Case no. DLO.0211.94.2024

Silesian University of Technology

Legal Monitor of the Silesian University of Technology

item 1412

RESOLUTION NO 63/2024
OF THE SENATE OF THE SILESIAN UNIVERSITY OF TECHNOLOGY
of 25 November 2024

amending the resolution on the adaptation of study programmes starting from the academic year 2019/2020 to the requirements defined in the Act

Acting pursuant to Article 28 section (1)) item (11) of the Act of 20 July 2018 - Law on Higher Education and Science (consolidated text, Journal of Laws of 2024, item 1571) the Senate of the Silesian University of Technology resolves as follows:

§ 1

Resolution no. 71/2019 of the Senate of the Silesian University of Technology dated 15 July 2019 on the adaptation of study programmes starting in the academic year 2019/2020 to the requirements specified in the Act (Legal Monitor of the SUT of 2019, item 210, as amended) shall be amended as follows:

Attachment no. 24.2 shall be replaced by the wording specified in the Attachment to the present resolution.

§ 2

The resolution shall be effective as of 1 March 2025.

Rector of the SUT: *M. Pawełczyk*

Study plan

Field/Course of study:	biomedical engineering
Cycle of study:	second cycle studies
Study profile:	general academic
Form of study:	full-time studies
Number of semesters	3 semesters
Number of ECTS credits required for graduation:	90 ECTS
Professional title awarded to graduates:	Master of Engineering
The field of study is assigned to disciplines:	biomedical engineering (100%) – leading discipline
Total number of teaching hours	full-time studies: 1125
Total number of ECTS credits to be obtained by the student in classes with direct participation of academic teachers or other instructors:	full-time studies: 45 ECTS
Number of ECTS credits a student must obtain from courses in humanities or social sciences – for fields of study assigned to disciplines within fields other than, respectively, humanities or social sciences:	5 ECTS
The scope and number of ECTS credits a student must obtain in the course of professional practice /internship:	Not applicable.
Principles and form of professional practice/internship:	Not applicable.

Symbol	**Assumed learning outcomes**	**Reference to the second-level characteristics of learning outcomes of the Polish Qualifications Framework**
Knowledge: student knows and understands		
K2A_W01	in-depth knowledge of advanced biomedical engineering, useful for formulating and solving complex engineering tasks	P7S_WG inż.
K2A_W02	fundamental problems and dilemmas of contemporary civilisation specific to the biomedical engineering programme, including those related to the use of artificial intelligence	P7S_WK
K2A_W03	advanced computer modelling methods, creating and adjusting models to experimental data, simulating biological processes, as well as methods of identifying parameters and assessing the quality of the models created	P7S_WG
K2A_W04	concepts of the life cycle of devices, as well as their equipment subject to rapid wear and tear, depreciation	P7S_WG_inż
K2A_W05	major trends and new developments in various scientific disciplines, including biomedical engineering	P7S_WG
K2A_W06	management issues, including biomedical engineering projects and the creation and development of individual entrepreneurship	P7S_WK
K2A_W07	economic, legal, ethical and other relevant conditions of various professional activities related to biomedical engineering, including data protection regulations and intellectual property rights	P7S_WK
Skills: student is able to		
K2A_U01	integrate knowledge from the fields of science and scientific disciplines related to biomedical engineering, obtained from literature, databases and other appropriately selected sources (also in English), as well as take into account non-technical aspects, interpret and critically evaluate such aspects	P7S_UW inż.
K2A_U02	prepare and present an oral presentation/scientific paper on biomedical engineering issues in Polish or a foreign language and communicate using various information and communication techniques	P7S_UK
K2A_U03	plan and organise work in a team, conduct experiments, in particular computer simulations, interpret the results obtained and draw conclusions	P7S_UO P7S_UW inż.
K2A_U04	use analytical, simulation and experimental methods when formulating and solving engineering tasks and research problems, design - according to a given specification - and make simple devices, objects, systems typical of biomedical engineering or implement processes, using appropriately selected methods, techniques, tools and materials, and formulate hypotheses related to engineering problems	P7S_UW inż.

K2A_U05	solve practical engineering tasks requiring the use of engineering standards and norms and the application of biomedical engineering technologies, using the experience gained in an environment of professional engineering activity, and assess the usefulness and applicability of biomedical sciences and new technological developments in medicine, as well as propose improvements to existing technical solutions	P7S_UU inż.
K2A_U06	assess the usefulness of methods and tools (including computer and IT devices and systems) used to solve an engineering task, carry out a critical analysis and evaluate the way they function	P7S_UW
K2A_U07	speak a second foreign language at level A1 or higher of the Common European Framework of Reference for Languages	P7S_UK
K2A_U08	use English at level B2+ of the Common European Framework of Reference for Languages, including specialist terminology from the field of biomedical engineering	P7S_UK
K2A_U09	independently plan and realise one's own lifelong learning and guide others in this respect	P7S_UU
Social competences: student is ready to:		
K2A_K01	critically appraise their knowledge and perceived content, including recognition of the limitations of available methods and tools	P7S_KK
K2A_K02	recognise the importance of knowledge in solving cognitive and practical problems and seek expert advice when difficulties arise in solving a problem independently	P7S_KK
K2A_K03	think and act in a creative and entrepreneurial manner	P7S_KO
K2A_K04	responsibly fulfil professional roles, in particular, reliably draw conclusions from conducted analyses, avoiding over-interpretation of their results, as well as observe and develop ethical principles related to the performed activities and demanding the same from others	P7S_KR

Classes and groups of classes

Name of class or group of classes	Number of ECTS	Learning outcomes (symbol) assigned to a class or group of classes	Program content ensuring the achievement of learning outcomes
Foreign language	4	K2A_U07	Vocabulary, communicative functions and grammatical structures at a selected level of language proficiency.
Group of courses in the field of humanities, economics and social sciences (HES)	5	K2A_W06 K2A_W07 K2A_U03 K2A_K03	Methods of managing projects related to the purchase, implementation and maintenance of medical devices, in particular systems and equipment. IT systems supporting the efficiency and effectiveness of project implementation through appropriate team management, work schedule preparation, budgeting, project implementation control and project risk assessment. Methods of business management. Legal regulations concerning medical devices. Ethical issues related to the work of a biomedical engineer.
Group of compulsory specialisation courses (including two courses taught in English 5 ECTS)	10	K2A_W01 K2A_W02 K2A_W03 K2A_W04 K2A_W05 K2A_U01 K2A_U02 K2A_U03 K2A_U04 K2A_U05 K2A_U06 K2A_U08 K2A_U09 K2A_K01 K2A_K02 K2A_K03 K2A_K04	Modern IT solutions used in hospital systems. Modern technologies, methods and tools for the production of medical devices. Engineering methods to support the planning of medical procedures using the latest scientific achievements, minimally invasive techniques and medical robots. As part of the classes conducted in English, the use of specialised terminology related to the chosen field of study at the B2+ level of the Common European Framework of Reference for Languages.
Group of courses for specialisations (including elective courses): Information technology in medicine	43	K2A_W01 K2A_W02 K2A_W03 K2A_W05 K2A_U01 K2A_U02 K2A_U03 K2A_U04 K2A_U05 K2A_U06 K2A_U09 K2A_K01 K2A_K02 K2A_K03 K2A_K04	Issues related to the field of advanced software design methods, with particular emphasis on solutions using elements of artificial intelligence and deep learning, as well as the analysis of multimodal data for broadly understood support of medical diagnostics and therapy.
Group of courses for specialisation	43	K2A_W01 K2A_W02 K2A_W03	Materials for medicine and dental prosthetics, including biomaterials and methods of modifying their surface using modern technologies for shaping surface layers and coatings. Design of personalised implants, modern implant

(including elective courses): Design and production of medical devices		K2A_W04 K2A_W05 K2A_U01 K2A_U02 K2A_U03 K2A_U04 K2A_U05 K2A_U06 K2A_U09 K2A_K01 K2A_K02 K2A_K03 K2A_K04	systems, surgical instruments and miniaturised surgical instruments, including medical sterilisation processes, as well as hospital and rehabilitation equipment. Techniques and technologies, as well as methods of manufacturing finished medical devices in accordance with the recommendations of relevant guidelines and standards. Preparation of technical-drawing and implementation documentation including procedures for the evaluation of medical devices, including clinical procedures, essential requirements, risk analysis, registration of the device with the Office for Registration of Medical Devices and other procedures required by the European Directive.
Group of courses for the specialisation (including electives): Biomechatronics and medical equipment	43	K2A_W01 K2A_W02 K2A_W03 K2A_W04 K2A_W05 K2A_U01 K2A_U02 K2A_U03 K2A_U04 K2A_U05 K2A_U06 K2A_U09 K2A_K01 K2A_K02 K2A_K03 K2A_K04	Principles of constructing medical equipment with the use of specialised engineering software (CAD/CAE) and creating complete technical documentation. Designing modern systems, biomechatronic devices and equipment for medical purposes, taking into account the life cycle and depreciation. Manufacturing technologies, biomechanical testing and risk assessment of medical devices. Engineering support for rehabilitation and sports training. Virtual reality (VR) technologies in medical applications. Assessment of systems' compliance with technical, ergonomic and safety standards in medicine. Engineering support for planning medical procedures using the latest Custom-Design technologies.
Group of courses for the specialisation (including electives): Medical engineering	43	K2A_W01 K2A_W02 K2A_W03 K2A_W04 K2A_W05 K2A_U01 K2A_U02 K2A_U03 K2A_U04 K2A_U05 K2A_U06 K2A_U09 K2A_K01 K2A_K02 K2A_K03 K2A_K04	The principles of functioning and construction of various medical devices and equipment, from diagnostic to therapeutic. Concepts in the field of equipment life cycle, as well as their equipment subject to rapid wear and tear, depreciation. Technologies for imaging, monitoring therapy and its effects, and medical diagnostics. Management of medical databases. IT systems used in the field of medicine, in particular in diagnostics and therapy. Artificial intelligence algorithms and tools, their application and limitations in clinical practice. Technical safety standards and rules in the context of medical devices, in particular systems and equipment. Administration of hospital information systems, including radiological image and data exchange systems (RIS and PACS), and medical data management.
Courses in the form of Project Based Learning (PBL)	6	K2A_U01 K2A_U02 K2A_U03 K2A_U04 K2A_U05 K2A_U06 K2A_K01 K2A_K02 K2A_K03 K2A_K04	Project implementation in the form of PBL in subject areas consistent with the field of study and the selected scope of graduation.
Courses from the University database of elective courses	2	K2A_W05 K2A_U09	Classes selected from the general database covering a wide range of subjects, which may relate to subject-specific, interdisciplinary or humanities and social sciences issues.
Diploma seminar (preparation of master's thesis)	20	K2A_W01 K2A_W02 K2A_U01 K2A_U02 K2A_U03 K2A_U04 K2A_U05 K2A_U06 K2A_U09 K2A_K01 K2A_K02 K2A_K03 K2A_K04	Issues related to the ability to correctly conduct the research process as part of the implementation of a master's thesis and preparation of a description of research work, in terms of syntax, editing and formatting of text, selection of content that is appropriate to the topic of the performed work, formulation of research objectives, and summary and evaluation of the research work carried out. Learning to argue in a discussion and justify one's own position. Solving research problems in the field of biomedical engineering independently, consisting in the application of scientific methods aimed at achieving the set goal, along with the preparation of documentation of the research and application work carried out.

Means of verification and assessment of the learning outcomes achieved by the student throughout the entire learning cycle

Name of the means of verification and assessment of learning outcomes	Description of how learning outcomes are verified and assessed
Written examination	The examination tests the student's knowledge by requiring them to be able to combine facts, answer cross-sectional questions and/or solve specific engineering problems e.g. calculus tasks, create computer programs. The examination may be conducted in the form of a single-choice or multiple-choice test or be in the form of open questions.
Oral examination	The oral examination is aimed at checking the student's knowledge, level of understanding of the issues constituting the course content, ability to combine and analyse facts, ability to solve engineering problems indicated by the examiner.
Diploma examination	The oral examination which includes answering questions concerning the curricular content of the course and in the scope of graduation.
Final written test	The final written test verifies the student's knowledge of the material realised in the course. It may be conducted in the form of cross-sectional questions, as well as engineering / calculation tasks, as well as in the form of a single or multiple-choice test or may be in the form of a set of open questions.
Oral test in class	An oral test consists in oral answers to questions on topics covering the content of the course. It is used to check the level of mastery of part or all of the course content.
Project	Evaluation of a completed project task performed independently (or possibly in cooperation with other students, upon the consent of the teacher) under the guidance of the teacher.
Report	Evaluation of the knowledge and ability to analyse the results and formulate conclusions from the research/experiments carried out independently (or possibly in cooperation with other students, upon the consent of the teacher) under the guidance of the teacher.
Presentation	Oral, audiovisual or electronic presentations of end-of-term assignment.
Computer programme	A computer programme prepared in a selected programming language, constituting the implementation of an algorithm or required functionality, possibly with a graphical user interface, or source codes of developed programmes or libraries, or their fragments.
Observation of activity	Observation and assessment of the student's practical skills based on the way in which the research/experiments are carried out, as well as on the basis of oral/written statements during the course.

I, Małgorzata Sokołowska, a sworn translator of the English language in Gliwice, entered on the list of sworn translators of the Minister of Justice under the no.: TP/1509/05, certify this to be a true translation of a Polish document prepared in Word.
Gliwice, this 31 March 2025. Rep. no. 142/2025.

Ja, Małgorzata Sokołowska, tłumacz przysięgły języka angielskiego w Gliwicach, nr wpisu na listę tłumaczy przysięgłych Ministra Sprawiedliwości: TP/1509/05, poświadczam zgodność niniejszego tłumaczenia z okazanym mi plikiem Word dokumentu sporządzonego w języku polskim.
Gliwice, dnia 31 marca 2025 roku. Rep. Nr 142/2025.