1.	**Field of study**	**Materials Science and Engineering**
2.	Faculty	Faculty of Science and Technology
3.	Academic year of entry	2025/2026 (summer term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time
7.	ISCED code	0715 (Mechanics and metal trades)
8.	Number of semesters	3
9.	Degree	magister (Master's Degree)
10.	General characteristics of the field of study and the assumed concept of education	Materials Science is an interdisciplinary field of scientific and technical research that analyzes the influence of the chemical and physical structure of materials on their electrical, mechanical, optical, surface, chemical, magnetic, and thermal properties, as well as various combinations of these properties. Materials Science encompasses a range of modern physical and chemical research techniques that can be used to characterize both the structure and properties of materials. These techniques are designed to study the influence of structure on the properties of materials, particularly those that are practically applied in various technologies. This enables the development of methods for obtaining materials with precisely defined functional characteristics. This research not only influences the planned structure of end products but also helps develop effective methods for their production and processing. The second-cycle, full-time Master's degree program in Materials Science offers three specializations: Biomaterials, Innovative Engineering Materials, and Quality Control of Materials and Products. The common feature of this specialization is an interdisciplinary body of knowledge in the areas of team management in research and industrial activities, the operation of IT systems and computer-aided engineering systems, the selection of materials and manufacturing technologies, and material processing. Graduates are prepared to take creative initiatives and make decisions regarding engineering and materials technologies, as well as to independently run their own businesses and operate in small and medium-sized enterprises, with particular emphasis on the intersection of materials science, medicine, and veterinary medicine.
11.	Information on the relationship between the studies and the university's strategy as well as the socio-economic needs that determine the conduct of studies and the compliance of learning outcomes with these needs	The interdisciplinary "Materials Engineering" program, offered across all three cycles, aligns well with two strategic goals identified in the University of Silesia's Development Strategy: "Innovative education and modern teaching offerings" and "Active collaboration between the University and its environment." This modern curriculum encompasses three specializations: Biomaterials, Innovative Engineering Materials, and Quality Control of Materials and Products, enabling a significant individualization of the educational process. One of the priority goals of this program is a close relationship with industry and medicine, which allows students to learn about the specifics of the relevant industries, technological needs, and inventiveness. Students in this program complete their master's theses in collaboration with companies and industrial enterprises operating in both technical and medical fields. This allows for better utilization of the students' scientific potential and, on the other hand, adapts the curriculum to the needs of the labor market. The ability to design, knowledge of how to produce and introduce new innovative materials fits this field into the general trend and strategy of education focused on a knowledge-based economy.
12.	Specializations	Biomaterials Innovative Engineering Materials Quality control of materials and products
13.	General description of the specialization	<u>Biomaterials</u> Graduates possess advanced knowledge of biomaterials used in implants and artificial organs. They understand the structure and functioning of implants, artificial organs, and tissues, as well as the impact of physiological and biological environments on the degradation rate of biomaterials, with particular emphasis on toxicological and allergenic aspects. They are familiar with advanced research methods enabling in-depth analysis of the structure and properties of biomaterials. They can utilize knowledge of materials

		engineering and technology to perform material analyses and design technological processes and studies that expand the use and acquisition of new materials for medical applications. The comprehensive knowledge gained in materials engineering, particularly in the field of biomaterials, predisposes graduates to work as consultants in the medical field. The "Biomaterials" specialization expands and enhances the existing "Materials Engineering" program offerings. It will allow students to focus on the specifics of materials for applications in medicine, dentistry, and veterinary medicine. Progress in medicine places increasing demands on the properties of biomaterials, including their biocompatibility. Major issues related to biomaterials include: the selection of implant materials and their applications, the influence of the living organism's environment on implant behavior, the basic assumptions of bioavailability, tissue reaction mechanisms, the biophysical, biochemical, and biomechanical requirements for implants, corrosion, abrasion, and degradation of various biomaterials, technologies for applying surface layers to implants, and implant design issues. All of this necessitates the training of highly specialized scientific and technical personnel dedicated to the design, modeling, and testing of the properties and structure of biomaterials, as well as their commercialization. Graduates of this specialization will fill a long-standing gap between engineers specializing in biomaterials and physicians who use these materials in practice. <u>Innovative Engineering Materials</u> Graduates of the second-cycle program in Innovative Engineering Materials possess skills and advanced knowledge in materials science, engineering materials design, processing, and shaping their properties, as well as IT tools applied to materials science. Materials science is an interdisciplinary field of scientific and technical research, combining elements of physics, chemistry, mechanics, manufacturing technology, and computer science. Its core research focuses on the study of the influence of the chemical and physical structure of materials on their mechanical, electrical, optical, surface, chemical, magnetic, and thermal properties, as well as the interrelationships between these properties. This knowledge provides the foundation for the development, processing, and use of modern materials in various industries and technologies. Modern materials science is based on the application of a broad spectrum of research methods—both physical and chemical—enabling the comprehensive characterization of the structure and properties of materials and biomaterials. Graduates will be prepared to develop new materials with precisely defined performance parameters, as well as to improve the production, processing, and quality assessment of existing materials and products. <u>Quality control of materials and products</u> Graduates of the second-cycle "Quality Control of Materials and Products" specialization possess skills and advanced knowledge in materials science, engineering materials design, processing, and shaping their properties, quality control of materials and products, as well as IT tools applied to materials science and quality control. The curriculum in the "Quality Control of Materials and Products" specialization will enable the education of specialists equipped with knowledge of the latest achievements in physics, chemistry, and metallurgy in the production of modern materials and the possibilities of modeling new ones. Graduates of this specialization possess the ability to comprehensively assess the quality of various groups of materials and conduct ongoing analysis of their performance parameters important for the production and processing of materials for specific applications. During their studies, they will acquire the ability to use scientific and technical information and acquire the knowledge necessary to communicate effectively with teams. Graduates possess knowledge of computer science and the implementation of IT systems and will be prepared to participate in projects requiring the assessment of the quality of modern materials in industry, research and service institutions, and in medium- and small-sized enterprises. Moreover, having in-depth knowledge of basic sciences and general knowledge of materials technology, they will be able to communicate effectively both with engineers employed in economic entities and organizations and with researchers dealing with modern materials.
14.	The semester from which the specializations starts	1
15.	Percentage of the ECTS credits for each of the scientific or artistic disciplines to which the learning outcomes are related to the total	Biomaterials: • *[leading discipline]* materials engineering (engineering and technology): 100% Innovative Engineering Materials:

	number of ECTS credits (along with the indication of the leading discipline)	• *[leading discipline]* materials engineering (engineering and technology): 100% Quality control of materials and products: • *[leading discipline]* materials engineering (engineering and technology): 100%
16.	Number of ECTS credits required to achieve the qualification equivalent to the level of study	90
17.	Percentage of the ECTS credits for optional modules in relation to the total number of ECTS credits	Biomaterials: 57%, Innovative Engineering Materials: 57%, Quality control of materials and products: 72%
18.	Total number of ECTS credits that a student must obtain in the modules taught	Biomaterials: 48, Innovative Engineering Materials: 47, Quality control of materials and products: 59
19.	Number of ECTS credits that a student must obtain in modules assigned to disciplines within the humanities or social sciences (not less than 5 ECTS) - in the case of fields of study assigned to disciplines within the fields other than, respectively, humanities or social sciences	Biomaterials: 6, Innovative Engineering Materials: 6, Quality control of materials and products: 6
20.	Number of ECTS credits - higher than 50% of the total number of credits - that a student must obtain: • in general university programmes within a module connected with research carried out in the scientific or artistic disciplines to develop his/her knowledge and research skills; • in practical programmes within a module to develop practical skills	Biomaterials: 62, Innovative Engineering Materials: 55, Quality control of materials and products: 76
21.	Total number of ECTS credits that a student must obtain in internships	Biomaterials: 0, Innovative Engineering Materials: 0, Quality control of materials and products: 0
22.	Internships (hours and conditions) in the case of practical programmes and in general university programme - if such requires internship	not applicable
23.	Graduation requirements	The condition for admission to the diploma examination is to achieve the learning outcomes provided for in the study program, to obtain a certificate of an appropriate level of language proficiency in a foreign language and to obtain positive grades for the diploma dissertation. The condition for graduation is to pass the diploma examination with at least a satisfactory result. A graduate receives a higher education diploma confirming obtaining the qualifications of the appropriate degree.

		Detailed rules of the diploma process and the requirements for the diploma thesis are set out in the Rules and Regulations of Studies at the University of Silesia and the diploma regulations.