes, compares, and distinguishes issues related to team management and communication in an IT project.	K2_IST_W02, K2_IST_W06
In terms of skills		
PEU_U01	Selects, analyses, interprets, constructs, develops, organises and applies management methods appropriate to the various phases of IT system development.	K2_IST_U07, K2_IST_U13
PEU_U02	Analyzes the scope of work, divides work, assigns resources, schedules tasks, estimates costs, monitors and reports on the implementation of an IT project.	K2_IST_U07, K2_IST_U13
PEU_U03	Searches, selects, analyzes, evaluates, constructs by integrating existing solutions, implements, and uses tools supporting IT project management.	K2_IST_U07, K2_IST_U13
PEU_U04	Selects, adapts, constructs, controls, monitors, operates, implements and uses methods and processes for managing an IT project team.	K2_IST_U13
In terms of social competences		
PEU_K01	Has a sense of need to protect, defend and take care of the team he manages. He is responsible not only for the success of the project but also for a good atmosphere in the team. He supports the team's initiatives that go beyond the usual routine. He takes on challenges, does not avoid taking risks, is open to the possibility of implementing new solutions in the project he manages and in future projects. He acts in accordance with the project management style adopted in the work environment, but is open to the needs of people, whom he meets, acts in accordance with his conscience. He has a sense of need to cooperate in identifying problems and in solving them together.	K2_IST_K04

Program content ensuring learning outcomes

To familiarise students with modern methods of IT project management, in particular with the principles of organising project work, team management, risk management and IT project management tools.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Seminar	15
Preparation for an exam/credit	12
Credit/Exam	4
Self-study of class topics	10
Preparation of a project	8

Preparation of a report/summary/presentation/paper	16
Student workload	**Hours** 125

Wrocław University of Science and Technology

Advanced Topics in Artificial Intelligence

Educational subject description sheet

Basic information

Field of study Applied Computer Science **Speciality** Computer Engineering **Organizational unit** Faculty of Information and Communication Technology **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Group of classes** Yes **Lecture languages** English **Mandatoriness** Obligatory in specialty **Block** Specialty subjects **Subject related to scientific research** Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 30 Seminar: 15	6.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Awareness of the role of creative thinking and knowledge representation.	K2_IST_W04
PEU_W02	Explains issues connected with Machine Learning task.	K2_IST_W04
PEU_W03	Explains issues connected with Deep Leaning and Generative AI	K2_IST_W03, K2_IST_W04
In terms of skills		
PEU_U01	Demonstrate the ability to formulate problems in a way that facilitates its solution.	K2_IST_U02, K2_IST_U04

PEU_U02	Applies skilful selection of intelligent techniques to the given problem.	K2_IST_U02, K2_IST_U04
PEU_U03	Explores intelligent processing of information with Deep Learning and Generative AI Models	K2_IST_U02, K2_IST_U04

Program content ensuring learning outcomes

The aim of the course is to extend and deepen the knowledge of the students in relation to intelligent methods, their uses and methods of
validation. The course teaches ability to select appropriate intelligent techniques and their validation to the task. Several contemporary AI methods are presented starting with deep learning, pretrained language models, through zero-shot and a few-shot learing, till Large Language models, generative AI and Agentic AI.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Seminar	15
Conducting literature research	4
Preparaton for classes	16
Preparation for an exam/credit	6
Preparation of a project	30
Self-study of class topics	5
Credit/Exam	4
Preparation of a report/summary/presentation/paper	10
Student workload	**Hours** 150

Wrocław University of Science and Technology

Recent Advances in Computer Science

Educational subject description sheet

Basic information

Field of study
Applied Computer Science

Speciality
Computer Engineering

Organizational unit
Faculty of Information and Communication Technology

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 2	• Seminar: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Knowledge of recent advances in computer science and telecommunication.	K2_IST_W03
In terms of skills		
PEU_U01	Ability to analyze scientific and professional texts, beginning from the choice of topic, selection of retrieved information in the Internet, use of traditional literature, and to interpret the presented ideas, as well as to prepare multimedia presentation.	K2_IST_U01
PEU_U02	Ability to present some specific topics and interest others with them.	K2_IST_U10
PEU_U03	Ability to conduct a scientific and professional debate.	K2_IST_U11
In terms of social competences		

PEU_K01	Consciousness of the significance of new advances in the development of information and telecommunication technologies.	K2_IST_K01

Program content ensuring learning outcomes

The main goal of the seminar classes is to present IT development trends and the main projects undertaken by leading research and development centers in the world. The seminar classes also allow students to acquire basic skills related to preparation and presentation of scientific texts, beginning from the choice of topic, selection of tasks to be performed, use of literature to the interpretation of the results, then preparing students to make a short presentation, and finally to to stimulate students to follow the latest trends in the development of information and telecommunication technologies. It means that the main goal of the seminar classes is to learn about IT development trends and the main projects undertaken by leading research and development centers in the world.

Calculation of ECTS points

Activity form	**Activity hours**
Seminar	30
Preparation of a report/summary/presentation/paper	10
Conducting literature research	5
Self-study of class topics	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Research Methodology

Educational subject description sheet

Basic information

Field of study Applied Computer Science **Speciality** Computer Engineering **Organizational unit** Faculty of Information and Communication Technology **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Group of classes** Yes **Lecture languages** English **Mandatoriness** Obligatory in specialty **Block** Specialty subjects **Subject related to scientific research** Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Graded credit **Activities and hours** Lecture: 30 Laboratory: 30 Seminar: 15	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Describes the theory of scientific research. Lists the issues that make up this theory. Defines its basic elements.	K2_IST_W04
PEU_W02	Explains the formulation of research hypotheses. Lists and describes data collection and analysis techniques.	K2_IST_W01, K2_IST_W07
PEU_W03	Characterises the process of writing research proposals. Explains what a research report, scientific article and scientific presentation are.	K2_IST_W04
PEU_W04	Explains the methodology of contemporary research in computer science.	K2_IST_W04

In terms of skills		
PEU_U01	Plans research. Organises the research environment.	K2_IST_U03
PEU_U02	Identifies and describes scientific problems. Formulates research hypotheses.	K2_IST_U02
PEU_U03	Selects appropriate methods for data collection and analysis.	K2_IST_U03
PEU_U04	Produces a report on the research conducted and prepares a scientific presentation.	K2_IST_U03

Program content ensuring learning outcomes

Introduction to philosophy of science and research methodology. Short history notes.
Introduction to research. Definitions, characteristics and theories of research. Main components in research processes. Types of research. Research in computer science.
Problem identification and topic selection. Literature collecting and review. Sources of information. Selecting, indexing and verification.
Analyzing and formulating the research problem statement. Exploring and defining research objectives.
Research Methods. Types of methods and their selection. Plans and documentation. Formulation of research hypothesis.
Methods of measurement. Single and multi-item measures. Indexing and scaling. The special role of measurement in research. Strategies. Accuracy and precision of measurements.
Models in scientific research. Model selection and verification.
Data in research. Types of data. Data collection, data preparation, data processing, calculations and documentation.
Statistical methods. Statistical calculations and hypotheses. Limitations of statistical methods. Verification of research hypothesis.
Analytical methods. Mathematical models and their solution. Mathematical models and real data in scientific research.
Software in scientific research. Reliability and accuracy of calculations. Reports and publications. Types. Preparation of publications. Academic style of writing papers. Presentations of research results.
Applying new research methods to contemporary computer engineering. Ethics of scientific research.

Calculation of ECTS points

Activity form	Activity hours
Lecture	30
Laboratory	30
Seminar	15
Preparation of a project	15
Preparation for an exam/credit	6
Credit/Exam	2
Conducting literature research	7

Preparation of a report/summary/presentation/paper	10
Self-study of class topics	10
Student workload	**Hours** 125

Wrocław University of Science and Technology

Business Fundamentals and Intellectual Property Protection

Educational subject description sheet

Basic information

Field of study
Applied Computer Science

Speciality
-

Organizational unit
Faculty of Information and Communication Technology

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 2	• Lecture: 30 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes the conditions for conducting business activity and the basic principles of creating and developing an enterprise.	K2_IST_W08
PEU_W02	Distinguishes between the subjects and identifies the systems of intellectual property protection, the rules for obtaining it, together with the operation of patent information databases.	K2_IST_W08
In terms of social competences		
PEU_K01	Is capable of thinking and acting in an entrepreneurial manner.	K2_IST_K02

Program content ensuring learning outcomes

As part of the course, students will be provided with knowledge about the processes of creating and developing enterprises, as well as about the management of intellectual property in business activities.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Credit/Exam	2
Preparation for an exam/credit	10
Preparation of a report/summary/presentation/paper	23
Self-study of class topics	10
Student workload	**Hours** 75

Wrocław University of Science and Technology

Foreign Language 2.1

Educational subject description sheet

Basic information

Field of study
lektoraty

Speciality
-

Organizational unit
Wrocław University of Science and Technology

Study level
second degree

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
SJO000-25SM02684C

Lecture languages
English

Mandatoriness
Elective

Block
Foreign languages

Semesters	Activities, hours, ECTS and examination
Semester 1, Semester 2, Semester 3	• Classes: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	Student has knowledge, skills and competences consistent with the requirements specified for the minimum B2 level according to the Common European Framework of Reference for Languages; knows, understands and uses linguistic means (grammatical, lexical and stylistic) from academic, specialist and technical languages used in the field of study and in the academic and professional environment; communicates in an intercultural and professional environment; understands and has the ability to analyze foreign-language specialist texts; improves their skills in the area of specialized and academic languages.	SJO_S2_U01

Program content ensuring learning outcomes

B2 plus English, French, Spanish, GermanC1 plus English languageGeneral educational content

Formation and deepening of communicative competence in academic and professional settings.
Interaction appropriate to the appropriate level of linguistic competence, such as the student's own profile for academic and professional purposes. Deepening creative, receptive and interactive competence in a team.
Language in communication in specialized and professional fields in the modern world. Verbal and non-verbal communication - functioning freely in an intercultural environment, conducting discourse, polemics, analysis of specialized texts.

Calculation of ECTS points

Activity form	**Activity hours**
Classes	30
Preparaton for classes	30
Student workload	**Hours** 60

Wrocław University of Science and Technology

Monographic Project

Educational subject description sheet

Basic information

Field of study Applied Computer Science **Speciality** - **Organizational unit** Faculty of Information and Communication Technology **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Obligatory **Block** Major-specific subjects

Semester	**Activities, hours, ECTS and examination**
Semester 2	• Project: 30 h, 2 ECTS, Graded credit; including sub-activities: ◦ Synchronous project activities: 30

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	Able to find information from a variety of sources, analyze, synthesize and .can document it	K2_IST_U01
PEU_U02	Able to critically analyze existing solutions and suggest improvements if necessary.	K2_IST_U09
PEU_U03	Able to plan and implement the process of self-education, identify possible directions for further learning.	K2_IST_U12
In terms of social competences		
PEU_K01	Is ready to critically evaluate the content he receives and is aware of the importance of knowledge in problem solving.	K2_IST_K01

Program content ensuring learning outcomes

Acquisition of the ability to obtain information, including in English, on relevant issues related to the problems of the thesis topic. Implementation of literature review/work related to the thesis topic. Determination of the purpose and scope of the thesis.

Calculation of ECTS points

Activity form	**Activity hours**
Project	30
Credit/Exam	2
Conducting literature research	6
Preparation of a project	6
Preparation of a report/summary/presentation/paper	6
Student workload	**Hours** 50

Wrocław University of Science and Technology

Mobile and Multimedia Systems

Educational subject description sheet

Basic information

Field of study Applied Computer Science **Speciality** Computer Engineering **Organizational unit** Faculty of Information and Communication Technology **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Group of classes** Yes **Lecture languages** English **Mandatoriness** Obligatory in specialty **Block** Specialty subjects **Subject related to scientific research** Yes

Semester	**Examination**	**Number of ECTS points**
Semester 3	Graded credit **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Describes various types of mobile and multimedia systems, listing their advantages and disadvantages, as well as current trends and standards.	K2_IST_W06
In terms of skills		
PEU_U01	Designs and develops multimedia and mobile systems using up to date frameworks.	K2_IST_U06

Program content ensuring learning outcomes

The course content covers topics related to the design, development, and integration of multimedia content in mobile applications. Students learn about data compression methods, sources of multimedia acquisition, user interface design principles, and the fundamentals of 2D and 3D computer animation. The course includes practical aspects of building m-commerce applications with interactive 3D visualization and programming for Android and iOS platforms. It also covers mobile gaming technologies, modern multimedia devices, and applications of augmented reality.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparation of a project	15
Preparaton for classes	5
Self-study of class topics	5
Preparation for an exam/credit	8
Credit/Exam	2
Preparation of a report/summary/presentation/paper	5
Student workload	**Hours** 100

Wrocław University of Science and Technology

Video Game Design

Educational subject description sheet

Basic information

Field of study Applied Computer Science **Speciality** Computer Engineering **Organizational unit** Faculty of Information and Communication Technology **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Group of classes** Yes **Lecture languages** English **Mandatoriness** Obligatory in specialty **Block** Specialty subjects **Subject related to scientific research** Yes

Semester	**Examination**	**Number of ECTS points**
Semester 3	Graded credit **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Knows the basic concepts of designing and creating video games.	K2_IST_W06
PEU_W02	Characterizes the fields and roles in the game creation process.	K2_IST_W06
PEU_W03	Uses tools and platforms supporting the design and prototyping of video games.	K2_IST_W06
In terms of skills		
PEU_U01	Designs and prototypes video games in selected environments.	K2_IST_U06

Program content ensuring learning outcomes

Designing a computer game as a specific information system. Create game design documentation (GDD) as the design progresses. Implementation of the game in the selected environment. Evaluating the usability of the finished product and assessing the user experience.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparation of a project	20
Preparation for an exam/credit	8
Credit/Exam	2
Preparation of a report/summary/presentation/paper	10
Student workload	**Hours** 100

Wrocław University of Science and Technology

Ethics of New Technologies

Educational subject description sheet

Basic information

Field of study
Applied Computer Science

Speciality
-

Organizational unit
Faculty of Information and Communication Technology

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Subjects from the fields of humanities or social sciences

Semester	Activities, hours, ECTS and examination
Semester 3	• Seminar: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Explains basic ethical concepts and theories and explains the moral significance of innovation and new technologies.	K2_IST_W09
PEU_W02	Knows the structure of the ethical dilemma, new ethical approaches to technology (roboethics, neuroethics). Lists theoretical principles and practical aspects of technology assessment. Identifies ethical and social consequences of engineering and technical activities. Knows the principle of responsibility	K2_IST_W09
In terms of skills		
PEU_U01	Analyzes and formulates arguments based on sources, so to take part in a topical discussion or communicate to a wider audience.	K2_IST_U11
In terms of social competences		

PEU_K01	Respects the principles of ethical, social and legal responsibility for the consequences of engineering activities and is able to interpret these principles based on the ethics of new technologies.	K2_IST_K03
PEU_K02	Appreciates the moral value of innovation and the importance of moral dilemmas involved in the related to new technologies in a professional and social context.	K2_IST_K03

Program content ensuring learning outcomes

The subject explains core ethical concepts and theories and explains the moral significance of innovation and new technologies.
The programme content includes: structure of the ethical dilemma, new ethical approaches to technology (roboethics, neuroethics), theoretical principles and practical aspects of technology assessment, ethical and social consequences of engineering and technical activities, the principle of responsibility. Structured assignments develop the ability to use sources, formulate critical judgements and communicate results to a wider audience.

Calculation of ECTS points

Activity form	**Activity hours**
Seminar	15
Preparation of a report/summary/presentation/paper	10
Credit/Exam	2
Self-study of class topics	10
Conducting literature research	6
Preparation for an exam/credit	7
Student workload	**Hours** 50

Wrocław University of Science and Technology

Diploma Seminar

Educational subject description sheet

Basic information

Field of study
Applied Computer Science

Speciality
-

Organizational unit
Faculty of Information and Communication Technology

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Seminar: 30 h, 2 ECTS, Graded credit; including sub-activities: ◦ Synchronous seminar: 30

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	Able to study specific issues in applied computer science.	K2_IST_U01, K2_IST_U12
PEU_U02	Able to present the studied issues in the field of applied computer science and conduct a discussion with the audience on the presented content.	K2_IST_U01, K2_IST_U10, K2_IST_U11, K2_IST_U12
In terms of social competences		
PEU_K01	Is ready to critically evaluate the content he receives. Is aware of the importance of knowledge in problem solving.	K2_IST_K01

Program content ensuring learning outcomes

Finding and analyzing specialized knowledge in the field of applied computer science. Ability to present it using mutimedia techniques. Acquisition of skills in debate and communication on professional topics. Acquisition of social competence in the

importance of knowledge in problem solving.

Calculation of ECTS points

Activity form	**Activity hours**
Seminar	30
Preparation of a report/summary/presentation/paper	20
Student workload	**Hours** 50

Wrocław University of Science and Technology

Master Thesis

Educational subject description sheet

Basic information

Field of study
Applied Computer Science

Speciality
-

Organizational unit
Faculty of Information and Communication Technology

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Diploma thesis: 75 h, 18 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	Able to find information from various sources, analyze it, synthesize it and can document it.	K2_IST_U01
PEU_U02	Able to critically analyze existing solutions and suggest improvements if necessary.	K2_IST_U09
PEU_U03	Can plan and implement the process of self-education, identify possible directions for further learning.	K2_IST_U12
In terms of social competences		
PEU_K01	Able to think and act creatively and entrepreneurially.	K2_IST_K02

Program content ensuring learning outcomes

Implementation and documentation of research performed as part of the thesis.

Calculation of ECTS points

Activity form	Activity hours
Diploma thesis	75
Preparation of the thesis	230
Conducting empirical studies	100
Conducting literature research	10
Self-development of practical skills	35
Student workload	**Hours** 450