

WSB Merito University in Poznań

Faculty of Finance and Banking

STUDY PROGRAM

for the field of study

Computer Science

(English-language track)

First-cycle studies (Bachelor's level)

Mode of study: Full-time | Profile: Practical

Academic Year 2025/2026

I. GENERAL CHARACTERISTICS OF THE STUDY PROGRAM

Name of study program	Computer Science
Level of education	First-cycle studies (Bachelor's level)
Educational profile	Practical
Mode of study	Full-time
Duration of studies (semesters)	7
Total ECTS credits	210
Total contact hours (full-time)	5376
Academic title awarded	Engineer (Inżynier)
Professional internship (hours)	960
Language of instruction	English
Year of commencement	2025

II. LEARNING OUTCOMES

Symbol	Learning Outcomes
Knowledge	The graduate knows and understands:
Inf_I_W01	in an advanced degree: algorithms, data structures, software engineering and programming languages
Inf_I_W02	in an advanced degree: computer system architecture, operating systems, database systems and data warehouses, computer networks, and system security
Inf_I_W03	methods and tools used in solving IT tasks
Inf_I_W04	in an advanced degree: principles of human-computer interaction
Inf_I_W05	at a basic level: patent law, copyright, personal data protection, threats related to cybercrime, and provisions of professional codes of ethics
Inf_I_W06	methods and tools for describing social and economic processes and phenomena
Inf_I_W07	the basic principles of organizing and developing forms of individual entrepreneurship
Inf_I_W08	basic concepts related to describing and explaining economic reality
Inf_I_W09	mathematical and statistical methods used in computer science
Inf_I_W10	the principles of business ethics
Inf_I_W11	issues related to the life cycles of IT systems, including software
Inf_I_W12	general issues of algorithms and their complexity, programming paradigms, and basic IT tools
Inf_I_W13	standards and norms used in data transmission and processing, and in software engineering
Inf_I_W14	in an advanced degree: acquisition, storage and processing of multimedia data
Skills	The graduate is able to:

Inf_I_U01	acquire and integrate information from literature and other sources, evaluate it and perform critical analysis
Inf_I_U02	communicate in a professional environment in Polish and English (at B2 CEFR level), using specialist terminology and advanced IT communication tools
Inf_I_U03	model and design IT systems, describe functional and non-functional requirements, evaluate software architecture
Inf_I_U04	program applications, formulate algorithms, select programming languages, design graphical user interfaces, document and systematically test software, program web applications
Inf_I_U05	design relational databases, process and analyze data stored in databases, program database applications
Inf_I_U06	acquire and process multimedia data and use it in applications
Inf_I_U07	perform typical tasks related to maintaining computer systems and networks, and ensuring system security
Inf_I_U08	prepare and deliver a public presentation in Polish and English on computer science topics, using professional knowledge and terminology
Inf_I_U09	prepare a study of standard and complex IT problems using selected literature and documented sources in Polish and English
Inf_I_U10	plan and conduct computational experiments and computer simulations using IT tools, interpret results and draw conclusions
Inf_I_U11	use appropriate analytical, simulation and experimental methods to formulate and solve IT problems, including complex and non-standard ones
Inf_I_U12	recognize economic, legal and environmental aspects when formulating and solving IT tasks
Inf_I_U13	work in an industrial environment applying relevant safety principles
Inf_I_U14	perform a preliminary economic analysis of engineering activities
Inf_I_U15	operate IT systems running in enterprises within a standard technical scope
Inf_I_U16	solve typical IT problems arising in enterprises
Inf_I_U17	apply norms related to data transmission, processing and the preparation and management of IT projects
Inf_I_U18	engage in lifelong learning by planning and implementing the acquisition of new knowledge and skills
Inf_I_U19	work and cooperate in various social groups and in various roles
Inf_I_U20	select priorities to achieve a defined goal or task set by oneself or others
Social Competences	The graduate is ready to:
Inf_I_K01	recognize the necessity of lifelong learning and critically evaluate possessed knowledge
Inf_I_K02	identify and resolve dilemmas related to the practice of the profession
Inf_I_K03	think and act in an entrepreneurial manner, including initiating actions for the public interest
Inf_I_K04	recognize the non-technical consequences of one's activities
Inf_I_K05	act responsibly by promoting and adhering to the principles of professional ethics
Inf_I_K06	communicate and explain the achievements of computer science to a wide audience

III. COURSES AND PROGRAM CONTENT

B) COURSES AND PROGRAM CONTENT ENSURING ACHIEVEMENT OF LEARNING OUTCOMES

Course / Group of Courses	Program Content	ECTS	Year	Semester
Fundamentals of Business Management	Intro to business ideas. Business Plan. Business Models. Environmental Business Context. Management functions. Plans & Organization. Motivation & Control. Marketing in management. Management in globalization. Case studies.	3	1	2
English for IT	What is IT. Software and Hardware. ICT Systems. Inside the System. Giving a Presentation. Using Software. Software Development. Popular Applications. Multimedia. Software Licensing.	6	1	2
Foreign Language (Spanish or German)	Personal information. Society and Family. Health and nutrition. Media. Science and education. Work and economy; Natural environment; World affairs; Sport and Recreation; Entertainment; Weather; Technological and social trends; Shopping; Transport; Phone calls; Correspondence.	8 (4 per semester)	2	3, 4
Project Work Methodologies	Study techniques; Creating presentations; Public speaking and self-presentation; Teamwork; Writing skills; Project method work; Design Thinking; Project methodology.	7 (2 per semester)	1, 2	1, 2, 3
Mathematics	Elements of mathematical logic. Propositional calculus. Combinatorics. Recursion and mathematical induction. Graphs. Matrices. Linear equations. Elementary functions. Limits of sequences. Convergence of series. Derivatives. Integrals. Fundamentals of linear programming.	5	1	1
Communication Skills for Computer Specialists	Basic elements of the communication process. Verbal and non-verbal communication. Communication in a project team. Business communication with clients. Public speaking. Rhetoric. Eristic. Communication inside an organization. Multicultural communication.	1	1	2
Software Testing	Introduction to testing concepts. Basic stages of the testing process. Testing within the software development life cycle. Testing design techniques. Test case prioritization. Qualitative attribute testing. Automation testing (Selenium). Security testing. Testing process management.	2	3	5
Entrepreneurship	Concept and essence of entrepreneurship. Entrepreneurship in Poland and the world. Entrepreneurial competence. Market-focused creativity. Business ideas. Placing an organization on the market. Sources of capital. Business plan. External entrepreneurship environment. Intellectual capital. Employee entrepreneurship.	1	2	4
Economics	Economics and economy. Tools of economic analysis. Market economy. Intro to macroeconomics. Output and economic	3	1	1

	fluctuations. The labor market. Money, inflation/deflation. Fiscal and monetary policy. Modern economic problems.			
Discrete Mathematics	Elements of mathematical logic. Propositional calculus. Combinatorics. Recursion and mathematical induction. Graphs. Matrices. Linear equations. Elementary functions. Limits of sequences. Convergence of series. Derivatives. Integrals. Fundamentals of linear programming.	6	1	2
Probability Theory and Statistics	Basics of Statistics. Data in Statistics. Methods of displaying data. Measures of central tendency and variability. Probability. Random variables. Sampling. Hypothesis testing. Regression and correlation. Time series.	5	2	3
Information Technologies	Introduction to IT tools. Text editors. Spreadsheets. Data importing. Generating charts. Databases and data warehouses. Creating presentations. Delphi cost approximation method.	2	1	1
Fundamentals of Computer Science	Computer number formats. Binary arithmetic. Computer architecture. Algorithms. Programming languages. Compilers. Flowcharts. Basic data types and structures. Software classification. Artificial intelligence. Information society.	2	1	1
Introduction to Computer Programming	Integrated development environments. Elementary types, variables and instructions in C#. Arrays, structures, console I/O, error handling. Structural programming, subprograms. Files/streams. Text manipulation. Graphical User Interface. Event-driven programming.	4	1	1
Data Structures and Algorithms	Complexity analysis. Recursion. Dynamic programming. Greedy algorithms. Sorting algorithms. Linear data structures: lists, queues, stacks. Trees, heaps, priority queues. Graphs. Pattern matching. Data compression. Hash tables. Cryptography. NP-completeness.	3	1	2
Object-Oriented Programming	OOP paradigm. Classes. Delegates. Interfaces. Events. Exception handling. Serialization. Operator overloading. Java vs. C#. Python introduction.	4	2	3
Web Application Programming	HTML (4 and 5). CSS. PHP (OOP, database connections, sessions). JavaScript (DOM, jQuery, AJAX).	3	2	4
Advanced Programming	Uniform user interface creation. Database interaction with ADO.NET. Crystal Reports. ASP.NET web services. Parallel programming. Advanced C# components.	3	3	5
Computer Architecture	History of computer systems. Computer system construction. Processor principles. RISC architecture, pipelining, cache, multi-core processors. Data representations. Digital technology. Assembly language programming. Identifying hardware failures.	2	1	2
Operating Systems	Introduction. Shell and graphic environments. Filesystems. Process management. Memory management. Choosing the right OS. System security basics.	3	1	2

Computer Security	Security concepts, threats, vulnerabilities. OWASP TOP 10. Static code analysis. Threat modelling. Firewalls. Encryption and PKI. VPN and access controls. Penetration testing. Intrusion detection systems. Malware analysis.	3	3	5
Computer Networks	Data transfer issues. Network architectures. ISO/OSI Model. Local network standards. Network devices. Virtual LANs. Wireless networks. Network services. Security overview.	3	2	3
IT Systems Analysis and Design	Concept of IT systems. Software engineering. Conceptual modelling. UML. BPMN. Use case modelling. Static and dynamic system modelling. Requirements determination. Transformation to logical model.	3	3	5
Computational Methods	Numerical systems and errors. Systems of linear equations. Polynomial functions. Numerical integration. Monte Carlo method.	5	2	3
Databases	Relational DBMS. ER diagrams. Normalization. SQL. ACID transactions. Physical files and indexes. XML. CAP theorem. NoSQL databases.	2	2	4
Project Management	RUP methodology. Project management. Design documentation. System modelling. Behavioral and structural perspectives. IT architectures. Testing. Software quality. Code refactoring. Design patterns.	3	2	4
Multimedia Processing Technology	Application areas of multimedia. Protection of intellectual property. Image manipulation. Multimedia compression. Tools for processing multimedia. Creating multimedia applications.	3	3	6
Software Engineering	Software development process. SDLC models. Requirements specification. UML. Version control. Design patterns. Testing. Code refactoring. Documentation generation.	3	3	6
Laboratory of Engineering Science	Physics. Chemistry. Technology (CNC machining). Food science. Plastics. Arduino. Raspberry Pi	3	2	3
Laboratory of New Technologies	Computer networks — physical layer wiring and fiber optic.	3	2	4
Fundamentals of Electrical Engineering	Basic Concepts and Laws of Electrical Engineering. Electrical Circuits. Electronic Components. Circuit Analysis. Measurement of Electrical Signals. Safety. Introduction to Digital Electronics.	2	1	2
Cultural Differences	Introduction to Culture. Cultural characteristics. Hofstede's 4 cultural dimensions. Intercultural verbal and nonverbal communication. Culture Shock. Cross-cultural competencies.	2	1	1
Specialization Courses	Advanced Database Systems: Advanced algorithms and data structures (XML, JSON, graphs, spatial data, parallel/distributed algorithms). Databases and NoSQL. Advanced database applications. Outsourcing Cloud Solutions: Cloud architectures, virtualization, container technologies, cloud platforms, DevOps, cloud security, microservices.	3-5	3	3, 4

IV. STUDY PROGRAM

Specializations for the 2025/26 cohort:

- Advanced Database Systems
- Outsourcing Cloud Solutions

A) ASSIGNMENT TO SCIENTIFIC DISCIPLINES

No.	Scientific Discipline	% ECTS
1	Engineering and Technical Sciences — Technical Computer Science (leading discipline)	90%
2	Natural Sciences — Mathematics	10%

B) BASIC ECTS INDICATORS

Indicator Name	ECTS Credits
Total ECTS for direct instruction (full-time)	112
Total ECTS for practical skills courses	157
Total ECTS for humanities/social sciences courses	11
Total ECTS for elective courses	95
Total ECTS for professional internships	36

C) PROFESSIONAL INTERNSHIPS

The scope of internships for students commencing in 2025/26 is 960 hours (36 ECTS). The program is modular; students complete mandatory modules and choose from elective modules. Internships may be completed in: IT Department, Organization and Management, Development, Production, Human Resources, Marketing, Commercial, Customer Service, Financial Settlements, and other departments. Students may independently select their internship host or choose from the university's partner company catalogue.

Internship	Module Content
	<p>Obligatory modules: Legal basis and objects of activity; Organization of the company; Organizational documentation; Company infrastructure.</p> <p>Elective modules: IT development strategies; Organization of IT services; Detailed IT infrastructure; Software used; Database management systems; Embedded devices and IoT; IT project management; IT system security policy; Effectiveness of IT solutions; IT solutions in user organizations; IT solutions in producing organizations; Multimedia/Graphics specialization modules.</p>

D) METHODS OF VERIFYING LEARNING OUTCOMES

Verification of knowledge outcomes:

- Interactive quiz on Moodle platform (test and descriptive questions)
- Written test (test and descriptive questions)
- Written exam (test and descriptive questions)
- Oral test
- Mid-semester assessments
- Individual or group preparation of a topic
- Individual written work in the form of an essay or paper
- Case study analysis
- Report
- Thesis (theoretical part with bibliography)

Verification of skills outcomes:

- Project
- Activity during classes understood as engagement in group work
- Practical tasks performed individually or in teams
- Simulations during classes
- Written test (problem-based questions)
- Written exam (problem-based questions)
- Thesis (practical part – survey research, data analysis, conclusions, recommendations)

Verification of social competences outcomes:

- Moderated discussion or debate conducted during classes
- Participation in classes understood as active conversation with the instructor
- Presentation of a topic or project to the group, defense of the project
- Peer feedback

A key element of the learning outcomes measurement system is the diploma project produced during the diploma seminar and its defense. Based on students' three-semester participation in the seminar and completion of the diploma project according to university standards, its evaluation by the supervisor and reviewer, and its defence, a broad spectrum of outcomes is measured. The diploma project at first-cycle level is prepared by students in teams and contains a concept for solving a practical or theoretical problem in the field of study. The Thesis Quality Committee reviews diploma project topics for compliance with the field of study. The general principles of the graduation process are set out in the Study Regulations; the detailed procedure for sitting the diploma examination is published on the Extranet/Intranet in advance.

E) STUDY PLAN

The detailed study plan (timetable) is available in the official university documentation. It includes the schedule of all courses, contact hours, ECTS credits, and assessment methods for each specialization across all semesters of the program.