



Lodz University
of Technology

Study programme

Faculty:	Faculty of Electrical, Electronic, Computer and Control Engineering
Major:	Biomedical Engineering
Level of study:	second-cycle programme (magister inżynier)
Form of study:	full-time studies
Academic year:	2026/27

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Basic information

Name of the field of study:	Biomedical Engineering
Level of study:	second-cycle programme (magister inżynier)
Study profile:	general academic
Form of studies:	full-time studies
Duration of studies (number of semesters):	3
The number of ECTS points required to complete studies:	90
Total number of hours of classes:	1125
The number of ECTS points a student obtains as part of classes conducted with the direct participation of academic teachers or other persons conducting classes:	45
Professional title awarded to graduates:	magister inżynier
ISCED code:	0788
Language of study:	polish

Assigning the course to the disciplines to which the learning outcomes relate

Discipline	Percentage share
Technical computing and telecommunications	54%
Material Engineering	41%
Biomedical engineering	5%

Learning outcomes (in relation to the PQF)

No.	Learning outcome code	Learning Outcome Content	Reference to the universal characteristics of the first level of PRK	Reference to the second-level characteristics of the PRK, taking into account the second-level characteristics enabling the acquisition of engineering competences
1	2IBM1	Has in-depth knowledge of IT techniques to support signal and imaging diagnostics in medicine and the properties of biomedical materials, their interactions with the body and selection criteria.	P7U_W	P7S_WG, P7S_WG_inż
2	2IBM2	Has knowledge of legal, social and economic aspects of medicine and intellectual property protection.	P7U_W	P7S_WK, P7S_WK_inż
3	2IBM3	Identifies and explains the principles of operation and applications of modern technologies, and is able to use them to design and evaluate innovative solutions in healthcare, taking into account the full design and operation cycle.	P7U_W	P7S_WG, P7S_WK
4	2IBM4	Is able to design and evaluate advanced biomedical engineering solutions, including materials, devices and systems, selecting and adapting design methods, supporting tools and prototyping and testing techniques, taking into account innovative scientific and technological solutions and current trends in the field.	P7U_U	P7S_UW, P7S_UW_inż
5	2IBM5	Is able to plan and conduct experiments and analyze the obtained results, identifying opportunities for improvement in existing biomedical systems taking into account technical and economic criteria, using the latest achievements in science and technology and the principles of a modern research approach.	P7U_U	P7S_UW, P7S_UU, P7S_UW_inż
6	2IBM6	Is able to use literature and databases, integrate interdisciplinary knowledge, formulate conclusions and opinions, present the results of research or project work and conduct discussions also in English at B2+ level, while maintaining the standards of scientific and academic communication.	P7U_U	P7S_UW, P7S_UK
7	2IBM7	Is able to communicate the achievements of biomedical engineering in a way that is understandable to various audiences, taking into account different points of view and the specificity of the scientific, technical and social context.	P7U_U	P7S_UK
8	2IBM8	Is able to effectively collaborate and lead an interdisciplinary team, employing communication, organizational and leadership skills and demonstrating creativity and innovation in identifying and solving complex biomedical engineering problems.	P7U_U	P7S_UO
9	2IBM9	Is ready to make responsible ethical, social and environmental decisions in the activities of a biomedical engineer and to act in an entrepreneurial manner, initiating and implementing innovative solutions in line with the principles of sustainable development.	P7U_K	P7S_KK, P7S_KO, P7S_KR

Matrix of course modules in relation to learning outcomes and curriculum content

No.	Course name	Program content	2IBM1	2IBM2	2IBM3	2IBM4	2IBM5	2IBM6	2IBM7	2IBM8	2IBM9
1	Medical Devices Certification	Medical device classification regulations, CE marking requirements, and legal sources governing the introduction of products to the market by class. Devices used in certification, requirements for assessing physicochemical, mechanical, and biological properties, sources of guidelines and standards for medical documentation and certification pathways, documentation of regulations, directives, and standards, and their interrelationships.		x				x			x
2	The Influence of Physical Factors on Living Organisms	physical factors influencing the functioning of living organisms, i.e. noise, temperature, electromagnetic field, ionizing radiation, non-ionizing radiation and the effects of their action on living organisms.	x					x			x
3	Biological Evaluation of Biomaterials	Definitions and concepts related to materials biocompatibility testing. The nature of tissue-implant interactions. Testing of materials in contact with blood. Genotoxicity testing. In vitro cell culture. Cytotoxicity testing. Evaluation of biomaterials in vivo studies. Use of animals as model organisms. Evaluation of the allergic effects of biomaterials. Microbiological testing of biomaterials.	x		x	x		x	x		x
4	Microsystems in Medical Applications	selected issues related to the design and manufacturing of microsystems; mechanisms and phenomena used in silicon microsystems; structure and application examples of microsystems; reliability of microsystems; multi-domain simulation of basic micromachine systems in a CAD environment using the Finite Element Method.	x		x	x		x	x		x
5	Operating Tools and Techniques	The evolution of medical thought over the centuries: from ancient times to the present day; milestones in the development of surgery: pain management, infection control, blood therapy; the division and types of modern surgical instruments; typical features of surgical instruments; materials used for surgical instruments; control and handling of instruments; surgical techniques in soft tissue surgery; surgical techniques in orthopedics; the role of imaging techniques in modern surgery; medical robots; modern computer techniques in medicine; biobots	x		x	x		x	x		x
6	3D Printing and Bioprinting	Basics of additive techniques; variety of 3D printing techniques, including materials dedicated to each of them; introduction of concepts differentiating 3D printing and 3D bioprinting; advantages and disadvantages of individual technologies, as well as their varieties and directions of development; latest achievements in the field of bioprinting for biomedical applications; progress in 3D printing and 3D bioprinting in terms of complementary development of other fields of science and technological achievements; basic research techniques and parameters verifying the correctness and efficiency of 3D printing and bioprinting.	x		x	x		x	x		x
7	Medical Electronic Equipment and Mobile Technologies	Basic anatomy for biosignal recording; amplifiers and safety in medical equipment; electronic and portable devices for biosignal recording. User interface design and universal design principles. An overview of mobile operating systems and programming languages, application distribution methods, and limitations in mobile device programming. Basic architecture of a selected mobile system, software development and management, graphical and audio interface design, and the use of built-in mobile device resources.	x		x	x		x	x		x
8	Methodical Design of Innovative Biomedical Solutions	patterns and principles of the given method, differences and correctness of tool selection depending on the type of project, its topic, level of complexity, available resources and expected results, team project thematically related to the field of study and specialization, project topics will always remain within the area of biomedical engineering.			x	x				x	

No.	Course name	Program content	2IBM1	2IBM2	2IBM3	2IBM4	2IBM5	2IBM6	2IBM7	2IBM8	2IBM9
9	Ethical Aspects and Principles of Conducting Clinical Trials	The history of clinical trials, post-World War II abuses, and the importance of the Nuremberg Code, the Helsinki Declaration, and the Belmont Report. Ethical principles, patient well-being, therapeutic and research experiments. Phases of preclinical and clinical trials, an overview of Polish legislation. Good Clinical Practice (GCP), the competencies of trial participants, regulatory institutions in Poland and internationally, CROs, and clinical trial transparency.		x				x	x		x
10	Introduction to Biomedical Engineering	basic issues in the field of biomedical engineering, methods and applications of image processing and biomedical signals.	x		x				x		
11	Polymer Biomedical Composites	Selected topics in composites: definitions, types, and importance in biomedical engineering. Criteria for selecting materials for biomedical composites, their production methods, and characterization. Carbon and polymer fibers in biomedical applications and composite degradation. Production of nanofibrous structures and composites with fibrous and powder phases, carbon fiber, and biocompatible polymers, including by injection molding. Assessment of the mechanical properties of the resulting materials.	x		x	x	x	x	x	x	
12	Artificial Organs	artificial organs, their structure and operation, anatomical structure of selected organs; achievements of modern bionics, selected aspects of ethics in implantation, artificial heart valves, extracorporeal circulation, respiratory support, artificial kidney, dialysis and hemodialysis, artificial pancreas, artificial liver.	x		x	x	x	x	x	x	
13	Electronic Aid Systems for the Disabled	Gerontology and aging; age-related disabilities (dementia, motor and sensory limitations) and their types. Information and communication systems in telecare, smart home technologies, and rehabilitation devices. Wearable and implantable assistive devices, human-computer interfaces, and brain-computer systems. Examples of support systems for the elderly and disabled, solutions for the blind, virtual reality in rehabilitation, and digital accessibility.									
14	Textronic Advanced Biomedical Systems	Standards and safety of medical systems; textile materials in biomedical textronics; conductivity of fibrous structures; integration of sensors with electronics and clothing; monitoring vital signs; interference and propagation of body waves; examples of systems for chronically ill patients. Fabrication of conductive paths and sensors, ECG electrodes, and textile antennas; assessment of their properties and design of a selected textronic system.	x		x	x	x	x	x	x	
15	Robotics in Rehabilitation	Rehabilitation and medical manipulators and robots; Service, social and android robots as tools and assistants in therapy; Measurement of biomechanical parameters of human movement; Impedance and position-force control of manipulators; The importance of the patient-robot and therapist-robot interface; tasks illustrating the lecture content using selected robots, creating and programming robot interfaces for specific tasks.	x		x	x	x	x	x	x	
16	Research Problem Based Learning	Detailed content depends on the project topic chosen by students from the available options.		x			x	x		x	
17	Functionalization of Biomaterials by Physicochemical Methods	Types of biomaterials and their requirements. Key surface characteristics and modification trends and techniques, including plasma methods and surface cleaning. Polymer modifications imparting anti-adhesive, hydrophilic, antibacterial, and other properties. Self-assembly on surfaces and chemical modifications: covalent bonds, ionic bonds, van der Waals interactions, ionic techniques, radiation, layer-by-layer, and ALD.	x		x	x	x	x	x	x	

No.	Course name	Program content	2IBM1	2IBM2	2IBM3	2IBM4	2IBM5	2IBM6	2IBM7	2IBM8	2IBM9
18	Nanomaterials in Medicine	Issues in the structure, fabrication, and application of nanomaterials in medicine. Carbon nanomaterials from nanopowders to nanocoatings. Possibilities of creating hybrid materials. Polymer nanofabrics. Factors determining surface modification at the nanoscale. Typical fabrication methods and material solutions for nanocoatings for biomedicine. Assessment of nanomaterial properties in selected physicochemical studies. Issues related to nanorisk.	x		x	x	x	x	x	x	
19	Engineering for Battlefield Medicine	Fundamental differences between military and civilian medicine. Issues related to the application of treatment technologies in combat-specific conditions, including the use of diagnostic equipment and biomaterials for rapid tissue regeneration and hemorrhage control. The possibilities of using implants and temporary and replacement prostheses, life-saving equipment, and individual and group medical equipment will be presented. Additionally, future systems for wartime applications will be demonstrated.	x		x	x	x	x	x	x	
20	Advanced Technologies in Biomaterials	Classification and properties of fibrous biomaterials, including surgical sutures, dressing materials, and perioperative textiles. Characterization of polymers used in biomaterials and the structure-property relationship. Surface modification methods, including those using electric fields. Application of polymeric biomaterials in tissue engineering and regenerative medicine, and modern manufacturing technologies. Preparation of films, foams by freeze-drying, microcapsules, electrospun nanofibers, and surgical sutures. Construct characterization (microscopy), additive methods, testing of air permeability, absorbency, and mechanical properties of materials.	x		x	x	x	x	x	x	
21	Foreign Language for Specialist Purposes	Features and analysis of a scientific text; summarising, paraphrasing, citing, bibliography and avoiding plagiarism; describing concepts and processes; presenting and interpreting research results; developing a text, synthesizing sources and formulating statements; linguistic register; types and features of scientific presentations, signposting, body language; linguistic and grammatical rules in writing and presenting; structure of a scientific article, case study, review article.						x	x		
22	Biomimetic Materials and Structures	Patterns from nature in technology and materials engineering to optimize the functional properties of materials and structures; using inspiration from biological structures and processes for practical technological solutions and in materials design; introduction to biomimetics; materials with superhydrophobic properties, with special adhesive properties; biomimetic optical materials; biomimetic nanomaterials; biomimetic patterns of surface topography; biomimetics and natural porous materials and composites.	x		x	x	x	x	x	x	
23	Molecular Modeling of Biomolecules	Fundamentals of molecular modeling: molecular mechanics, force fields, electrostatics, and basic quantum methods. Geometry optimization, molecular dynamics, free energy calculations, and environmental considerations. Biochemical system modeling and structure prediction, spatial information storage, visualization packages, and file formats. Remote computing, data transfer, and queuing systems. Applications: conformational analysis, geometry optimization, vibrational analysis, and electrostatic properties.	x		x	x	x	x	x	x	
24	Imaging Diagnostics	Distorted image model and restoration methods. Quantitative quality assessment, feature determination and selection. Basic classifiers and neural networks in classification. Quantitative methods in imaging diagnostics. Implementation of image restoration and analysis of results. Application of data processing methods and computer tools for quantitative image analysis.	x		x	x	x	x	x	x	

No.	Course name	Program content	2IBM1	2IBM2	2IBM3	2IBM4	2IBM5	2IBM6	2IBM7	2IBM8	2IBM9
25	Diploma Seminar	Each student prepares three oral presentations individually: the first, devoted to the initial phase of preparing the thesis; the second, presenting its main findings; and the third, a short presentation lasting several minutes, meeting the requirements of the thesis exam. Preparation for the competency exam.									
26	Final Project	Conducting a literature review. Dividing the work into specific tasks. Selecting tools to solve the specific tasks. Conducting experiments. Analyzing the obtained results. Describing the results.									
27	Internship	The internship takes place in the third semester, lasting at least four weeks, and is preceded by occupational health and safety training and an introduction to the company's production profile. The student works in a relevant department, actively participating in the company's operations. The internship schedule is tailored to the company's capabilities and the technologies used. The internship is conducted under the supervision of a supervisor from the company and the university. The student submits an individual schedule to the university supervisor, describing the tasks and their deadlines.							x	x	
28	Medical Device Evaluation Systems	Standardization and conformity assessment: standards objectives, standards organizations, document types, the New Approach, harmonized standards, mandatory and voluntary certification, declaration of conformity, certification bodies. Accreditation: definition, objectives, process, and accreditation bodies. Management systems: quality, environmental, HACCP and GMP/GHP, laboratory quality systems, medical quality systems, integrated management systems. Medical materials testing: assessment of physical, chemical, and biological properties, selection of methods for material type and product requirements. Assessment of the properties of dressings, hospital devices, and implantable devices.							x	x	x

ECTS - subjects

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
1	Medical Devices Certification	4	4		4	
2	The Influence of Physical Factors on Living Organisms	4			4	
3	Biological Evaluation of Biomaterials	5			5	
4	Microsystems in Medical Applications	5			5	
5	Operating Tools and Techniques	5			5	
6	3D Printing and Bioprinting	4			4	
7	Medical Electronic Equipment and Mobile Technologies	5			5	
8	Methodical Design of Innovative Biomedical Solutions	5			5	
9	Ethical Aspects and Principles of Conducting Clinical Trials	3	3		3	
10	Introduction to Biomedical Engineering	4			4	
11	Polymer Biomedical Composites	4			4	
12	Artificial Organs	2			2	
13	Electronic Aid Systems for the Disabled	4			4	
14	Textronic Advanced Biomedical Systems	4			4	
15	Robotics in Rehabilitation	4			4	
16	Research Problem Based Learning	10			10	10
17	Functionalization of Biomaterials by Physicochemical Methods	4			4	
18	Nanomaterials in Medicine	4			4	
19	Engineering for Battlefield Medicine	4			4	
20	Advanced Technologies in Biomaterials	4			4	
21	Foreign Language for Specialist Purposes	2				

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
22	Biomimetic Materials and Structures	3			3	
23	Molecular Modeling of Biomolecules	3			3	
24	Imaging Diagnostics	4			4	
25	Diploma Seminar	3			3	
26	Final Project	20		20	20	
27	Internship	4		4		
28	Medical Device Evaluation Systems	3			3	

ECTS indicators

Name	Value
The total number of ECTS credits that a student must obtain through elective courses (amounting to no less than 30% of the total ECTS credits required to obtain the qualification corresponding to the given level of study)	56/90 (62.22%)
The total number of ECTS credits to be earned by a student through courses in the fields of humanities or social sciences	7
The total number of ECTS credits that a student must obtain from courses related to research conducted at the university, amounting to more than 50% of the total ECTS credits required to graduate from a given level of study	84/90 (93.33%)

Methods of verifying and assessing learning outcomes

Verification of achieved learning outcomes requires the use of diverse forms of student assessment, appropriate to the categories of knowledge, skills, and social competencies to which these outcomes relate. The selection of suitable tools also depends on the specifics of the subject and the form of classes, and is described in the syllabi of individual courses. The achievement of the required learning outcomes is verified through:

1. Written work (exams, tests, reports, essays, projects, posters, thesis, etc.);
2. Oral statements (oral knowledge checks, public presentations such as delivering a paper, presentation, etc.);
3. Practical and/or project tasks (both group and individual);
4. Observation and evaluation of student activity during classes;
5. Self-assessment and peer assessment (especially in the case of group projects);
6. Competency exam and diploma exam.

Verification may be formative (partial, repeated during classes) and/or summative (final assessment). The final verification result is given according to the currently applicable grading scale.

The course coordinator or instructor is obliged, during the first class, to discuss the course syllabus and to formulate and provide documented information to students regarding the methods of verification and the conditions for conducting assessments of learning outcomes.

Professional internships

Duration: 4 weeks

ECTS points earned: 4

Internships conducted in accordance with the study program in a form adapted to the profile and specificity of the field of study and in accordance with the rules set forth by the faculty and the University.

Characteristics of the course

Graduate profile

Graduates of second-cycle studies in Biomedical Engineering possess in-depth, interdisciplinary knowledge of modern technologies used in medicine, including computer techniques supporting signal and imaging diagnostics, as well as biomedical materials and their applications in contact with the human body. They understand the principles of design, operation, and evaluation of biomedical devices, systems, and technologies, as well as the legal, social, and ethical conditions governing their use. Graduates are prepared to independently develop their professional skills and continue their education in third-cycle studies.

Graduates can plan and conduct scientific research and experiments, analyze obtained results, and develop innovative technical solutions using modern IT tools and design methods. They demonstrate the ability to integrate knowledge from various areas of science and technology, as well as the ability to work in interdisciplinary research and design teams.

Graduates of the Biomedical Engineering program are prepared for creative work in an area where technical sciences support medicine. They can find employment in IT companies designing and implementing medical information systems, in design, construction, and technological units dealing with medical devices, including medical equipment, implants, and medical instruments, as well as in healthcare facilities integrating, operating, and maintaining diagnostic and therapeutic devices.

The relationship between the field of study and the university's strategy

The University's mission and main strategic goals have been defined and precisely specified in the Development Strategy of Lodz University of Technology for 2025-2030. This strategy is based on the implementation of the COOPERATION concept, the key areas of which are: - IMPACT on the socio-economic environment; - INTERNATIONALIZATION; - INNOVATION and technology transfer; - LEADERSHIP and organizational culture; - SCIENCE; - INFRASTRUCTURE; - STAFF; - TALENTS; - SUSTAINABILITY; - EDUCATION; - STUDENTS.

The University's strategic priorities include conducting groundbreaking research, developing the potential of scientists, and collaborating with businesses to transfer knowledge and technology. Preparing students and doctoral candidates for the challenges of the labor market by developing research, entrepreneurial, and social competencies. Building the University's international reputation through collaboration, academic exchange, and participation in global projects. Creating a friendly, ethical, and modern work and study environment, while respecting the principles of sustainable development, is key to the University's mission. The second-cycle Biomedical Engineering program addresses the University's mission through a curriculum based on in-depth knowledge and skills in medical informatics, medical electronics, engineering biomechanics, and biomaterials engineering, with a focus on the current state and development trends in these fields.

The content of the core subjects has been selected to ensure that each graduate acquires knowledge and skills that can be directly applied to interdisciplinary engineering activities in a competitive job market and to scientific and research activities in the field of biomedical engineering. Particular emphasis is placed on the ability to use modern equipment and diagnostic and therapeutic systems utilizing ICT, IT, electronic, and material methods, techniques, and technologies. Students learn to independently acquire knowledge, including the verification and selection of information from various sources, particularly electronic ones. Graduates are prepared to collaborate with medical doctors in the design and manufacture of medical equipment and diagnostic and therapeutic systems, as well as to participate in research projects related to biomedical engineering.

As with first-cycle studies, some classes are also taught in English in second-cycle studies. Graduates of second-cycle studies can remain at the university and continue their education in third-cycle studies at the Interdisciplinary Doctoral School. The specific learning outcomes are directly related to the concept and profile of education, which are aligned with the university's mission and strategy. They encompass the fields of engineering and technology, as well as the scientific disciplines of technical computer science and telecommunications, and materials science.

Educational objectives and employment and continuing education opportunities

The educational concept for the Biomedical Engineering program is based on the following pillars: research in the disciplines of technical computer science and telecommunications, and materials engineering. Education in the theoretical and practical aspects of computer science, electronics, and materials engineering related to biomedical engineering at both the major and specialist levels. Key areas of study include: biomedical signal and image processing, biomaterials and their assessment, biomaterial surface engineering, artificial intelligence, robotics, legal basis for the implementation of medical devices, artificial implants and organs, and manufacturing

technologies in medicine.

Taking into account the needs of employers in the program for a large number of practical classes, such as laboratories (working with specialized equipment used in medicine and the production of biomaterials), exercises (developing the ability to think abstractly), projects (aimed at preparing students for independent problem-solving and teamwork), seminars (preparing students to plan their work and present its results, critically evaluate their work and participate in discussions) and a wide range of specialized education in diploma blocks and in elective blocks.

Graduates of this program are prepared to work in:

- IT companies designing, implementing, and maintaining medical information systems,
- design, construction, and technological units developing medical devices such as diagnostic equipment, implants, and medical tools,
- healthcare facilities, where they can participate in the integration, operation, and maintenance of diagnostic and therapeutic devices and systems,
- research and development institutions conducting work at the intersection of technical and biomedical sciences.

The qualifications obtained enable graduates to find employment in companies in the medical, biotechnology, and IT sectors, as well as to continue their education in third-cycle studies (at doctoral schools) in fields related to biomedical engineering and technical sciences.

Description of the process and outcome of consultations on the proposed study program with the socio-economic environment

In developing the educational concept and curriculum for the Biomedical Engineering (IB) program, consultations were held with students and alumni employed by IB-related companies in the Łódź region (e.g., Tricomed, AptVision, Central Institute for Labor Protection, MDH, Technolutions). Members of the Biomedical Engineering program council also participated in events organized by the Łódź ICT Cluster, which brings together over 40 IT companies operating in the Łódź region. This allows for an understanding of the current labor market needs in computer science, which is the leading scientific discipline in the Biomedical Engineering program.

Cooperation with medical centers in Poland (e.g. Norbert Barlicki Hospital in Łódź, Copernicus Hospital in Łódź, Władysław Biegański Hospital in Łódź, Military Medical Academy Hospital in Łódź, Clinical and Didactic Center of the City of Łódź, Jagiellonian University Medical College, Polish Mother's Memorial Hospital Institute in Łódź) and companies dealing with individual orthopedic supplies (production of lower and upper limb prostheses) and the production of orthopedic implants and technologies used in implantation (Medgal, Proteo, Otopro) allows us to become familiar with the latest trends and needs of the medical market, and the program of study in this field is modified on this basis.

Description of competencies expected from a candidate applying for admission to studies

In accordance with the recruitment resolution in force for a given academic year.

The unit organizing education

Faculty of Electrical, Electronic, Computer and Control Engineering

Education program

Semester 1

Course	Number of hours	ECTS points	Form of verification	Obligatory
Medical Devices Certification	Seminar: 30 Lecture: 15	4	Exam	Obligatory
Methodical Design of Innovative Biomedical Solutions	Project work: 60	5	Graded assignment	Obligatory
Ethical Aspects and Principles of Conducting Clinical Trials	Seminar: 30	3	Graded assignment	Obligatory
Introduction to Biomedical Engineering	Seminar: 15 Lecture: 30	4	Exam	Obligatory
Elective Course Block 1		14	Graded assignment	Obligatory group
The student chooses 1 module				
Tools, Materials and Systems in Medicine 1		14	Graded assignment	Optional
The Influence of Physical Factors on Living Organisms	Seminar: 20 Lecture: 10	4	Graded assignment	Obowiązkowe w bloku
Biological Evaluation of Biomaterials	Laboratory classes: 30 Lecture: 15	5	Graded assignment	Obowiązkowe w bloku
Microsystems in Medical Applications	Laboratory classes: 30 Lecture: 20	5	Graded assignment	Obowiązkowe w bloku
Tools, Materials and Systems in Medicine 2		14	Graded assignment	Optional
Operating Tools and Techniques	Seminar: 30 Lecture: 15	5	Graded assignment	Obowiązkowe w bloku
3D Printing and Bioprinting	Seminar: 10 Laboratory classes: 10 Lecture: 10	4	Graded assignment	Obowiązkowe w bloku
Medical Electronic Equipment and Mobile Technologies	Seminar: 20 Project work: 20 Lecture: 10	5	Graded assignment	Obowiązkowe w bloku
Sum	305	30		

Semester 2

Course	Number of hours	ECTS points	Form of verification	Obligatory
Research Problem Based Learning	Project work: 75	10	Graded assignment	Obligatory
Foreign Language for Specialist Purposes	Tutorials: 45	2	Graded assignment	Obligatory
Elective Course Block 2		10	Graded assignment	Obligatory group
The student chooses 1 module				
Bloch 2.1 Biomaterials in Medicine 1		10	Graded assignment	Optional
Artificial Organs	Seminar: 20 Lecture: 10	2	Graded assignment	Obowiązkowe w bloku
Nanomaterials in Medicine	Laboratory classes: 30 Lecture: 20	4	Graded assignment	Obowiązkowe w bloku
Engineering for Battlefield Medicine	Seminar: 15 Project work: 20 Lecture: 15	4	Graded assignment	Obowiązkowe w bloku
Block 2.2 Biomaterials in Medicine 2		10	Graded assignment	Optional
Polymer Biomedical Composites	Laboratory classes: 30 Lecture: 20	4	Graded assignment	Obowiązkowe w bloku
Biomimetic Materials and Structures	Seminar: 30 Lecture: 10	3	Graded assignment	Obowiązkowe w bloku
Molecular Modeling of Biomolecules	Laboratory classes: 30 Lecture: 10	3	Graded assignment	Obowiązkowe w bloku
Elective Course Block 2		8	Graded assignment	Obligatory group
The student chooses 1 module				
Block 3.1 Medical Electronics and Textronics 1		8	Graded assignment	Optional
Textronic Advanced Biomedical Systems	Laboratory classes: 20 Project work: 20 Lecture: 10	4	Graded assignment	Obowiązkowe w bloku

Course	Number of hours	ECTS points	Form of verification	Obligatory
Robotics in Rehabilitation	Laboratory classes: 30 Project work: 10 Lecture: 10	4	Graded assignment	Obowiązkowe w bloku
Block 3.2 Medical Electronics and Textronics 2		8	Graded assignment	Optional
Electronic Aid Systems for the Disabled	Laboratory classes: 15 Project work: 15 Lecture: 15	4	Graded assignment	Obowiązkowe w bloku
Imaging Diagnostics	Laboratory classes: 30 Project work: 10 Lecture: 15	4	Graded assignment	Obowiązkowe w bloku
Block 3.3 Medical Electronics and Textronics 3		8	Graded assignment	Optional
Functionalization of Biomaterials by Physicochemical Methods	Laboratory classes: 20 Project work: 15 Lecture: 15	4	Graded assignment	Obowiązkowe w bloku
Advanced Technologies in Biomaterials	Laboratory classes: 20 Project work: 15 Lecture: 15	4	Graded assignment	Obowiązkowe w bloku
Sum	350	30		

Semester 3

Course	Number of hours	ECTS points	Form of verification	Obligatory
Diploma Seminar	Seminar: 30	3	Exam	Obligatory
Final Project	Diploma Thesis: 0	20	Pass	Obligatory subjects to choose from
Internship	Internship: 0	4	Pass	Obligatory subjects to choose from

Course	Number of hours	ECTS points	Form of verification	Obligatory
Medical Device Evaluation Systems	Laboratory classes: 25 Lecture: 20	3	Graded assignment	Obligatory
Sum	75	30		