

**Learning outcomes of the programme:**

1.	Field of study	<b>Materials Science and Engineering</b>
2.	Academic year of entry	2018/2019 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic

Code of the learning outcome of the programme	Learning outcomes The graduate:	Codes of the learning outcomes of the areas of education to which the learning outcome of the programme is related
<b>KNOWLEDGE</b>		
IM1A_W01	have knowledge of mathematics, comprising linear algebra, rudiments of complex numbers theory, statistics and calculus, vector and tensor calculus; necessary to understand and describe properties of engineering materials as well as their testing methods; understand the importance of approximations used in calculations of materials properties	T1A_W01
IM1A_W02	have knowledge of physics, comprising mechanics, electricity and magnetism, optics, atomic physics and elements of solid state physics, including the knowledge necessary to understand basic physical phenomena occurring in various engineering materials	T1A_W01
IM1A_W03	have basic theoretical and practical knowledge of general, inorganic and organic chemistry necessary to form properties of engineering materials resulting from appropriate qualitative and quantitative choice of the chemical composition	T1A_W01
IM1A_W04	have structured and theoretically founded knowledge of basic terms, phenomena and processes in the technical thermodynamics necessary to understand the energy transformation in thermodynamic transformations and rules of energy and exergy balance	T1A_W02, T1A_W03
IM1A_W05	have detailed knowledge about the structure and specific characteristics of amorphous and crystalline materials; single-crystals and polycrystals; mono- and polyphase materials; nanomaterials and macroscopic materials	T1A_W04
IM1A_W06	have structured and theoretically founded knowledge of individual groups of engineering materials, including the knowledge necessary to understand the relationships between the internal structure and properties as well as designing and modelling new materials of specified properties	T1A_W03
IM1A_W07	have knowledge about phenomena and processes affecting the formation of structure and properties of basic engineering materials	T1A_W03
IM1A_W08	know basic testing methods and construction of research instruments necessary to describe the structure and to assess basic properties of engineering materials	T1A_W06, T1A_W07
IM1A_W09	have structured basic subject-matter knowledge of equipment, manufacturing techniques and processing of basic engineering materials groups	T1A_W02, T1A_W06
IM1A_W10	have knowledge about the recycling of raw materials, materials and energy necessary to choose appropriate management methods for waste originating from engineering activities	T1A_W03, T1A_W08
IM1A_W11	have basic knowledge about development trends in the area of the newest engineering materials for industrial and medical applications as well as advanced manufacturing technologies and techniques of their properties forming	T1A_W05
IM1A_W12	have founded and structured subject-matter knowledge about mechanics and biomechanics comprising a statistical analysis of mechanical systems and machine components efforts, materials strength as well as criteria for materials selection based on models of technical mechanics and biomechanic systems	T1A_W02, T1A_W06
IM1A_W13	have expanded and theoretically founded knowledge about materials designing and selection methodology for engineering structures, necessary to understand interrelations between the materials structure, properties and manufacturing methods, having a decisive impact on the engineering structures durability	T1A_W03
IM1A_W14	have structured and theoretically founded knowledge related to understanding physico-chemical phenomena and mechanisms occurring during chemical and electrochemical corrosion, methods for its prevention and learning economic and business aspects of materials corrosion	T1A_W03
IM1A_W15	have elementary and structured subject-matter knowledge about phenomena and processes occurring on the surface or in the surface layer of engineering materials, necessary to understand changes of materials structure and properties in the surface layer during the operation and during its modification; assessment of negative processes in the surface layer of an engineering material and suggesting an adequate prevention	T1A_W02, T1A_W03, T1A_W06
IM1A_W16	have structured and theoretically founded knowledge about the area of metallic, ceramic, polymer, biocomposite, and carbon biomaterials existing on the nano, micro and macroscale, necessary to determine properties, which a biomaterial must feature	T1A_W02, T1A_W03

IM1A_W17	have basic subject-matter knowledge about physical and chemical phenomena and processes as well as interactions occurring between biomaterials and the biological environment of a human body, knowledge of immunological and haematological issues necessary to understand specific conditions of biomaterials operation	T1A_W02, T1A_W03
IM1A_W18	have structured knowledge about the computer architecture and the hardware layer necessary for applications in materials engineering	T1A_W02, T1A_W03
IM1A_W19	have elementary knowledge about operating systems, necessary for installation, service and maintenance of IT tools used for the technical designing and for the analysis of engineering materials properties	T1A_W02, T1A_W07
IM1A_W20	have structured knowledge about programming methodology and techniques; know at least one higher-order programming language necessary to simulate phenomena and processes occurring in engineering materials	T1A_W02, T1A_W06, T1A_W07
IM1A_W21	have founded and structured subject-matter knowledge about designing, structure and application of database systems, necessary for their comprehensive use for the needs of engineering activities in the field of technology and medicine	T1A_W02, T1A_W03, T1A_W07
IM1A_W22	have detailed, theoretically supported knowledge about the technical designing broadened by computer assistance of the designing process CAD; have structured knowledge about the engineering graphics	T1A_W02, T1A_W07
IM1A_W23	have structured theoretical knowledge about basics of electronics and electrotechnics necessary to understand the operation of basic electrical circuits and equipment	T1A_W03, T1A_W04
IM1A_W24	have elementary knowledge of physical, psychological and social working conditions in the situation of technological changes as well as environmental challenges and other non-technical conditions of engineering activities, know basic rules of health and safety at work binding in the industry	T1A_W08
IM1A_W25	have basic knowledge about management, including the quality management and running a business, as well as rational management of engineering materials; know general rules of companies establishment and development	T1A_W09
IM1A_W26	know and understand basic terms and rules in the field of intellectual property protection; know and understand the rules of using the patent information resources	T1A_W10
IM1A_W27	have elementary knowledge about marketing, know general rules of companies establishment and development, markets surveying and matching the own offer to the customers expectations	T1A_W11
IM1A_W28	It has a general knowledge of selected scientific methods and know the discipline unrelated to the field of study	T2A_W08
<b>SKILLS</b>		
IM1A_U01	can gather information about engineering materials from the literature, data sheets, databases, standards and other sources; can analyse and interpret it, draw conclusions as well as use in practical applications	T1A_U01
IM1A_U02	can work individually and in a team; can estimate the time necessary to perform the ordered task; can prepare and implement a work schedule ensuring compliance with the deadlines	T1A_U03
IM1A_U03	can use English at a level sufficient to communicate as well as to read with comprehension catalogue cards , application notes, IT hardware and tools user manuals as well as similar documents	T1A_U02, T1A_U04, T1A_U06
IM1A_U04	can prepare documentation related to an engineering task implementation and prepare a text containing a discussion of this task implementation results	T1A_U02, T1A_U03
IM1A_U05	can prepare and present a short presentation of an engineering task implementation	T1A_U03, T1A_U04
IM1A_U06	have the skill of self-education among others to update the knowledge and to raise the professional competences	T1A_U05
IM1A_U07	have the skill of practical application of the program code in a selected higher-order programming language and of developing simple numerical programs to be used in materials engineering	T1A_U07
IM1A_U08	can use properly selected methods and equipment enabling determination of the engineering material structure and properties	T1A_U08, T1A_U09, T1A_U13
IM1A_U09	can define and distinguish basic groups of engineering materials; determine necessary properties of an engineering material and show current and prospective areas for their application	T1A_U08, T1A_U10
IM1A_U10	can use the learned methods, mathematical and physical models as well as computer simulations to analyse and assess materials properties	T1A_U08, T1A_U09
IM1A_U11	can plan and carry out experiments, including measurements of basic practical properties of materials, interpret the obtained results and draw conclusions	T1A_U08
IM1A_U12	can perform strength analyses of machines and mechanical systems components, can resolve technical problems based on the laws of mechanics	T1A_U09, T1A_U13
IM1A_U13	can - when formulating and resolving tasks comprising engineering materials designing and using - recognise their systemic and non-technical aspects	T1A_U10, T1A_U13
IM1A_U14	can assess and choose engineering materials for technical and medical applications depending on the structure, properties and use conditions from the mechanical, technological, and operational properties as well as economic aspects point of view	T1A_U13, T1A_U16

IM1A_U15	have preparation necessary to work in an industrial environment and know the safety rules related to such work	T1A_U11
IM1A_U16	can perform a preliminary economic analysis of undertaken engineering activities in the field of materials selection	T1A_U12
IM1A_U17	have skills of applying the marketing theory in practice; can survey the market and analyse the environment, competitors and the company itself	T1A_U10
IM1A_U18	can prepare the organisation mission and objectives, carry out negotiations, prepare and implement strategies of organisation development, can recognise the management functions in individual processes	T1A_U10
IM1A_U19	can prepare patent documentation, can use basic legislation related to the intellectual property protection	T1A_U10
IM1A_U20	can identify processes of engineering materials damage and suggest actions preventing or retarding such processes	T1A_U14
IM1A_U21	can assess usability of routine methods and tools used to resolve simple tasks in the field of materials engineering and select and apply proper methods and tools	T1A_U13, T1A_U15
IM1A_U22	can design and shape a real structure of materials and resulting engineering materials properties	T1A_U16
IM1A_U23	can assess and choose a technological process to obtain a product of a defined structure and practical properties	T1A_U16
IM1A_U24	can design or indicate techniques and technologies used to obtain materials from the waste processing	T1A_U10, T1A_U16
IM1A_U25	can define basic features and structure of materials for medical applications linked with their functional properties	T1A_U16
IM1A_U26	It has the ability to pose and analyze problems based on acquired content in the field of science disciplines unrelated to the field of study.	T1A_U08, T1A_U10
<b>SOCIAL COMPETENCES</b>		
IM1A_K01	understand the need and know possibilities of continuous education (second and third level studies, postgraduate studies, courses) - developing professional, personal and social competences	T1A_K01
IM1A_K02	are aware of the importance and understand non-technical aspects and effects of materials engineer activities, including their influence on the environment and related responsibility for the taken decisions	T1A_K02
IM1A_K03	are aware of responsibility for own work and are ready to submit to the team work rules and to bear responsibility for tasks implemented together	T1A_K03, T1A_K04
IM1A_K04	are aware of importance to behave professionally, to observe rules of professional ethics and to respect diversity of opinions	T1A_K05
IM1A_K05	can think and act in a creative and entrepreneurial way	T1A_K06
IM1A_K06	are aware of the social role of university graduates and in particular understand the need to formulate and communicate to the society - inter alia through the mass media - the information and opinions on achievements of materials engineering and other aspects of materials engineer activities; undertake efforts to communicate this information in a widely understandable way	T1A_K07
IM1A_K07	He understands the need for an interdisciplinary approach to problem solving, to integrate knowledge from different disciplines and to practice self-serving deepening knowledge.	T1A_K07