1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Basics of management

Module code: IM1A_PZ

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_PZ_1	Students have elementary knowledge about management, including the quality management and running a business.	IM1A_W17	5
IM1A_PZ_2	Students 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.	IM1A_U18	5
IM1A_PZ_3	Students can prepare documentation for invention and utility design applications, know basic legislation related to the intellectual property protection.	IM1A_U19	5
IM1A_PZ_4	Students are aware of the responsibility for the taken decisions and of the importance of professional behaviour.	IM1A_K03 IM1A_K04	2 2

3. Module description

Description	The Basics of management module shall enable students learning basic terms related to management, including the quality management and running a business. Students will gain the knowledge about preparation of the organisation mission and objectives, carrying out negotiations, preparing and implementing strategies of organisation development, recognising management functions in individual processes.
Prerequisites	The knowledge within the secondary school scope is required: mathematics, physics, chemistry, and biology .

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A _ PZ _w _1	Credits	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_PZ_1, IM1A_PZ_2, IM1A_PZ_3, IM1A_PZ_4

IM1A _ PZ _w _2	Project	Checking the skill of practical application of the acquired knowledge - the analysis of source literature, preparing of a concept to run an own business - under supervision of the teacher; project presentation; discussions, conclusions.	IM1A_PZ_1, IM1A_PZ_2, IM1A_PZ_3, IM1A_PZ_4

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A _ PZ _fs _1	lecture	The lecture shall enable learning basic terms related to management, including the quality management and running a business.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	30	IM1A _ PZ _w_1
IM1A _ PZ _fs _2	discussion classes	Students will acquire the skill to prepare the organisation mission and objectives, to carry out negotiations, prepare and implement strategies of organisation development, recognise management functions in individual processes.	15	Preparation and implementation of an own business project; preparation to present the work and to discuss.	20	IM1A _ PZ _w_2

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Chemistry 2

Module code: IM1A_CH2

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_CH2_1	Learning basic issues of organic chemistry - learning the nature of the difference in reactions of inorganic and organic compounds and through that - possibilities of materials properties shaping. Understanding the nature of aliphatic and aromatic organic compounds structure and properties based on the electron structure and possible types of carbon hybridisation. Understanding relationships between an organic compound structure and potential possibilities to synthesise polymer materials of specified properties.	IM1A_W03	5
IM1A_CH2_2	The skill to analyse properties of organic compounds in relation to the creation by them of various polymer materials of specified properties. The skill to apply a proper, frequently complicated, nomenclature of organic compounds and to present their structure taking into account the phenomenon of isomerism.	IM1A_U01 IM1A_U06 IM1A_U09	2 2 5
IM1A_CH2_3	The awareness of the need for appropriate selection of organic compounds to synthesise polymer engineering materials of appropriate required properties.	IM1A_K01 IM1A_K02 IM1A_K05	2 3 1

3. Module description

Description	The Chemistry 2 module allows students to acquire the basic knowledge about organic chemistry. Owing to that students should be capable to make a proper choice of organic compounds to synthesise polymer engineering materials of required properties. The gained knowledge will allow understanding the relationships between the chemical composition, structure, type of monomer structure and specified practical properties of polymer materials. The gained knowledge shall also allow understanding significant properties of macromolecular organic compounds existing in the nature - sugars, starches, cellulose, and proteins.
Prerequisites	The knowledge of chemistry at the level of secondary grammar school is required.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_CH2_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_CH2_1, IM1A_CH2_2, IM1A_CH2_3
IM1A_CH2_w_2	Written test	The test of skills acquired during laboratory classes.	IM1A_CH2_1, IM1A_CH2_2, IM1A_CH2_3
IM1A_CH2_w_3	Report	Assessment of the skill to analyse results obtained during laboratory classes.	IM1A_CH2_1, IM1A_CH2_2, IM1A_CH2_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_CH2 _fs_1	lecture	The lecture will present issues of aqueous electrolytic solutions chemistry and of organic chemistry. The presentation will comprise properties, synthesis methods and reactions characteristic of hydrocarbons, alcohols, aldehydes, ketones, carboxylic acids, esters, nitrogen compounds and heterocyclic compounds.	30	The work comprising an independent analysis and acquiring the knowledge presented during the lectures, expanded by the literature materials shown and the recommended sources for the analysed issues.	40	IM1A_CH2_w_1, IM1A_CH2_w_2
IM1A_CH2 _fs_2	laboratory classes	Laboratory classes are aimed at mastering the skills required in a chemical laboratory, such as efficient use of laboratory glassware and simple equipment, performing simple qualitative analyses and syntheses of organic compounds.	30	Preparation to classes through independent studying of recommended issues.	30	IM1A_CH2_w_2, IM1A_CH2_w_3

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Biomaterials

Module code: IM1A_BIOM

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_BIOM_1	Understanding the issues related to the biocompatibility of implant materials - ‘in vivo’ and ‘in vitro’ tests, learning the interactions between the tissue and the implant, the organism response to the implant, understanding the issues of corrosion resistance from the medical applications point of view.	IM1A_W17	3
IM1A_BIOM_2	Learning the specific nature of diverse ceramic, polymer, carbon and composite biomaterials used in medicine.	IM1A_W16	5
IM1A_BIOM_3	The skill to analyse requirements related to the structure and resulting from it properties of metallic biomaterials, learning the specific nature of ceramic biomaterials in view of their application in medicine.	IM1A_K05 IM1A_U25	1 5
IM1A_BIOM_4	The skill to choose appropriate biomaterials for specific applications in medicine, the skill of communication between a biomaterials engineer and the medical staff.	IM1A_K05 IM1A_U09 IM1A_U13 IM1A_U14	1 1 2 1

3. Module description

Description	The Biomaterials module shall enable that students are knowledgeable about specific properties and structure of metallic, ceramic, polymer and carbon materials and also composites for applications in medicine. Owing to that students shall acquire the skill of selecting appropriate materials for specific applications, shaping their properties through the choice of chemical and phase composition, the application of appropriate thermomechanical treatment as well as surface modification.
Prerequisites	It is required to achieve effects of education of the modules: physics, chemistry, crystallography, materials science, and materials testing methods.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_BIOM_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_BIOM_1, IM1A_BIOM_2, IM1A_BIOM_3, IM1A_BIOM_4
IM1A_BIOM_w_2	Written test	Checking the acquired skill to choose the biomaterial for applications, to determine biotolerance, to test mechanical and physical properties.	IM1A_BIOM_1, IM1A_BIOM_2, IM1A_BIOM_3, IM1A_BIOM_4
IM1A_BIOM_w_3	Test	Assessment of mastering the basic knowledge necessary for individual performance of a practical exercise.	IM1A_BIOM_1, IM1A_BIOM_2
IM1A_BIOM_w_4	Report	Assessment of the skill to understand the structure shaping mechanisms and to connect them with properties of materials for medicine by a correct formulation of conclusions.	IM1A_BIOM_3, IM1A_BIOM_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_BIOM_fs_1	lecture	The lecture shall enable understanding issues related to the structure of diverse materials for applications in medicine, and also of their specific properties and possibilities of shaping them. The information will be provided on legal regulations and ethical aspects of tests on animals.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	25	IM1A_BIOM_w_1
IM1A_BIOM_fs_2	laboratory classes	The application of the acquired theoretical knowledge in practical learning of the structure, chemical and phase composition, determination of significant biomaterials' properties. Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories.	15	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	10	IM1A_BIOM_w_2, IM1A_BIOM_w_3, IM1A_BIOM_w_4

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Ceramics

Module code: IM1A_C

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_C_1	Learning basic features of a ceramic material and the skill to recall them at the material type identification. Understanding the nature of the sintering process as well as its individual stages. Gaining the knowledge about basic physical phenomena occurring in ceramic materials.	IM1A_K05 IM1A_W06 IM1A_W07 IM1A_W11	1 3 3 1
IM1A_C_2	Acquiring basic skills of practical manufacturing of simple functional ceramics. Mastering the skill to assess and examine a real structure and selected practical properties of ceramic materials.	IM1A_U04 IM1A_U09 IM1A_U23	2 2 2
IM1A_C_3	Developing the awareness of the need for development of ceramic materials technology.	IM1A_K02	1

3. Module description

Description	The module Ceramics shall enable students achieving competence in the field of physical and practical properties of ceramic materials and in choosing ceramics and ceramic materials for technical applications as well as acquiring skills to assess and examine a real structure and selected practical properties of ceramic materials.
Prerequisites	It is required to achieve effects of education of mathematics, physics, chemistry, thermodynamics, crystallography, and basics of materials science modules.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_C_w_1	Oral examination	Verification of the knowledge based on the lectures content, recommended literature and attended laboratory classes.	IM1A_C_1, IM1A_C_2, IM1A_C_3
IM1A_C_w_2	Final Report	Assessment of mastering the skill of independent manufacturing of a ceramic material, examining selected physical properties, the real structure, analysis of measurement results as well as assessment of the measurement uncertainty.	IM1A_C_2
IM1A_C_w_3	Interview	Assessment of understanding the nature of the sintering process and its individual stages.	IM1A_C_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_C _fs_1	lecture	The lecture shall enable understanding the nature of the sintering process and specific properties of ceramic materials. The whole is illustrated with demonstrations and multimedia presentations.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	40	IM1A_C_w_1
IM1A_C _fs_2	laboratory classes	Practical classes consisting in manufacturing simple functional ceramics, examining its real structure and basic physical properties.	30	Preparation of theoretical basics and issues related to the process of ceramics manufacturing. Processing test results, writing a report, and preparing a presentation.	30	IM1A_C_w_2, IM1A_C_w_3

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Crystallography

Module code: IM1A_KRYST

1. Number of the ECTS credits: 5

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_KRYST_1	Understanding the relationships between the atomic structure, chemical bonds, and thermodynamic conditions of crystallisation and the symmetry of the external crystals structure and the internal symmetry of crystalline structures.	IM1A_W05	3
IM1A_KRYST_2	Learning the principles of crystalline materials classification based on the ordering and symmetry. A proper use of a stereographic projection.	IM1A_W05	3
IM1A_KRYST_3	The skill to analyse crystalline materials structure based on the information contained in databases for single-crystals and poly-crystals.	IM1A_U01 IM1A_U09 IM1A_U10	1 3 2
IM1A_KRYST_4	The skill of abstract thinking and linking causes with effects as well as of judging conclusions.	IM1A_K05	2

3. Module description

Description	The Crystallography module shall enable that students are knowledgeable about the description and classification of crystalline structures, both single and poly crystals, based on the symmetry and stoichiometry. Students learn the skill to acquire independently the knowledge about new materials structure. It should also prepare students to use this knowledge at further stages of education - in the materials science, materials testing methods and others.
Prerequisites	The knowledge of basics of mathematics, in particular geometry, knowledge of basics of physics.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_KRYST_w_1	Oral examination	Verification of the knowledge based on the lectures content, recommended literature as well as attended classes and consultations.	IM1A_KRYST_1, IM1A_KRYST_2, IM1A_KRYST_3, IM1A_KRYST_4
IM1A_KRYST_w_2	Written test	Checking the acquired skill to determine indices of lattice planes and straight lines and to project them stereographically.	IM1A_KRYST_1, IM1A_KRYST_2
IM1A_KRYST_w_3	Test	Checking the acquired skill to derive point groups and space groups.	IM1A_KRYST_2
IM1A_KRYST_w_4	Report	The assessment of the skill to make independently a stereographic projection and to determine its indices as well as to properly draw conclusions.	IM1A_KRYST_2, IM1A_KRYST_3, IM1A_KRYST_4

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_KRYST_fs_1	lecture	The lecture shall enable understanding the laws ruling the structure of crystalline bodies, elements, and inorganic chemical compounds and systematising basic terms and principles of their classification based on periodicity and stoichiometry. The lecture is delivered with the use of multimedia.	30	The work with the recommended literature comprising independent acquisition of knowledge and preparing a synopsis (notes)	25	IM1A_KRYST_w_1
IM1A_KRYST_fs_2	laboratory classes	The application of the learned theoretical information in a laboratory equipped with models of crystals and crystalline structures. Exercises are performed by students individually with the use of computers with specialised software.	30	Preparation of theoretical basics and issues related to the topic of performed exercise. Individual preparation of exercise results.	45	IM1A_KRYST_w_2, IM1A_KRYST_w_3, IM1A_KRYST_w_4

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Applied mathematics 2

Module code: IM1_MAT2

1. Number of the ECTS credits: 5

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_MAT2_1	Students have the knowledge about complex numbers and linear algebra. Students know theorems of differential and integral calculus of a real function of many real variables as well as basics of the differential equations theory.	IM1A_W01	3
IM1A_MAT2_2	Students can think and act in a creative way.	IM1A_K01 IM1A_K05	3 3

3. Module description

Description	The Applied mathematics 2 module shall enable students learning those mathematical issues, which are the basis for the teaching of other general and field of study subjects in the next semesters of studies, and which are necessary to understand mathematical models and research methods used in the materials science. The accomplishment of this objective will require learning issues related to complex numbers and linear algebra, functional series, differential and integral calculus of a real function of many real variables as well as the differential equations theory.
Prerequisites	The knowledge of mathematics at the level of Applied mathematics 1 is required.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_MAT2_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended laboratory classes.	IM1A_MAT2_1, IM1A_MAT2_2
IM1A_MAT2_w_2	Written test	Semestral checking of skills acquired during laboratory classes.	IM1A_MAT2_1, IM1A_MAT2_2
		A cyclical written verification of knowledge about resolving the mathematical problems being	

IM1A_MAT2_w_3	Test	the content of laboratory classes.	IM1A_MAT2_1, IM1A_MAT2_2

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_MAT2_fs_1	lecture	The lecture shall enable learning issues related to complex numbers and linear algebra, functional series, differential and integral calculus of a real function of many real variables as well as the differential equations theory. The lecture is delivered based on a selected set of handbooks.	30	The work with the recommended literature comprising independent acquisition of issues presented during the lectures.	45	IM1A_MAT2_w_1
IM1A_MAT2_fs_2	laboratory classes	Practical application of mathematical theorems and methods in the problems solving. Computer assisted classes will be delivered based on discussion and independent problems solving.	30	Preparation to classes through independent studying of recommended issues.	45	IM1A_MAT2_w_2, IM1A_MAT2_w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Applied mathematics 1

Module code: IM1_MAT1

1. Number of the ECTS credits: 5

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_MAT1_1	Understanding the role of proof in mathematics. Students have theoretical and practical knowledge about sequences of numbers and numerical series, functions as well as the integral and differential calculus of a real function of one real variable.	IM1A_W01	2
IM1A_MAT1_2	Students understand the need of continuous learning. Students can think and act in a creative way.	IM1A_K01 IM1A_K05	2 2

3. Module description

Description	The Applied mathematics 1 module shall enable students learning those mathematical issues, which are the basis for the teaching of other general and field of study subjects in the next semesters of studies, and which are necessary to understand mathematical models and research methods used in the materials science. Owing to that students shall understand the importance of mathematics not only in the description of materials physio-chemical properties, but also in designing new engineering materials for technical and medical applications. The accomplishment of the above objectives will require learning a number of issues from the field of calculus, such as numerical sets, numerical sequences and series, continuity and limits of one-variable function, derivative and integrals of a real function of one real variable.
Prerequisites	The knowledge of mathematics at the secondary school level is required.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_MAT1_w_1	Written examination	Verification of knowledge based on the lectures content and recommended literature.	IM1A_MAT1_1, IM1A_MAT1_2
IM1A_MAT1_w	Written test	Semestral checking of skills acquired during laboratory classes.	

_2			IM1A_MAT1_1, IM1A_MAT1_2
IM1A_MAT1_w_3	Test	A cyclical written verification of knowledge about resolving the mathematical problems being the content of laboratory classes.	IM1A_MAT1_1, IM1A_MAT1_2

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_MAT1_fs_1	lecture	The lecture shall enable understanding calculus theorems and methods (numerical sequences and series, differential and integral calculus of a real variable function). The lecture is delivered based on a selected set of handbooks.	30	The work with the recommended literature comprising independent acquisition of issues presented during the lectures.	45	IM1A_MAT1_w_1
IM1A_MAT1_fs_2	laboratory classes	Practical application of mathematical theorems and methods in the problems solving. Computer assisted classes will be delivered based on discussion and independent problems solving.	30	Preparation to classes through independent studying of recommended issues.	45	IM1A_MAT1_w_2, IM1A_MAT1_w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Basics of electronics and electrotechnics

Module code: IM1A_PEE_Bio

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_PEE_1	Understanding basic terms from the field of electrotechnics and electronics as well as using them in practice; learning phenomena, processes, laws and relationships used in electronics and electrotechnics.	IM1A_W02 IM1A_W23	1 5
IM1A_PEE_2	The skill of analysing simple electrical circuits and also of their designing and assembling.	IM1A_U21	3
IM1A_PEE_3	Development of the awareness of the need to use phenomena from the field of electricity and magnetism in technology; students have the skill of creative thinking.	IM1A_K02 IM1A_K05	1 1

3. Module description

Description	The Basics of electronics and electrotechnics module shall enable that students are knowledgeable about basic problems from the field of electronics and electrotechnics as well as phenomena and processes utilised in electrical systems Owing to that students shall acquire a better understanding of processes being the subject of electronics and electrotechnics . The understanding of phenomena used in electronics and electrotechnics shall result in honing the skill of electrical circuits designing, constructing and resolving.
Prerequisites	It is required to achieve effects of education of the modules: physics, chemistry, crystallography, materials testing methods and thermodynamics.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A _PEE _w _2	Test	Assessment of mastering the basic knowledge necessary for individual performance of a practical exercise.	IM1A_PEE_1
IM1A _PEE _w	Report	The assessment of the skill of understanding electronics and electrotechnics by correct	IM1A_PEE_2, IM1A_PEE_3

_3		formulation of conclusions.	

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A _PEE _fs _1	lecture	The lecture shall enable understanding the issues of electronics and electrotechnics, phenomena, processes and mechanisms used in electrical systems. The lecture is delivered with the use of multimedia and demonstrations.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	20	IM1A _PEE _w_2
IM1A _PEE _fs _2	laboratory classes	The application of learned theoretical knowledge in practical learning the phenomena of electronics and electrotechnics. Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories.	30	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	40	IM1A _PEE _w_2, IM1A _PEE _w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Basics of electronics and electrotechnics

Module code: IM1A_PEE_NoM

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_PEE_1	Understanding basic terms from the field of electronics and electrotechnics as well as using them in practice; learning phenomena, processes, laws and relationships used in electronics and electrotechnics.	IM1A_W02 IM1A_W23	1 5
IM1A_PEE_2	The skill of analysing simple electrical circuits and also of their designing and assembling.	IM1A_U21	3
IM1A_PEE_3	Development of the awareness of the need to use phenomena from the field of electricity and magnetism in technology; students have the skill of creative thinking.	IM1A_K02 IM1A_K05	1 1

3. Module description

Description	The Basics of electronics and electrotechnics module shall enable that students are knowledgeable about basic problems from the field of electronics and electrotechnics as well as phenomena and processes utilised in electrical systems Owing to that students shall acquire a better understanding of processes being the subject of electronics and electrotechnics . The understanding of phenomena used in electronics and electrotechnics shall result in honing the skill of electrical circuits designing, constructing and resolving.
Prerequisites	It is required to achieve effects of education of the modules: physics, chemistry, crystallography, materials testing methods and thermodynamics.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A _PEE _w _1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_PEE_1, IM1A_PEE_2, IM1A_PEE_3
IM1A _PEE _w	Test	Assessment of mastering the basic knowledge necessary for individual performance of a	IM1A_PEE_1

_2		practical exercise.	
IM1A _PEE _w _3	Report	The assessment of the skill of understanding electronics and electrotechnics by correct formulation of conclusions.	IM1A_PEE_2, IM1A_PEE_3

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A _PEE _fs _1	lecture	The lecture shall enable understanding the issues of electronics and electrotechnics, phenomena, processes and mechanisms used in electrical systems. The lecture is delivered with the use of multimedia and demonstrations.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	40	IM1A _PEE _w_1
IM1A _PEE _fs _2	laboratory classes	The application of learned theoretical knowledge in practical learning the phenomena of electronics and electrotechnics. Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories.	30	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	20	IM1A _PEE _w_2, IM1A _PEE _w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Basics of materials science

Module code: IM1A_PNOM

1. Number of the ECTS credits: 9

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_PNOM_1	Understanding of the structure and of significant characteristics of amorphous and crystalline materials; single- and poly-crystalline; mono- and polyphase materials; understand relationships between the structure and properties of engineering materials and the influence of phenomena and processes on the structure change.	IM1A_W05 IM1A_W06	4 5
IM1A_PNOM_2	Learning phenomena, processes, and methods for structure forming as well as mechanisms responsible for mechanical properties changing.	IM1A_W07	3
IM1A_PNOM_3	The skill to analyse the structure and properties of engineering materials and to choose methods for materials structure and properties forming for technical applications.	IM1A_U09 IM1A_U10	5 3
IM1A_PNOM_4	Development of the awareness of non-technical aspects for the used engineering materials; moulding of creative thinking.	IM1A_K02 IM1A_K05	2 3

3. Module description

Description	The module Basics of materials science shall enable that students are knowledgeable about the structure of engineering materials as well as about methods, phenomena, and processes enabling changes of such materials properties. Owing to that students shall achieve a better understanding of correlations between engineering materials structure and mechanisms affecting their properties. The understanding of relationships and correlations between engineering materials properties and their structure shall result in deepening the skill to shape the structure and properties of engineering materials for technical and medical applications.
Prerequisites	It is required to achieve effects of education of the modules: physics, chemistry, crystallography, materials testing methods and thermodynamics.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_PNOM_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_PNOM_1, IM1A_PNOM_2, IM1A_PNOM_3, IM1A_PNOM_4
IM1A_PNOM_w_2	Written test	Checking the acquired skill of structure shaping methods and mechanisms responsible for mechanical properties changing.	IM1A_PNOM_1, IM1A_PNOM_2, IM1A_PNOM_3, IM1A_PNOM_4
IM1A_PNOM_w_3	Test	Assessment of mastering the basic knowledge necessary for individual performance of a practical exercise.	IM1A_PNOM_1, IM1A_PNOM_2
IM1A_PNOM_w_4	Report	Assessment of the skill to understand the structure shaping mechanisms and to connect them with engineering materials properties by a correct formulation of conclusions.	IM1A_PNOM_3, IM1A_PNOM_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_PNOM_fs_1	lecture	The lecture shall enable an understanding of issues related to the structure of engineering materials, phenomena, processes, and mechanisms enabling their properties shaping. The lecture is delivered with the use of multimedia, demonstrations and the „Materials science” software.	75	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	50	IM1A_PNOM_w_1
IM1A_PNOM_fs_2	laboratory classes	The application of acquired theoretical knowledge to practical learning of engineering materials structure and of mechanisms enabling shaping their properties. Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories.	75	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	55	IM1A_PNOM_w_2, IM1A_PNOM_w_3, IM1A_PNOM_w_4

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Biological and physiological aspects of biomaterials

Module code: IM1A_BFAB

1. Number of the ECTS credits: 2

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_BFAB_1	Learning basic physical and chemical phenomena and processes affecting the interactions between a human organism and biomaterials; understanding basic phenomena accompanying the presence of implants and artificial organs in a human body.	IM1A_W14 IM1A_W17	1 5
IM1A_BFAB_2	Students can define immunological and haematological problems related to the application of engineering materials in medicine.	IM1A_K05 IM1A_U25	1 2
IM1A_BFAB_3	Development of the awareness of engineering materials influence on a human body consequences.	IM1A_K02	1

3. Module description

Description	The Biological and physiological aspects of biomaterials module shall enable students learning the nature of biomaterial/tissue interactions, learning the nature of phenomena occurring on the biomaterial - biological environment interface, being knowledgeable about immunological and haematological problems related to the application of artificial organs and implants as well as materials resorption. Owing to that students shall learn and understand mechanisms of human body influence on implants and artificial organs.
Prerequisites	It is required to achieve effects of education of the modules: physics, chemistry, physico-chemistry of biological processes, introduction to biomaterials, metallic, ceramic, carbon and composite biomaterials, polymers for medicine, and nanomaterials in medicine.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_ BFAB _w_1	Credits test	Verification of the knowledge based on the lectures content, recommended literature and classes.	

			IM1A_BFAB_1, IM1A_BFAB_2, IM1A_BFAB_3
IM1A_ BFAB _w_2	Written test	Checking the knowledge about characteristics of systemic fluids, the nature of biomaterial/ tissue interactions, the mechanism of phenomena at the biomaterial - biological environment interface, cells reaction to the implant, immunological and haematological problems related to the application of artificial organs and implants, and materials resorption.	IM1A_BFAB_1, IM1A_BFAB_2, IM1A_BFAB_3

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_BFAB _fs_1	lecture	The lecture shall enable understanding basic terms related to mechanisms of human body influence on implants and artificial organs. The lecture is delivered with the use of multimedia and demonstrations.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	10	IM1A_ BFAB _w_1
IM1A_BFAB _fs_2	laboratory classes	The analysis of basic issues related to the knowledge about biomaterial/tissue interactions, the mechanism of phenomena at the biomaterial - biological environment interface, immunological and haematological problems related to the application of artificial organs and implants. Classes are conducted based on oral presentations and discussion with the use of multimedia, and demonstrations.	15	Preparation to classes through independent studying of recommended issues.	5	IM1A_ BFAB _w_2

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Carbon and composite biomaterials

Module code: IM1A_BWK

1. Number of the ECTS credits: 5

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_BWK_1	An elementary knowledge comprising the structural design, biocompatibility criteria and properties of carbon and composite biomaterials; distinguishing basic carbon structures; distinguishing composite materials because of the matrix type; being knowledgeable about current development trends of the chemistry of carbon and composite materials used in medicine.	IM1A_W11 IM1A_W16 IM1A_W17	2 3 3
IM1A_BWK_2	The skill to evaluate basic features and possibilities of a selected carbon and composite material application in medicine.	IM1A_U14 IM1A_U25	3 2
IM1A_BWK_3	Development of the awareness of carbon and composite biomaterials application consequences in medicine.	IM1A_K02	1

3. Module description

Description	The Carbon and composite biomaterials module allows students to acquire a basic knowledge about carbon and composite materials used for medical purposes. Owing to that students should be capable of classifying the aforementioned materials, of showing basic criteria for their selection, as well as should be aware of the biodegradation processes occurrence. These skills will allow understanding the relations between the chemical and phase structure, the condition of carbon and composite biomaterials surface and the practical properties of the material. Students understand that a composite material, created from at least two components, of substantially different properties, is a new material of properties better as compared to components properties. Students will learn the current research trends related to the use of carbon and composite materials for medical purposes, in which the biomaterials of the newest generation are to influence organisms in a way that stimulates their regeneration.
Prerequisites	It is required to achieve effects of education of the modules: chemistry, physics, materials testing methods, and introduction to biomaterials.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_BWK_w_1	Written examination	Verification of the knowledge obtained based on lectures, suggested literature and carried out classes.	IM1A_BWK_1, IM1A_BWK_2, IM1A_BWK_3
IM1A_BWK_w_2	Written test	Assessment of the acquired skills of elementary description of carbon and composite biomaterials and also of their classification.	IM1A_BWK_1, IM1A_BWK_2, IM1A_BWK_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_ BWK_fs_2	laboratory classes	The classes are aimed at performing a practical analysis for basic issues related to carbon and composite biomaterials properties, and determining parameters characteristic of carbon and composite materials. Classes are conducted based on discussion and resolving tasks with the use of multimedia, and demonstrations.	30	Preparation to classes through independent studying of recommended issues	45	IM1A_BWK_w_2
IM1A_BWK _fs_1	lecture	The lecture shall provide students with the basic criteria for carbon and composite biomaterials division and selection for medical purposes. The lecture is delivered with the use of multimedia, demonstrations and exhibits.	30	The work with the literature materials recommended as sources, comprising an independent analysis and the acquisition of knowledge about the analysed issues.	45	IM1A_BWK_w_1

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Ceramic biomaterials

Module code: IM1A_BC

1. Number of the ECTS credits: 5

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_BC_1	Learning basic features of a bioceramic material and the skill to recall them at the material type identification. Acquiring basic knowledge about those materials structure, properties and manufacturing methods.	IM1A_W16	3
IM1A_BC_2	Mastering the skill to assess and examine a real structure and selected practical properties of bioceramic materials.	IM1A_K05 IM1A_U14 IM1A_U25	1 3 3
IM1A_BC_3	Developing the awareness of the need for development of bioceramic materials technology and their potential applications in medicine.	IM1A_K02	1

3. Module description

Description	The module Ceramic biomaterials shall enable students achieving competence in the field of basic physical and practical properties of bioceramic materials and in choosing bioceramic materials for medical applications as well as acquiring skills to assess and examine a real structure and selected practical properties of bioceramic materials.
Prerequisites	It is required to achieve effects of education of the modules: physics, chemistry, thermodynamics, crystallography, rudiments of the materials science as well as introduction to biomaterials.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_BC_w_1	Oral examination	Verification of the knowledge based on the lectures content, recommended literature and attended laboratory classes.	IM1A_BC_1, IM1A_BC_2, IM1A_BC_3

IM1A_BC_w_2	Weekly reports	Assessment of the degree of mastering the skill in the field of examining selected physical properties, the real structure, analysis of measurement results as well as assessment of the measurement uncertainty.	IM1A_BC_2
IM1A_BC_w_3	Interview	Assessment of understanding.	IM1A_BC_3

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_BC _fs _1	lecture	The lecture shall enable the understanding of the nature of specific properties of ceramic biomaterials used in medicine. The whole is illustrated with demonstrations and multimedia presentations.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	40	IM1A_BC_w_1
IM1A_BC _fs _2	laboratory classes	Practical classes consisting in examining the real structure and basic physical properties of ceramic biomaterials.	30	Preparation of theoretical basics and issues related to the process of ceramics and polymers manufacturing as well as examining their properties. Processing of test results, preparing reports.	60	IM1A_BC_w_2, IM1A_BC_w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Chemistry 1

Module code: IM1A_CH1

1. Number of the ECTS credits: 5

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_CH1_1	Understanding the relationships between the atomic structure of elements, their position in the periodic system, type of chemical bonds and potential properties of created engineering materials - ceramic, polymer and metallic materials. Learning basic issues of general and inorganic chemistry - learning the nature of the difference in reactions of inorganic and organic compounds and through that - possibilities of materials properties shaping. The knowledge of inorganic compounds classes - the skill to use proper nomenclature of inorganic compounds and to present their structure.	IM1A_W03	5
IM1A_CH1_2	The skill to analyse properties of inorganic compounds in relation to production possibilities of engineering materials featuring specific mechanical, electrical, magnetic, optical properties - ionic and covalent ceramic materials, metals and metallic alloys, composite materials.	IM1A_U01 IM1A_U06 IM1A_U09	2 2 5
IM1A_CH1_3	The awareness of the need of appropriate qualitative and quantitative selection of material’s chemical composition to synthesise engineering materials of appropriate required properties.	IM1A_K01 IM1A_K02 IM1A_K05	2 3 1

3. Module description

Description	The Chemistry 1 module allows students to acquire the basic knowledge about general and inorganic chemistry. Owing to that students should be capable to make a qualitative and quantitative choice of materials’ chemical composition to obtain materials with required properties. The gained knowledge will allow understanding the relationships between the chemical composition, structure, phase composition and specified (mechanical, electrical, magnetic, optical) practical properties of ceramic, metallic and polymer materials.
Prerequisites	The knowledge of chemistry at the level of secondary grammar school is required.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_CH1_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_CH1_1, IM1A_CH1_2, IM1A_CH1_3
IM1A_CH1_w_2	Written test	The test of skills acquired during the auditorium and laboratory classes.	IM1A_CH1_1, IM1A_CH1_2, IM1A_CH1_3
IM1A_CH1_w_3	Report	Assessment of the skill to analyse results obtained during laboratory classes.	IM1A_CH1_1, IM1A_CH1_2, IM1A_CH1_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_CH1 _fs_2	practical classes	The classes are aimed mainly at mastering the skill of proper writing the chemical equations and resolving diverse computational problems. Classes enhanced with discussion of issues presented during lectures.	15	Preparation to classes through independent studying of recommended issues.	50	IM1A_CH1_w_2
IM1A_CH1 _fs_3	laboratory classes	Laboratory classes are aimed at mastering the basic skills required in a chemical laboratory: preparing solutions of appropriate concentration, performing reactions with inorganic and organic compounds, performing simple quantitative analyses.	15	Preparation to classes through independent studying of recommended issues.	20	IM1A_CH1_w_2, IM1A_CH1_w_3
IM1A_CH1_fs_1	lecture	The lecture on chemistry will focus especially on the structure of atoms and its close relationship to the periodic table of elements. The correlation will be analysed between the state of valence electrons and a possibility to create chemical bonds: ionic, covalent, metallic, hydrogen, Van der Waals, and as a result to create basic types of materials: ceramics, polymers and metals. The first part of the lecture will be devoted to the general and inorganic chemistry.	30	The work comprising an independent analysis and acquiring the knowledge presented during the lectures, expanded by the literature materials shown and the recommended sources for the analysed issues.	50	IM1A_CH1_w_1, IM1A_CH1_w_2

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Composites

Module code: IM1A_KOMP

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_KOMP_1	Learning the principles of composite materials classification based on the type of matrix, reinforcement, their structure and properties and also methods for designing the composite materials composition and structure.	IM1A_W06 IM1A_W07 IM1A_W11	2 2 1
IM1A_KOMP_2	Preparation of theoretical foundations for independent designing of a composite.	IM1A_U01 IM1A_U02 IM1A_U04 IM1A_U13	2 2 2 2
IM1A_KOMP_3	The skill to complete the information, to value it and to present own projects.	IM1A_U05	2

3. Module description

Description	The Composites module shall enable students the understanding of the role played by modern composite materials in the economy. It allows being knowledgeable about composite materials classification, their properties and methods used to value them. Students learn the skill to acquire independently the knowledge about new materials structure and their applications.
Prerequisites	Physics and chemistry on the level of year 3 of engineering studies.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_KOMP_w_1	Written test	Assessment of mastering the basic knowledge necessary for individual performance of a practical exercise.	IM1A_KOMP_1, IM1A_KOMP_2
IM1A_KOMP_w_2	Report	Preparation of a report / synopsis of the laboratory work aimed at making a composite based on a previously prepared and approved technological procedure. Preparation of a composite design.	IM1A_KOMP_2, IM1A_KOMP_3
IM1A_KOMP_w_3	Written test	Checking the acquired knowledge and skills in the field of procedures and technology for composites obtaining, composite materials characteristics and application (lecture credits).	IM1A_KOMP_1, IM1A_KOMP_2, IM1A_KOMP_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_KOMP_fs_1	lecture	The lecture shall enable understanding issues related to the structure, properties and potential application of typical composite materials and shall introduce examples of special new composites such as biocomposites, nanocomposites and others. The lecture is delivered with the use of multimedia.	25	The work with the recommended literature comprising independent acquisition of knowledge and preparing a synopsis (notes)	10	IM1A_KOMP_w_3
IM1A_KOMP_fs_2	laboratory classes	The application of theoretical knowledge acquired during attendance at lectures and learning the specialised literature from the field of structure, obtaining and testing composites during the work in the composites laboratory. Students individually or in groups of two analyse composites, prepare the technological process of composites obtaining, carry out basic tests of the obtained composite materials.	20	Preparation of theoretical basics and developing the working procedures to carry out the planned exercise. Individual preparation and presentation of laboratory work results.	35	IM1A_KOMP_w_1, IM1A_KOMP_w_2

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3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Computer science and IT

Module code: IM1A_ITI

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_ITI_1	Students have structured knowledge about the computer architecture and the hardware layer necessary for applications in materials engineering, have elementary knowledge about operating systems.	IM1A_W18	5
IM1A_ITI_2	Students know at a basic level at least one software package used to collect the data and its preliminary statistical analysis as well as know at a basic level at least one dedicated software package used for a detailed mathematical analysis and for a graphical presentation of the data.	IM1A_W19	3
IM1A_ITI_3	Student can collect the data and perform its basic statistical analysis. Students can perform a mathematical analysis of experimental data and design a graphical view of this analysis.	IM1A_U01 IM1A_U07	2 3
IM1A_ITI_4	Students understand the need for and know possibilities of IT application to assist the engineering work. Students are aware of the importance and understand the need for continuous learning. Students understand the importance of responsibility for tasks implemented both individually and in a team.	IM1A_K02 IM1A_K03 IM1A_K05	2 3 1

3. Module description

Description	The Computer science and IT module shall enable that students are knowledgeable about the computer architecture and the hardware layer necessary for applications in materials engineering and about operating systems, necessary to install, operate and maintain IT tools used for technical designing and for analysing the engineering materials properties. The module shall extend the knowledge and skills of measurement data analysis and visualisation (MS Excel). Moreover, the module will prepare students for an independent algorithmisation of the data processing. The module will also familiarise students with the IT environments used for mathematical computations, both numerical and symbolic ones (MathCad). After this module completion students will have a consolidated basic knowledge and skills in the field of IT assistance to engineering processes.
Prerequisites	The knowledge of algebra, basic elements of calculus and basics of computer use is required.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_ITI_w_2	Test	Checking the acquired skills of algorithmisation methods for elementary algebraic problems as well as mastering practical skills of resolving selected issues in the MS Excel spreadsheet environment and using the MathCad software.	IM1A_ITI_1, IM1A_ITI_2, IM1A_ITI_3, IM1A_ITI_4
IM1A_ITI_w_3	Reports	Assessment of performance of practical problems resolved during classes and described in the laboratory class manuals.	IM1A_ITI_1, IM1A_ITI_2, IM1A_ITI_3, IM1A_ITI_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_ITI_fs_1	lecture	The lecture shall enable understanding the issues of IT assistance to the research process in the field of materials engineering and materials science. The lecture is delivered with the use of multimedia, demonstrations and the ‘MathCad’ and ‘Origin’ software.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	30	IM1A_ITI_w_2
IM1A_ITI_fs_2	laboratory classes	Exercises are performed by students individually with the use of computer laboratories equipment.	30	Individual preparation of exercise results.	30	IM1A_ITI_w_2, IM1A_ITI_w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Corrosion and corrosion protection

Module code: IM1A_KIOPK

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_KIOPK_1	Learning and understanding corrosion mechanisms and the corrosion action on engineering materials; understanding economic and business aspects of engineering materials corrosion.	IM1A_W14	5
IM1A_KIOPK_2	The skill to evaluate the type of corrosion damage and to suggest methods for its elimination and to select an effective corrosion protection depending on the material type and its work environment.	IM1A_U20	5
IM1A_KIOPK_3	The skill to operate scientific-research instruments and diagnostic systems based on anticorrosion methods, techniques and technologies.	IM1A_U11	1
IM1A_KIOPK_4	The capability to express opinions, to discuss and exchange opinions and to use expertise allowing to resolve a broad scope of engineering problems related to the corrosion of various groups of materials, including the engineering designing taking into account corrosion issues.	IM1A_K05 IM1A_U01 IM1A_U13	1 1 2

3. Module description

Description	The Corrosion and corrosion protection module shall ensure students the basic knowledge about the chemical and electrochemical action of the environment on engineering materials. The module shall enable that students are knowledgeable about corrosion types, corrosion damage types as well as traditional and modern methods for corrosion and materials corrosion resistance testing. The understanding of relationships between the type of corrosion damage and the type of material and the acting environment shall result in acquiring the skill to choose corrosion protections, to apply a complex protection and also the anticorrosion prevention for engineering materials for industrial applications.
Prerequisites	The knowledge of materials chemistry, materials electrochemistry, physics, and materials science modules is required.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_KIOPK_w_1	Credits test	Verification of the knowledge based on the lectures content, recommended literature and attended laboratory classes.	IM1A_KIOPK_1, IM1A_KIOPK_2, IM1A_KIOPK_3, IM1A_KIOPK_4
IM1A_KIOPK_w_2	Written tests	Checking the skill to use the acquired knowledge to resolve the presented technical problems related to the corrosion damage evaluation and to make decisions on the method of corrosion protection for engineering materials.	IM1A_KIOPK_1, IM1A_KIOPK_2, IM1A_KIOPK_3, IM1A_KIOPK_4
IM1A_KIOPK_w_3	Weekly reports	The assessment of mastering the skill of independent performance of a practical exercise, of measurement results and measurement error analysis as well as of formulating the conclusions properly.	IM1A_KIOPK_3
IM1A_KIOPK_w_4	Interview	Assessment of understanding mechanisms of chemical and electrochemical corrosion processes, their interpretation and application in materials engineering issues.	IM1A_KIOPK_4

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_KIOPK_fs_1	lecture	The lecture shall enable understanding the nature of chemical and electrochemical action of a corrosive environment on engineering materials. It illustrates general rules of corrosion protection and of predicting the materials corrosion resistance. The lecture is delivered using demonstrations and modern audio-visual aids.	20	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues. Performing a thematic review of scientific papers in computer databases, in particular in a foreign language.	35	IM1A_KIOPK_w_1
IM1A_KIOPK_fs_2	laboratory classes	Individual and team performance of chemical and electrochemical experiments illustrating the lecture issues in teaching laboratories and using scientific-research instruments in scientific laboratories. Independent processing of obtained results, preparing graphs, analysis of experimental error and formulation of conclusions.	25	Preparation of theoretical basics and issues related to the subject matter of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	10	IM1A_KIOPK_w_2, IM1A_KIOPK_w_3, IM1A_KIOPK_w_4

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Databases on materials

Module code: IM1A_BDOM

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_BDOM_1	Gaining general knowledge about basic database terms. Acquiring the knowledge about structures of data existing in databases. Understanding relationships existing between tables in relational bases. Knowledge of general rules related to a database system designing. Detailed learning of information sources about engineering materials, comprising traditional sources of data (e.g. standards, material data sheets). Comprehensive learning of IT databases on materials comprising specialised software and internet databases.	IM1A_U01 IM1A_W21	2 5
IM1A_BDOM_2	The skill to create and practically use the relational databases.	IM1A_U01	4
IM1A_BDOM_3	Acquiring the skill of comprehensive use of computer software and internet databases on materials.	IM1A_U14	4
IM1A_BDOM_4	Development of the awareness of the need for a skilful use of databases on materials to resolve engineering tasks.	IM1A_K05	2

3. Module description

Description	The Databases on materials module shall enable students learning the knowledge related to the databases, with particular focus on relational databases. Students gain the knowledge about possibilities and applications of modern database systems as well as are prepared to create own databases. Owing to that students are capable of using skilfully and in a complex way the databases for the needs of engineering applications. Students shall master the knowledge about IT databases on materials, which comprise the computer software and internet databases.
Prerequisites	It is required to achieve effects of education of information science and IT, metals and alloys, ceramics and polymers modules.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_BDOM_w_1	Written test	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_BDOM_1, IM1A_BDOM_4
IM1A_BDOM_w_2	Test	Checking the skill to create and practically use the relational databases.	IM1A_BDOM_2
IM1A_BDOM_w_3	Report	Assessment of the skill to use computer software and internet databases to search for information on engineering materials.	IM1A_BDOM_2, IM1A_BDOM_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_BDOM_fs_1	lecture	The lecture shall enable understanding issues related to databases on materials, their designing and practical use in the technical engineering. The lecture is delivered with the use of multimedia.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	35	IM1A_BDOM_w_1
IM1A_BDOM_fs_2	laboratory classes	The application of the gained theoretical knowledge to acquire the skill to create and use databases. Exercises are performed by students individually with the use of teaching laboratories equipment.	30	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	30	IM1A_BDOM_w_2, IM1A_BDOM_w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Designing and engineering graphics

Module code: IM1A_PIGI

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_PIGI_1	Acquiring general knowledge about the technical designing. Learning the methods assisting the specification of design requirements and strategies for a design task solution seeking. Detailed learning of software packages performing complex actions assisting the engineering work, including the CAD (Computer Aided Design) systems. Learning geometrical foundations of the engineering graphics including principles of flat representation of solids. Learning detailed rules in force at drawing complex technical systems.	IM1A_W22	5
IM1A_PIGI_2	The skill to read and understand the content of technical drawings, to present spatial objects in accordance with the engineering graphics rules.	IM1A_U01	5
IM1A_PIGI_3	The skill to formulate and analyse a design problem, to look for the solution concept using assisting methods and techniques.	IM1A_K05 IM1A_U02 IM1A_U04 IM1A_U21	1 2 3 4

3. Module description

Description	The Designing and engineering graphics module shall enable students learning general rules related to the process of technical objects designing. Students shall master broad knowledge about the computer-assisted designing with the use of CAD systems. Owing to that students are capable of using skilfully and in a complex way the engineering graphics to record technical structures. Students can read and interpret the technical documentation.
Prerequisites	It is required to achieve effects of education of information science and IT modules.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A _PIGI_w_1	Written test	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_PIGI_1
IM1A _PIGI_w_2	Test	Checking the acquired skills to formulate and analyse the problem and to resolve a design task.	IM1A_PIGI_2
IM1A _PIGI_w_3	Report	Assessment of the skill to use the engineering graphics and CAD systems in the process of technical designing.	IM1A_PIGI_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A _PIGI_fs_1	lecture	The lecture shall enable understanding the principles in force in the process of technical designing taking into account the engineering graphics to record the structure. The lecture is delivered with the use of multimedia.	15	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	20	IM1A _PIGI_w_1
IM1A _PIGI_fs_2	laboratory classes	The application of the gained theoretical knowledge about technical systems designing to acquire the skill of using the CAD computer-assisted designing. Exercises are performed by students individually with the use of teaching laboratories equipment.	30	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	30	IM1A _PIGI_w_2, IM1A _PIGI_w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Diploma laboratory 1

Module code: IM1A_PD1

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_PD1_1	The skill to acquire and analyse the literature information related to the issue studied in the diploma thesis.	IM1A_K05 IM1A_U01 IM1A_U02	2 5 1
IM1A_PD1_2	The skill to plan and implement individual stages of the prepared diploma thesis.	IM1A_U22	5
IM1A_PD1_3	Mastering the research techniques used at the thesis preparation.	IM1A_U08	5

3. Module description

Description	The Diploma laboratory 1 module shall enable students planning actions related to the preparation of the diploma thesis (preparing the material for tests, carrying out the tests, making the design, suggesting / making the model).
Prerequisites	It is required to achieve the effects of education of basic and field of study modules related to the topic of diploma thesis under development.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_PD1_w_1	Assessment of diploma thesis development progress	Determination of diploma thesis development progress based on the previously prepared schedule.	IM1A_PD1_1, IM1A_PD1_2, IM1A_PD1_3

5. Forms of teaching						
code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_PD1_fs_1	laboratory classes	Experimental work.	30	Literature studies. Interpretation of the prepared thesis results.	60	IM1A_PD1_w_1

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Diploma laboratory 2

Module code: IM1A_PD2

1. Number of the ECTS credits: 5

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_PD2_1	Mastering the skill to perform an experiment for diploma theses at the engineer level in the field of materials engineering.	IM1A_U04 IM1A_U21	1 5
IM1A_PD2_2	Mastering the research techniques used at the engineer diploma thesis preparation.	IM1A_K05 IM1A_K06 IM1A_U11	1 1 5

3. Module description

Description	The Diploma laboratory 2 module shall enable students completing actions related to the preparation of the diploma thesis (carrying out the tests, making the design, suggesting / making the model) Owing to that students will be capable of starting the analysis and processing of the obtained results.
Prerequisites	It is required to achieve the effects of eduction of basic and field of study modules related to the topic of diploma thesis under development.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_PD2_w_1	Assessment of diploma thesis development progress	Determination of diploma thesis development progress based on the previously prepared schedule.	IM1A_PD2_1, IM1A_PD2_2

5. Forms of teaching						
code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_PD2_fs_1	laboratory classes	Experimental work with the use of techniques necessary for the thesis development.	60	Literature studies. Interpretation of the prepared thesis results.	90	IM1A_PD2_w_1

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Diploma seminar 2

Module code: IM1A_SD2

1. Number of the ECTS credits: 5

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_SD2_1	Deepening the knowledge of materials engineering in the field of the diploma theses under development.	IM1A_U06	3
IM1A_SD2_2	The skill to use selected research techniques necessary to carry out research tasks.	IM1A_U11	5
IM1A_SD2_3	Independent preparation and presentation of papers related to the subject-matter of diploma theses under development.	IM1A_U04 IM1A_U05	5 5
IM1A_SD2_4	Acquiring the skill to lead discussion.	IM1A_K01	5

3. Module description

Description	The module Diploma seminar 2 shall enable that students are knowledgeable about the materials engineering issues within diploma theses under development. Owing to that students will acquire the skill of independent resolution of simple materials engineering issues through the analysis of necessary literature, of formulating the diploma thesis objective, of presenting the obtained results and of formulating the final conclusions.
Prerequisites	It is required to achieve the effects of eduction of basic and field of study modules related to the topic of diploma thesis under development.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_SD2_w_1	Assessment of presented papers and carried out discussion	Assessment of mastering the skill to present the literature information in the form of papers, to formulate the thesis objective, to use necessary research techniques and to present current results of the work.	IM1A_SD2_1, IM1A_SD2_2, IM1A_SD2_3, IM1A_SD2_4

5. Forms of teaching						
code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_SD2_fs_1	seminar	The seminar is carried out with the use of multimedia, enabling presentation of results obtained at individual stages of the work and presentation of final conclusions. A discussion is carried out after papers presentation.	30	Preparation for the seminar of multimedia presentations on the developed diploma thesis.	120	IM1A_SD2_w_1

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Diploma seminar 1

Module code: IM1A_SD1

1. Number of the ECTS credits: 2

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_SD1_1	The skill to acquire the information from the literature, databases and other sources, to integrate it, and to interpret it.	IM1A_U01 IM1A_U03 IM1A_U06	4 3 3
IM1A_SD1_2	The skill to determine an engineering problem and its components.	IM1A_U04	5
IM1A_SD1_3	The skill to discuss about possible solutions within the given engineering problem. The skill to use a material language characteristic of the represented engineering field.	IM1A_U02 IM1A_U03	5 4
IM1A_SD1_4	The skill to present results of own tests obtained at individual stages of the prepared diploma thesis.	IM1A_U04 IM1A_U05 IM1A_U13	4 5 4

3. Module description

Description	The Diploma seminar 1 module shall enable students learning the basic tools and techniques necessary to prepare a seminar presentation. Moreover, the attendance at the seminar shall develop the skill to discuss, argument, and formulate opinions in the specific field of science. Students shall develop the skills of effective presentation and communication related to the research issues under preparation.
Prerequisites	It is required to achieve the effects of eduction of basic and field of study modules related to the topic of diploma thesis under development.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_SD1_w_1	Assessment of presented papers and carried out discussion	Assessment of mastering the skill to present the literature information in the form of papers, to formulate the thesis objective, to use necessary research techniques and to present current results of the work.	IM1A_SD1_1, IM1A_SD1_2, IM1A_SD1_3, IM1A_SD1_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_SD1_fs_1	seminar	The seminar is carried out with the use of multimedia, enabling presentation of results obtained at individual stages of the work. A discussion is carried out after papers presentation.	15	Preparation for the seminar of multimedia presentations at individual stages of the carried out work.	45	IM1A_SD1_w_1

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Diploma thesis preparation

Module code: IM1A_PPD

1. Number of the ECTS credits: 15

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_PPD_1	The skill to process results obtained from the project and research work on an engineer level.	IM1A_U01 IM1A_U05	1 5
IM1A_PPD_2	The skill to draw conclusions based on results of the project and research work on an engineer level.	IM1A_K05	5
IM1A_PPD_3	Developing the whole diploma thesis, the skill to formulate an opinion and to communicate it to the public.	IM1A_K04 IM1A_K06	5 5

3. Module description

Description	The module Diploma thesis preparation shall enable students learning the skill to prepare the final version of an engineer diploma thesis.
Prerequisites	It is required to achieve the effects of eduction of basic and field of study modules related to the topic of diploma thesis under development.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_PPD_w_1	Diploma thesis	Diploma thesis presentation and assessment by the thesis supervisor and tutor.	IM1A_PPD_1, IM1A_PPD_2, IM1A_PPD_3

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_PPD_fs_1	seminar	Own work.	0	Developing the diploma thesis results and contents.	375	IM1A_PPD_w_1

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Engineering materials

Module code: IM1A_MI

1. Number of the ECTS credits: 6

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_MI_1	Students have detailed knowledge about individual materials in view of specific applications and know development trends within individual groups of materials	IM1A_W05	3
IM1A_MI_2	Students have knowledge about the structure and properties of basic groups of engineering materials useful to choose a material at manufacturing of technical products	IM1A_W06 IM1A_W07	3 3
IM1A_MI_3	Students have the skill to compare materials' mechanical, technological and operational properties and also to choose engineering materials for technical applications; they can assess economic conditions of various engineering materials use.	IM1A_U09 IM1A_U14	3 4
IM1A_MI_4	Students show readiness to cooperate with designers and process engineers	IM1A_K03	2

3. Module description

Description	The module Engineering materials shall enable that students are knowledgeable about basic groups of engineering materials in view of the structure, properties, the way of shaping and rules of selection for specific technical products. This will allow to deepen the skill of proper choice of structural materials for specific technical applications.
Prerequisites	It is required to achieve effects of education in rudiments of materials science, materials processing technology, as well as mechanics and materials strength modules

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_MI_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and	

		attended classes	IM1A_MI_1, IM1A_MI_2, IM1A_MI_3, IM1A_MI_4
IM1A_MI_w_2	Test	Assessment of mastering the basic general knowledge necessary for performance of a practical exercise	IM1A_MI_1, IM1A_MI_2
IM1A_MI_w_3	Report	The assessment of practical exercise performance and of correctness of the obtained results description and of conclusions formulation	IM1A_MI_3

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_MI _fs_1	lecture	The lecture shall enable learning the issues related to basic groups of engineering materials and their importance in the civilisation progress. The lecture is delivered with the use of multimedia.	30	The reading of recommended literature, preparation to the examination	65	IM1A_MI_w_1
IM1A_MI _fs_2	laboratory classes	Examining the structure and properties of materials selected from individual groups of materials. Exercises are performed by students with the use of equipment of teaching and scientific laboratories.	45	Preparation to tests, reading the laboratory instructions, preparation of reports	45	IM1A_MI_w_2, IM1A_MI_w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Foreign language 1

Module code: IM1A_JO1

1. Number of the ECTS credits: 2

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_JO1_1	Students have the skill of understanding various written and oral texts, including simple technical texts, requiring a systemic knowledge about the language (in particular grammatical structures, lexis, and phonetics); they have the skill of writing various texts, requiring the knowledge of the syntax, vocabulary and basic elements of style depending on the degree of their complexity and form; they can form clear and transparent oral statements (production and interaction) based on the knowledge of pronunciation, grammatical structures and vocabulary, including the lexis from the field of engineering, using rules of speech organisation, and an appropriate register and style.	IM1A_U03	4
IM1A_JO1_2	Students search, select, analyse, assess, and classify the information using various sources and methods.	IM1A_U01	3
IM1A_JO1_3	Students can work in a team, communicate with the environment in the work place and outside it, can use the interpersonal skills. Students understand the need for further learning, perform self-assessment, are capable of supplementing and improving the acquired knowledge and skills.	IM1A_K01 IM1A_U02 IM1A_U06	1 1 1
IM1A_JO1_4	Students communicate in a foreign language using various communication channels and techniques within a scope relevant for the specific area of knowledge.	IM1A_U03	5

3. Module description

Description	The module is aimed at developing the language communication competence in the field of language activities (reading, listening, speaking, writing, interacting) taking into account necessary language strategies as well as elements of specialised technical language. The module develops the skill of independent learning, acquiring the knowledge and working in a team and also of effective communication with the environment.
Prerequisites	Recommended knowledge of the foreign language enabling the achievement of the planned target level.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_JO1_w_1	Credits	Periodical written and oral checking of the language competence acquired during classes and through own work within the range of marks 2-5.	IM1A_JO1_1, IM1A_JO1_2, IM1A_JO1_3, IM1A_JO1_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_JO1_fs_1	practical classes	Subject classes using a communicative approach in foreign languages teaching, with elements of discussion, with written or oral feedback, with the involvement of student's own work. Classes are delivered using a motivating method (e..g. project) as well as remote education methods and techniques and also using the ICT.	30	Work with a handbook, dictionary, exercise book, supplementing literature, Internet sources. Acquiring and consolidating the language competence gained during classes. Preparing oral and written forms (e.g. a project, presentation, dialogue, essay, letter). Work on the e-learning platform. Preparation to various forms of education effects verification.	30	IM1A_JO1_w_1

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Foreign language 3

Module code: IM1A_JO3

1. Number of the ECTS credits: 2

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_JO3_1	Students have the skill of understanding various written and oral texts, including simple technical texts, requiring a systemic knowledge about the language (in particular grammatical structures, lexis, and phonetics); they have the skill of writing various texts, requiring the knowledge of the syntax, vocabulary and basic elements of style depending on the degree of their complexity and form; they can form clear and transparent oral statements (production and interaction) based on the knowledge of pronunciation, grammatical structures and vocabulary, including the lexis from the field of engineering, using rules of speech organisation, and an appropriate register and style.	IM1A_U03	4
IM1A_JO3_2	Students search, select, analyse, assess, and classify the information using various sources and methods.	IM1A_U01	3
IM1A_JO3_3	Students can work in a team, communicate with the environment in the work place and outside it, can use the interpersonal skills. Students understand the need for further learning, perform self-assessment, are capable of supplementing and improving the acquired knowledge and skills.	IM1A_K01 IM1A_U02 IM1A_U06	1 1 1
IM1A_JO3_4	Students communicate in a foreign language using various communication channels and techniques within a scope relevant for the specific area of knowledge.	IM1A_U03	5

3. Module description

Description	The module is aimed at developing the language communication competence in the field of language activities (reading, listening, speaking, writing, interacting) taking into account necessary language strategies as well as elements of specialised technical language. The module develops the skill of independent learning, acquiring the knowledge and working in a team and also of effective communication with the environment.
Prerequisites	Recommended knowledge of the foreign language enabling the achievement of the planned target level.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_JO3_w_1	Credits	Periodical written and oral checking of the language competence acquired during classes and through own work within the range of marks 2-5.	IM1A_JO3_1, IM1A_JO3_2, IM1A_JO3_3, IM1A_JO3_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_JO3_fs_1	practical classes	Subject classes using a communicative approach in foreign languages teaching, with elements of discussion, with written or oral feedback, with the involvement of student's own work. Classes are delivered using a motivating method (e.g. project) as well as remote education methods and techniques and also using the ICT.	30	Work with a handbook, dictionary, exercise book, supplementing literature, Internet sources. Acquiring and consolidating the language competence gained during classes. Preparing oral and written forms (e.g. a project, presentation, dialogue, essay, letter). Work on the e-learning platform. Preparation to various forms of education effects verification.	30	IM1A_JO3_w_1

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Foreign language 4

Module code: IM1A_JO4

1. Number of the ECTS credits: 2

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_JO4_1	Students have the skill of understanding various written and oral texts, including simple technical texts, requiring a systemic knowledge about the language (in particular grammatical structures, lexis, and phonetics); they have the skill of writing various texts, requiring the knowledge of the syntax, vocabulary and basic elements of style depending on the degree of their complexity and form; they can form clear and transparent oral statements (production and interaction) based on the knowledge of pronunciation, grammatical structures and vocabulary, including the lexis from the field of engineering, using rules of speech organisation, and an appropriate register and style.	IM1A_U03	4
IM1A_JO4_2	Students search, select, analyse, assess, and classify the information using various sources and methods.	IM1A_U01	3
IM1A_JO4_3	Students can work in a team, communicate with the environment in the work place and outside it, can use the interpersonal skills. Students understand the need for further learning, perform self-assessment, are capable of supplementing and improving the acquired knowledge and skills.	IM1A_K01 IM1A_U02 IM1A_U06	1 1 1
IM1A_JO4_4	Students communicate in a foreign language using various communication channels and techniques within a scope relevant for the specific area of knowledge.	IM1A_U03	5

3. Module description

Description	The module is aimed at developing the language communication competence in the field of language activities (reading, listening, speaking, writing, interacting) taking into account necessary language strategies as well as elements of specialised technical language. The module develops the skill of independent learning, acquiring the knowledge and working in a team and also of effective communication with the environment.
Prerequisites	Recommended knowledge of the foreign language enabling the achievement of the planned target level.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_JO4_w_1	Exam	Exhaustive written and oral checking of the language competence acquired during the implementation of four consecutive ‘Foreign language’ modules within the range of marks 2-5.	IM1A_JO4_1, IM1A_JO4_2, IM1A_JO4_3, IM1A_JO4_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_JO4_fs_1	practical classes	Subject classes using a communicative approach in foreign languages teaching, with elements of discussion, with written or oral feedback, with the involvement of student's own work. Classes are delivered using a motivating method (e..g. project) as well as remote education methods and techniques and also using the ICT.	30	Work with a handbook, dictionary, exercise book, supplementing literature, Internet sources. Acquiring and consolidating the language competence gained during classes. Preparing oral and written forms (e.g. a project, presentation, dialogue, essay, letter). Work on the e-learning platform. Preparation to various forms of education effects verification.	30	IM1A_JO4_w_1

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Foreign language 2

Module code: IM1A_JO2

1. Number of the ECTS credits: 2

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_JO2_1	Students have the skill of understanding various written and oral texts, including simple technical texts, requiring a systemic knowledge about the language (in particular grammatical structures, lexis, and phonetics); they have the skill of writing various texts, requiring the knowledge of the syntax, vocabulary and basic elements of style depending on the degree of their complexity and form; they can form clear and transparent oral statements (production and interaction) based on the knowledge of pronunciation, grammatical structures and vocabulary, including the lexis from the field of engineering, using rules of speech organisation, and an appropriate register and style.	IM1A_U03	4
IM1A_JO2_2	Students search, select, analyse, assess, and classify the information using various sources and methods.	IM1A_U01	3
IM1A_JO2_3	Students can work in a team, communicate with the environment in the work place and outside it, can use the interpersonal skills. Students understand the need for further learning, perform self-assessment, are capable of supplementing and improving the acquired knowledge and skills.	IM1A_K01 IM1A_U02 IM1A_U06	1 1 1
IM1A_JO2_4	Students communicate in a foreign language using various communication channels and techniques within a scope relevant for the specific area of knowledge.	IM1A_U03	5

3. Module description

Description	The module is aimed at developing the language communication competence in the field of language activities (reading, listening, speaking, writing, interacting) taking into account necessary language strategies as well as elements of specialised technical language. The module develops the skill of independent learning, acquiring the knowledge and working in a team and also of effective communication with the environment.
Prerequisites	Recommended knowledge of the foreign language enabling the achievement of the planned target level.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_JO2_w_1	Credits	Periodical written and oral checking of the language competence acquired during classes and through own work within the range of marks 2-5.	IM1A_JO2_1, IM1A_JO2_2, IM1A_JO2_3, IM1A_JO2_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_JO2_fs_1	practical classes	Subject classes using a communicative approach in foreign languages teaching, with elements of discussion, with written or oral feedback, with the involvement of student's own work. Classes are delivered using a motivating method (e..g. project) as well as remote education methods and techniques and also using the ICT.	30	Work with a handbook, dictionary, exercise book, supplementing literature, Internet sources. Acquiring and consolidating the language competence gained during classes. Preparing oral and written forms (e.g. a project, presentation, dialogue, essay, letter). Work on the e-learning platform. Preparation to various forms of education effects verification.	30	IM1A_JO2_w_1

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Intellectual property protection

Module code: IM1A_OWI

1. Number of the ECTS credits: 1

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_OWI_1	Increasing the knowledge about legislation in force in Poland on the intellectual property protection; understanding basic terms and principles from the field of intellectual property protection; knowledge of trademarks binding in the European Union; understanding and applying instruments of intellectual property protection; knowledge of national and international bodies granting the property rights.	IM1A_W26	5
IM1A_OWI_2	Students can prepare patent documentation, can use basic legislation related to the intellectual property protection.	IM1A_K05 IM1A_U01 IM1A_U19	1 2 5
IM1A_OWI_3	Students are aware of the importance of observing the professional ethics.	IM1A_K04	4

3. Module description

Description	The module Intellectual property protection shall enable students learning the basic issues, regulations and legal acts related to the intellectual property, including the chronology of patent procedure and the rules of preparing documentation for invention and utility design applications.
Prerequisites	The knowledge of basics of management, marketing and of psychological aspects of the work environment.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_OWI_w_1	Credits test	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_OWI_1, IM1A_OWI_2, IM1A_OWI_3

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_OWI_fs_1	lecture	The lecture shall enable understanding the issues, regulations and legal acts related to the intellectual property, learning principles of work organisation and integrated management in undertaken technical activities and in various types of professional activities. The lecture is delivered with the use of multimedia.	15	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	20	IM1A_OWI_w_1

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Introduction to biomaterials

Module code: IM1A_WBIO

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_WBIO_1	Learning physico-chemical characteristics of biomaterials, the structure and properties of biomaterials, functions of biomaterials, criteria for biomaterials quality	IM1A_W06	5
IM1A_WBIO_2	Obtaining basic knowledge about basic engineering materials used in medicine and veterinary science.	IM1A_W11	4
IM1A_WBIO_3	The skill of determining requirements set to biomaterials, learning the selection criteria, examples of practical applications in medicine. Procedures, norms and standards binding in the biomaterials engineering.	IM1A_U01 IM1A_U14 IM1A_U25	2 3 5
IM1A_WBIO_4	Development of the awareness of biomaterials application social and ethical aspects. European standards and legal regulations for tests on animals (ISO 10993 standard).	IM1A_K02	2

3. Module description

Description	The Introduction to biomaterials module shall enable that students are knowledgeable about the structure of materials used in medicine for implants and medical instruments and about criteria for their selection, about application limitations, phenomena occurring at the biomaterial-tissue interface, as well as social and ethical aspects of biomaterials application. The understanding of relationships between properties of materials for medical applications and their structure shall result in honing the skill of improving those materials properties to achieve a better biocompatibility.
Prerequisites	It is required to achieve effects of education of physics, chemistry, crystallography, and materials science modules

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_WBIO_w_1	Written test	Checking the acquired skill of structure shaping methods and mechanisms responsible for mechanical properties changing	IM1A_WBIO_1, IM1A_WBIO_2, IM1A_WBIO_3, IM1A_WBIO_4
IM1A_WBIO_w_2	Test	Assessment of mastering the basic knowledge necessary for individual performance of a practical exercise	IM1A_WBIO_1, IM1A_WBIO_2
IM1A_WBIO_w_3	Report	Assessment of the skill to understand the structure shaping mechanisms and to connect them with engineering materials properties by a correct formulation of conclusions	IM1A_WBIO_3, IM1A_WBIO_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_WBIO_fs_1	lecture	The lecture shall enable an understanding of issues related to the structure of engineering materials, phenomena, processes, and mechanisms enabling their properties shaping. The lecture is delivered with the use of multimedia, demonstrations and the „Materials science” software.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues	25	IM1A_WBIO_w_1
IM1A_WBIO_fs_3	laboratory classes	The application of acquired theoretical knowledge to practical learning of engineering materials structure and of mechanisms enabling shaping their properties. Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories.	30	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	10	IM1A_WBIO_w_2, IM1A_WBIO_w_3

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: IT techniques in medicine

Module code: IM1A_INMED

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_INMED_1	Learning the ways of data acquiring, processing, coding and storing for the needs of medicine.	IM1A_W19 IM1A_W21	2 2
IM1A_INMED_2	Learning statistical tests used in medicine (mainly non-parametric ones)	IM1A_W11	2
IM1A_INMED_3	The skill of using the Internet resources and medical databases .	IM1A_U01 IM1A_U10	3 2
IM1A_INMED_4	Development of the awareness of the IT importance for the needs of medicine.	IM1A_K01 IM1A_K02	1 1

3. Module description

Description	The module IT techniques in medicine shall enable students an insight into IT techniques in medicine with special emphasis on the ways of data acquiring, processing, coding, and storing in databases. Owing to that students shall understand the role of digital techniques in the recording of biological objects images or biological signals as well as advanced methods of their processing for the monitoring and diagnostic purposes; also the role of Internet in diagnostics, telemedicine or electronic patient service.
Prerequisites	It is required to achieve effects of education of the mathematics module.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_INMED_w_1	Written test	Checking the theoretical knowledge provided during the lecture and possibly deepened by own student's interests.	IM1A_INMED_1, IM1A_INMED_2
IM1A_INMED_w_2	Practical test	Practical resolving (using a computer) of the presented problems: (1) - statistical handling of numerical data (2) - retrieval of specific information from a database	IM1A_INMED_3, IM1A_INMED_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_INMED_fs_1	lecture	The lecture shall enable a complex look at medical data retrieving, processing, distributing, storing and handling as well as an introduction to numerical methods used in medicine. The lecture is delivered with the use of multimedia and teaching programs.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	30	IM1A_INMED_w_1
IM1A_INMED_fs_2	laboratory classes	Practical resolution of problems based on examples. The issues comprise a statistical data assessment and database issues. Exercises are performed by students individually with the use of computers in the teaching laboratory.	30	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	30	IM1A_INMED_w_2

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Materials economics

Module code: IM1A_EkoMat

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_EkoMat_1	Students have elementary knowledge about costs and rational materials management.	IM1A_W27	2
IM1A_EkoMat_2	Students can manage inventories, know the place, roles and tasks of warehouses in the enterprise logistics in the market economy reality.	IM1A_U01 IM1A_U16	2 5
IM1A_EkoMat_3	Students are aware of the need for skilful management of human and material resources in enterprises.	IM1A_K02 IM1A_K05	2 3

3. Module description

Description	The Materials economics module shall enable students learning the basic terms related to the elements of forecasting, costs, and rational materials management. Students acquire the skills to manage inventories, know the place, roles and tasks of warehouses in the enterprise logistics in the market economy reality.
Prerequisites	The knowledge within the secondary school scope is required: mathematics, physics, chemistry, and biology .

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_ EkoMat_w_1	Written test	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_EkoMat_1, IM1A_EkoMat_2, IM1A_EkoMat_3

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_EkoMat_fs_1	lecture	The lecture shall enable students learning the basic terms related to the elements of forecasting, costs, and rational materials management. Students acquire the skills to manage inventories, know the place, roles and tasks of warehouses in the enterprise logistics in the market economy reality.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	45	IM1A_ EkoMat_w_1
IM1A_EkoMat_fs_3	discussion classes	The application of the learned theoretical knowledge in a practical use in relation to the materials and inventories management in the enterprise.	15	Preparation to classes through independent studying of recommended issues from the literature.	30	IM1A_ EkoMat_w_1

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Materials electrochemistry

Module code: IM1A_EM

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_EM_1	Understanding basic terms and definitions, selected electrochemical processes; understanding factors affecting the efficiency of the electrochemical process for engineering materials obtaining.	IM1A_W11 IM1A_W14	2 4
IM1A_EM_2	The skill to apply knowledge related to the operation of scientific-research instruments and to measurement principles for electrochemical obtaining and characterising material properties, analysing and interpreting the obtained results and also formulating proper conclusions.	IM1A_K05 IM1A_U08 IM1A_U10 IM1A_U21	1 2 3 3

3. Module description

Description	The Materials electrochemistry module shall ensure students learning the physicochemical foundations of functional engineering materials for applications in electronics, technologies of electrochemical cells, power industry, renewable energy sources, sensors, medicine as well as materials corrosion. The module shall enable students mastering the methods of electrochemical obtaining and characterising electrochemical properties of materials for the aforementioned applications. The understanding of correlations between the nature of chemical bonds, crystallographic structure, electron structure and the transport properties, reactivity and stability of solids shall result in acquiring the skill to design materials of practical properties that were sought.
Prerequisites	The knowledge of the chemistry, physics, crystallography, and materials science modules is required.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_EM_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended laboratory classes.	IM1A_EM_1, IM1A_EM_2
IM1A_EM_w_2	Written tests	Checking the skill to use the acquired knowledge to understand mechanisms of the course of electrochemical processes and to form the material properties.	IM1A_EM_1, IM1A_EM_2
IM1A_EM_w_3	Weekly reports	The assessment of mastering the skill of independent performance of a practical exercise using many electrochemical measuring techniques, of experimental results and measurement error analysis as well as of formulating the conclusions properly.	IM1A_EM_1, IM1A_EM_2
IM1A_EM_w_4	Interview	Assessment of understanding the mechanisms and kinetics of electrochemical processes from a theoretical and utilitarian point of view.	IM1A_EM_1

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_ EM_fs _1	lecture	The lecture shall enable preparation to independent designing, electrochemical obtaining and characterising the practical properties of materials used in electronics, in electrochemical and fuel cells technologies, hydrogen power industry, sensors, corrosion, medicine and others based on the knowledge of the solid state chemistry and elements of the solid state physics. The lecture is delivered using demonstrations and modern audio-visual aids.	30	The work with the recommended literature comprising independent acquisition of knowledge related to issues presented during the lectures.	35	IM1A_EM_w_1
IM1A_EM _fs _2	laboratory classes	Individual and team performance of tests reflecting the lecture issues in teaching laboratories and using scientific-research instruments in scientific laboratories. Independent processing of obtained results, preparing graphs, analysis of experimental error and formulation of conclusions.	30	Preparation of theoretical basics and issues related to the subject matter of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	25	IM1A_EM_w_2, IM1A_EM_w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Materials for electronics and electrotechnics

Module code: IM1A_MEE

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_MEE_1	Acquiring the elementary knowledge about materials used in the electronic and electrotechnic industry, including the knowledge necessary to understand basic physical phenomena occurring in electronic components and circuits and also in their surroundings as well as methods for basic material parameters determination.	IM1A_W06 IM1A_W07 IM1A_W23	2 3 2
IM1A_MEE_2	Acquiring basic skills to obtain information (related to materials used in electronics and electrotechnics) from the literature, databases and other sources; the skill to integrate and evaluate it in the context of potential applications in electronics and electrotechnics. Acquiring the skill to perform simple measurements of selected material parameters and to prepare documentation related to an engineering task performance.	IM1A_U14	3
IM1A_MEE_3	Developing the awareness and understanding the need for development of modern technologies of materials for electronics and electrotechnics.	IM1A_K05	1

3. Module description

Description	The Materials for electronics and electrotechnics module shall enable students obtaining competence in the field of methods for obtaining, properties, classification, and structure of materials used in electronics and electrotechnics as well as competence in the field of selecting those materials for appropriate applications.
Prerequisites	It is required to achieve effects of education of the modules: mathematics, physics, thermodynamics, crystallography, rudiments of the materials science, ceramics, metals and alloys as well as materials testing methods.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_MEE_w_1	Credits based on an interview	Verification of the knowledge based on the lectures content, recommended literature and attended laboratory classes.	IM1A_MEE_1, IM1A_MEE_2, IM1A_MEE_3
IM1A_MEE_w_3	Reports on laboratory classes.	Assessment of mastering the skill in the field of independent testing selected physical material properties, of measurement results analysis as well as of the measurement uncertainty assessment.	IM1A_MEE_1
IM1A_MEE_w_4	Interview	Assessment of the awareness of the importance of professional behaviour, of professional ethics observation.	IM1A_MEE_2, IM1A_MEE_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_MEE _fs_1	lecture	The lecture shall enable understanding the nature of relationships between the structure and electrical properties of materials and their choice for specific applications in the electronic and electrotechnic industry. The whole is illustrated with demonstrations and multimedia presentations.	25	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	30	IM1A_MEE_w_1
IM1A_MEE _fs_3	laboratory classes	Practical classes consisting in performing measurements of basic electrical and magnetic properties of materials.	20	Preparation of theoretical basics and issues related to the specific exercise. Processing the test results, preparing a report.	15	IM1A_MEE_w_3, IM1A_MEE_w_4

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Materials manufacturing technologies

Module code: IM1A_TWM

1. Number of the ECTS credits: 9

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_TWM_1	Students have knowledge about techniques of obtaining, processing, recovering, and recycling materials from basic groups of engineering materials used in medicine.	IM1A_W07 IM1A_W09	2 2
IM1A_TWM_2	Students have basic knowledge about development trends in the field of advanced processing technologies and modern shaping techniques for materials used in medicine.	IM1A_W11	3
IM1A_TWM_3	Students can choose a technological process to obtain a product of a defined structure and practical properties.	IM1A_U21 IM1A_U22 IM1A_U23	5 5 5
IM1A_TWM_4	Students can design or indicate techniques and technologies used to obtain materials from the waste processing.	IM1A_U13 IM1A_U24	2 2
IM1A_TWM_5	Students are aware of the importance and understand the significance of materials manufacturing technologies for obtaining products for medical applications.	IM1A_K02 IM1A_K05	2 2

3. Module description

Description	The Materials manufacturing technologies module shall enable students learning the techniques for obtaining and processing structural materials. Owing to that students shall obtain a better understanding of technological processes used to obtain engineering materials and methods for their processing to obtain a specific shape and properties. This will allow honing the skill of choosing a relevant technology to obtain a product of demanded practical properties.
Prerequisites	It is required to achieve effects of education of physics, chemistry, thermodynamics, as well as designing and engineering graphics modules.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_TWM_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended laboratory classes.	IM1A_TWM_1, IM1A_TWM_2, IM1A_TWM_3, IM1A_TWM_4, IM1A_TWM_5
IM1A_TWM_w_2	Written test	Assessment of mastering the basic general knowledge necessary for performance of a practical exercise.	IM1A_TWM_1, IM1A_TWM_2
IM1A_TWM_w_3	Report	The assessment of practical exercise performance and of correctness of the obtained results description and of conclusions formulation.	IM1A_TWM_3, IM1A_TWM_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_TWM_fs_1	lecture	The lecture shall enable the understanding of issues related to structural materials manufacturing and processing techniques. The lecture is delivered with the use of multimedia.	75	The reading of recommended literature, preparation to the examination.	45	IM1A_TWM_w_1
IM1A_TWM_fs_2	laboratory classes	The application of learned theoretical knowledge in practical testing of the manufacturing and processing technology influence on materials structure and properties. Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories.	75	Preparation to tests, reading the laboratory instructions, preparation of reports.	75	IM1A_TWM_w_2, IM1A_TWM_w_3

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Materials recycling

Module code: IM1A_REMAT

1. Number of the ECTS credits: 5

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_REMAT_1	Understanding issues related to the generation of waste and its hazards to the environment; learning methods for the waste use through the material, raw material, and energy recycling.	IM1A_W10	5
IM1A_REMAT_2	The skill to use selected physico-chemical methods for the process of materials recovery.	IM1A_K05 IM1A_U20 IM1A_U24	1 5 5
IM1A_REMAT_3	Development of the awareness of the need to provide the information on waste hazards and methods for its management to improve the ecological awareness of the society.	IM1A_K02	4

3. Module description

Description	The Materials recycling module enables that students are knowledgeable about the environmental protection issues related to a sudden growth of industrial production. Students know hazards to the environment resulting from the fact of municipal, industrial and other waste generation. They understand the need to minimise the waste, to apply waste free or low waste technologies, to segregate the waste and to manage it. They know methods of waste use. Students are knowledgeable about issues related to the raw material, material, and energy recycling. They know management and recycling methods for such groups of materials as metals, plastics, glass, paper, construction materials and others. Owing to this knowledge students understand the need for developing the ecological awareness of the society by providing the information related to waste hazards for the environment and methods for its management again.
Prerequisites	It is required to achieve effects of education of chemistry, physics, and basics of materials science modules.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_REMAT_w_1	Written test	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_REMAT_1, IM1A_REMAT_2, IM1A_REMAT_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_REMAT_fs_1	lecture	The lecture shall enable understanding the issues related to the waste generation, methods for its minimisation and techniques for its reuse. The lecture is delivered with the use of multimedia and demonstrations.	15	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	75	IM1A_REMAT_w_1
IM1A_REMAT_fs_2	laboratory classes	The application of the possessed theoretical knowledge to perform practical exercises, aimed at recovering selected waste materials by means of appropriate physico-chemical methods.	30	Preparation of theoretical basics and issues related to the topic of performed exercise.	60	IM1A_REMAT_w_1

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Materials surface engineering

Module code: IM1A_IPM

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_IPM_1	Understanding the engineering materials surface and surface layers structure; learning phenomena and processes occurring on the material - environment interface; learning methods for the surface modification to improve functional properties of engineering materials.	IM1A_W14 IM1A_W15	1 5
IM1A_IPM_2	Students can select appropriate method for the engineering materials surface protection.	IM1A_K05 IM1A_U01 IM1A_U23	1 1 5

3. Module description

Description	The Materials surface engineering module shall enable that students are knowledgeable about the structure of engineering materials surface, about physico-chemical phenomena occurring on the interface and methods for the surface modification enabling changing functional properties of the engineering materials surface layer Owing to that students shall obtain a better understanding of correlations between processes occurring spontaneously or forced to cause specific changes of materials surface layer structure. The understanding of those relationships shall result in honing the skill to shape the surface structure so as to obtain functional properties, required in the planned conditions, of engineering materials intended for technical and medical applications.
Prerequisites	It is required to achieve effects of education of the modules: physics, chemistry, crystallography, engineering materials structure and properties.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_ IPM_w	Written examination	Verification of the knowledge based on the lectures content, recommended literature and	IM1A_IPM_1, IM1A_IPM_2

_1		attended classes.	
IM1A_ IPM_w _2	Written test	Checking the acquired skills related to the materials surface structure, the material-surroundings interface, methods for surface shaping and modifying to change functional properties of components made of engineering materials.	IM1A_IPM_1, IM1A_IPM_2
IM1A_ IPM_w _3	Test	Assessment of mastering the basic knowledge necessary for individual performance of a practical exercise,	IM1A_IPM_1, IM1A_IPM_2
IM1A_ IPM_w _4	Report	Assessment of the skill to understand the need for structure shaping and to connect it with engineering materials functional properties by a correct formulation of conclusions.	IM1A_IPM_1, IM1A_IPM_2

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_ IPM_fs _1	lecture	The lecture shall enable understanding the issues related to the surface structure and the need to modify it to improve the operational parameters and to extend the life of components made of engineering materials. Understanding physio-chemical phenomena and mechanisms enabling the manufacturing of modifying properties of surface layers. The lecture is delivered with the use of multimedia.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	35	IM1A_ IPM_w_1
IM1A_ IPM_fs _3	laboratory classes	The application of the gained theoretical knowledge to a practical learning of surface modification methods to improve functional properties of the materials surface layer. Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories.	15	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	15	IM1A_ IPM_w_2, IM1A_ IPM_w_3, IM1A_ IPM_w_4

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Materials technologies and processing

Module code: IM1A_TIPM

1. Number of the ECTS credits: 9

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A TIPM_5	Students are aware of the importance and understand the significance of materials manufacturing technologies to obtain products of optimum practical properties.	IM1A_K02 IM1A_K05	2 2
IM1A_TIPM_1	Students have the knowledge about techniques for obtaining, processing, and recycling materials from the basic groups of engineering materials, useful to select the technology of product manufacturing for a specific application and for the material recovery.	IM1A_W07 IM1A_W09	2 5
IM1A_TIPM_2	Students have the knowledge about development trends in the field of advanced processing technologies and modern materials forming techniques.	IM1A_W11	3
IM1A_TIPM_3	Students can choose a technological process to obtain a product of a defined structure and practical properties.	IM1A_U21 IM1A_U22 IM1A_U23	5 5 5
IM1A_TIPM_4	Students can design or indicate techniques and technologies used to obtain materials from the waste processing	IM1A_U13 IM1A_U24	2 2

3. Module description

Description	The Materials technologies and processing module shall enable students learning the techniques for obtaining and processing structural materials. Owing to that students shall obtain a better understanding of technological processes used to obtain engineering materials and methods for their processing to obtain a specific shape and properties. This will allow honing the skill of choosing a relevant technology to obtain a product of demanded practical properties.
Prerequisites	It is required to achieve effects of education of physics, chemistry, thermodynamics, as well as designing and engineering graphics modules.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_TIPM_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended laboratory classes.	IM1A TIPM_5, IM1A_TIPM_1, IM1A_TIPM_2, IM1A_TIPM_3, IM1A_TIPM_4
IM1A_TIPM_w_2	Written test	Assessment of mastering the basic general knowledge necessary for performance of a practical exercise.	IM1A_TIPM_1, IM1A_TIPM_2
IM1A_TIPM_w_3	Report	The assessment of practical exercise performance and of correctness of the obtained results description and of conclusions formulation.	IM1A_TIPM_3, IM1A_TIPM_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A _TIPM_fs_1	lecture	The lecture shall enable the understanding of issues related to structural materials manufacturing and processing techniques. The lecture is delivered with the use of multimedia.	75	The reading of recommended literature, preparation to the examination.	35	IM1A_TIPM_w_1
IM1A _TIPM_fs_2	laboratory classes	The application of learned theoretical knowledge in practical testing of the manufacturing and processing technology influence on materials structure and properties. Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories.	75	Preparation to tests, reading the laboratory instructions, preparation of reports .	75	IM1A_TIPM_w_2, IM1A_TIPM_w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Materials testing methods 2

Module code: IM1A_MBM2

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_MBM2_1	Understanding phenomena used in testing the mechanical, electrical, and magnetic properties; learning the design and principles of specialised scientific-research instruments operation, used to describe the engineering materials properties.	IM1A_K05 IM1A_W08	1 5
IM1A_MBM2_2	Acquiring the skill to operate specialised scientific-research instruments; to perform simple experiments; to interpret results and to evaluate measurement errors.	IM1A_U08 IM1A_U11 IM1A_U21	5 5 5
IM1A_MBM2_3	Development of creative thinking.	IM1A_K05	3

3. Module description

Description	The module Materials testing methods 2 shall enable that students learn about phenomena and principles of operation and design of research instruments, which are applied in measuring techniques and methods used to characterise the structure and basic properties of engineering materials. Owing to that students shall master operation of scientific-research instruments and acquire the skill to interpret measurement results. The understanding of phenomena and principles of operation shall result in a skilful application of an appropriate testing technique to assess materials properties. Students shall master basic definitions of material quantities, the idea of material equations and general rules used in measuring techniques. They will learn selected methods illustrating the general approach and results obtained using these methods.
Prerequisites	It is required to achieve effects of education of physics, chemistry, mathematics, and crystallography modules.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_ MBM2 _w_1	Oral examination	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_MBM2_1, IM1A_MBM2_2, IM1A_MBM2_3
IM1A_ MBM2 _w_2	Written examination	Checking the knowledge of phenomena and principles of operation of the learned research instruments as well of the skill to choose an appropriate method for measurements and for measurement results interpretation	IM1A_MBM2_1, IM1A_MBM2_2, IM1A_MBM2_3
IM1A_ MBM2 _w_3	Test	Assessment of mastering the basic knowledge necessary for individual performance of a practical exercise.	IM1A_MBM2_1, IM1A_MBM2_2, IM1A_MBM2_3
IM1A_ MBM2 _w_4	Report	Assessment of the skill to analyse engineering materials structure and properties.	IM1A_MBM2_1, IM1A_MBM2_2, IM1A_MBM2_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_ MBM2 _fs_1	lecture	The lecture shall enable understanding phenomena and principles of instruments used in methods for characterising engineering materials structure and properties. The lecture is delivered with the use of multimedia.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	10	IM1A_ MBM2 _w_1
IM1A_ MBM2 _fs_2	laboratory classes	Application of the acquired theoretical knowledge to learn the skill of the method selection, research instruments operation, to interpret results and to evaluate measurement errors. Exercises are performed by students individually or in teams, with the use of equipment of teaching and scientific laboratories.	45	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	35	IM1A_ MBM2 _w_2, IM1A_ MBM2 _w_3, IM1A_ MBM2 _w_4

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Materials testing methods 1

Module code: IM1A_MBM1

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_MBM1_1	Understanding phenomena used in methods for engineering materials structure and properties description, including methods using X-ray and basic microscopic techniques; learning the design and operation rules of specialised scientific-research instruments.	IM1A_W08	5
IM1A_MBM1_2	The skill to operate specialised scientific-research instruments, to analyse engineering materials structure and properties, to interpret results of research and to evaluate measurement errors.	IM1A_U08 IM1A_U11 IM1A_U21	5 5 5
IM1A_MBM1_3	Development of creative thinking.	IM1A_K05	3

3. Module description

Description	The module Materials testing methods 1 shall enable that students learn about phenomena and principles of operation and design of research instruments, which are applied in measuring techniques and methods used to characterise the structure and basic properties of engineering materials. Owing to that students shall master operation of scientific-research instruments and acquire the skill to interpret measurement results. The understanding of phenomena and principles of operation shall result in a skilful application of appropriate testing technique to assess materials structure and properties.
Prerequisites	It is required to achieve effects of education of physics, chemistry, and crystallography modules.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A _ MBM1 _w_1	Oral examination	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_MBM1_1, IM1A_MBM1_2, IM1A_MBM1_3
IM1A _ MBM1 _w_2	Written test	Checking the knowledge of measurement results interpretation, of phenomena and operating principle of the learned research instruments.	IM1A_MBM1_1, IM1A_MBM1_2, IM1A_MBM1_3
IM1A _ MBM1 _w_3	Test	Assessment of mastering the basic knowledge necessary for individual performance of a practical exercise.	IM1A_MBM1_1, IM1A_MBM1_2, IM1A_MBM1_3
IM1A _ MBM1 _w_4	Report	Assessment of the skill to analyse engineering materials structure and properties.	IM1A_MBM1_1, IM1A_MBM1_2, IM1A_MBM1_3

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A _ MBM1 _fs_1	lecture	The lecture shall enable understanding phenomena and principles of instruments used in methods for characterising engineering materials structure and properties. The lecture is delivered with the use of multimedia.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	15	IM1A _ MBM1 _w_1
IM1A_ MBM1 _fs_2	laboratory classes	Application of the acquired theoretical knowledge to learn the skill of research instruments operation, to interpret results and to evaluate measurement errors. Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories.	45	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	30	IM1A _ MBM1 _w_2, IM1A _ MBM1 _w_3, IM1A _ MBM1 _w_4

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Mathematical-physical basis of materials science

Module code: IM1A _MFP

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_MFP_1	Consolidation of the knowledge about the analysis of mathematical equations as a part of the differential and integral calculus. Deepening and broadening the analysis of differential and integral calculus applications in diverse examples from the materials engineering. Learning elements of the tensor calculus in relation to the theory of elasticity. Deepening the knowledge about statistical analysis of measurement results. Acquiring the skill to apply selected numerical techniques to the analysis of measurement results.	IM1A_W01 IM1A_W05 IM1A_W06	2 2 2
IM1A_MFP_2	Gaining the skill of independent resolution of simple mathematical problems from the field of materials engineering using a computer. Development of the skill of new knowledge acquisition, problem analysis, drawing conclusions based on mathematical equations, acquiring the skill to interpret ideas and concepts.	IM1A_U10 IM1A_U13	2 2
IM1A_MFP_3	Students are aware of the importance and understand non-technical aspects and effects of materials engineer activities.	IM1A_K02 IM1A_K05	2 1

3. Module description

Description	The Mathematical-physical basis of materials science module shall enable students learning the application of differential and integral calculus in the materials science. Students shall: i) master formulation of a research problem in the form of vector, differential and/or integral equations, ii) master the skill of proficient differentiation and integration, iii) learn the numerical analysis, using a computer, of simple physical problems, iv) learn to use a computer in statistical methods of experiment results processing, v) resolve and analyse simple materials science problems related to the application of specified mathematical equations, vi) gain the skill of choosing a proper analysis method for a determined research problem.
Prerequisites	The knowledge of mathematics at the level of vector, differential, and integral calculus as well as basics of physics is required.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A _MFP _w _1	Written credits test	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_MFP_1, IM1A_MFP_2, IM1A_MFP_3
IM1A _MFP_w _2	Weekly tests	Assessment of mastering the skill of independent performance of a problem analysis with the use of mathematical methods.	IM1A_MFP_2
IM1A _MFP_w _3	Interview	Assessment of mathematical principles understanding, their interpretation and testing in materials engineering issues.	IM1A_MFP_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A _MFP _fs_1	lecture	The lecture shall enable understanding the basic principles of mathematical description of materials properties taking into account the differential and integral calculus. It illustrates general regularities in scientific experiments planning and analysing. The whole is supported by the application of selected numerical techniques and demonstrations with the use of a computer.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	10	IM1A _MFP _w_1
IM1A _MFP _fs_2	laboratory classes	Resolving simple physical problems illustrating the lecture issues, using a computer. Mastering and deepening selected numerical techniques used in materials engineering.	45	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	5	IM1A _MFP_w_2, IM1A _MFP_w_3

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Mechanics and strength of materials

Module code: IM1A_MIWM

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_MIWM_1	Students have the knowledge about the technical mechanics and materials strength useful to ensure safety of structural elements work, to determine the degree of a structural element deformation and to optimise the structure performance in terms of its own weight and costs of the elements used; students have detailed knowledge related to the static and effort analysis of selected elements of mechanical systems.	IM1A_W12	5
IM1A_MIWM_2	Students can resolve technical problems based on laws of mechanics and perform strength analyses of machine and mechanical systems components.	IM1A_K05 IM1A_U04 IM1A_U12	1 2 5
IM1A_MIWM_3	Students show readiness to cooperate with designers and process engineers.	IM1A_K03	2

3. Module description

Description	The Mechanics and strength of materials module shall enable that students are knowledgeable about issues of balance of systems of forces acting on model material bodies and about phenomena occurring in real bodies, deformed under the effect of acting stresses and temperature fields. Owing to that students shall obtain a better understanding of the importance of material properties mechanical conditions. This will allow using in the process of designing of ready elements, mutual relationship between material features conditioned by the structure and varying in time parameters specifying the material condition.
Prerequisites	It is required to achieve effects of education of the physics and mathematics modules.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_MIWM_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended laboratory classes.	IM1A_MIWM_1, IM1A_MIWM_2, IM1A_MIWM_3
IM1A_MIWM_w_2	Test	Assessment of mastering the basic general knowledge necessary for performance of a practical exercise.	IM1A_MIWM_1, IM1A_MIWM_2
IM1A_MIWM_w_3	Report	The assessment of practical exercise performance and of correctness of the obtained results description and of conclusions formulation.	IM1A_MIWM_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_MIWM_fs_1	lecture	The lecture shall enable understanding the issues related to materials statistics and strength. The lecture is delivered with the use of multimedia.	45	The reading of recommended literature, preparation to the examination	20	IM1A_MIWM_w_1
IM1A_MIWM_fs_2	laboratory classes	Using the acquired theoretical knowledge in resolving practical technical problems and in strength analyses of machines components. Exercises are performed by students with the use of equipment of teaching and scientific laboratories.	30	Preparation to tests, reading the laboratory instructions, preparation of reports.	10	IM1A_MIWM_w_2, IM1A_MIWM_w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Mechanics with elements of biomechanics

Module code: IM1A_MZEB

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_MZEB_1	Understanding of the basics of mechanics and general biomechanics.	IM1A_W12	5
IM1A_MZEB_2	Students can refer the principles of mechanics to a living organism; resolve technical problems based on the laws of biomechanics and analyse forces acting on a biomechanical model of a human being and also assess the effects of those forces action on biomaterials properties.	IM1A_K05 IM1A_U04 IM1A_U12	1 2 5
IM1A_MZEB_3	Students show readiness to cooperate with designers, process engineers, and physicians.	IM1A_K03	2

3. Module description

Description	The Mechanics with elements of biomechanics module shall enable that students are knowledgeable about the issues of balance of forces acting on model material bodies and of effects of loads action on a biomechanical model of a human being as well as performing analyses of machines and biological materials effort. Owing to that students shall obtain a better understanding of material properties mechanical conditions in mechanical and biological systems. The knowledge of biomechanics rules allows a rational planning of treatment and rehabilitation of human motor organs.
Prerequisites	It is required to achieve effects of education of the physics and mathematics modules.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_MZEB_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_MZEB_1, IM1A_MZEB_2, IM1A_MZEB_3

IM1A_MZEB_w_2	Test	Assessment of mastering the basic general knowledge necessary for performance of a practical exercise.	IM1A_MZEB_1, IM1A_MZEB_2
IM1A_MZEB_w_3	Report	The assessment of practical exercise performance and of correctness of the obtained results description and of conclusions formulation.	IM1A_MZEB_3

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_MZEB_fs_1	lecture	The lecture shall enable understanding the issues related to statistics and materials strength as well as biomechanics. The lecture is delivered with the use of multimedia.	45	The reading of recommended literature, preparation to the examination.	15	IM1A_MZEB_w_1
IM1A_MZEB_fs_2	laboratory classes	Using the acquired theoretical knowledge in resolving practical technical problems and in strength analyses of machines and biological systems components. Exercises are performed by students with the use of equipment of teaching and scientific laboratories.	30	Preparation to tests, reading the laboratory instructions, preparation of reports.	10	IM1A_MZEB_w_2, IM1A_MZEB_w_3

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Metallic biomaterials

Module code: IM1A_BM

1. Number of the ECTS credits: 6

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_BM_1	Understanding physical and physico-chemical phenomena accompanying the interactions of human tissues with metals and their alloys	IM1A_W17	3
IM1A_BM_2	Obtaining knowledge about specific nature of individual groups of metallic biomaterials	IM1A_W11 IM1A_W16	2 3
IM1A_BM_3	Acquiring the skill to select metallic materials for applications depending on the structure, properties and conditions of use	IM1A_U14 IM1A_U25	3 3
IM1A_BM_4	Development of awareness of metallic biomaterials application consequences as a material for surgical instruments and medical implants manufacturing.	IM1A_K02	1

3. Module description

Description	The Metallic biomaterials module shall enable that students are knowledgeable about processes occurring at the metal-tissue interface, about types of metallic biomaterials, their properties and potential application possibilities in the environment of a human or animal organism. Owing to that students shall achieve the understanding of correlations between those materials structure, possibilities of its shaping and specific mechanisms of their operation. The understanding of those relationships shall result in honing the skill to select, from individual metallic biomaterials, a material satisfying conditions of specific applications.
Prerequisites	It is required to achieve effects of education in physics, chemistry, crystallography, thermodynamics as well as rudiments of materials science, introduction to biomaterials, and physico-chemistry of biological processes modules.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_ BM _w _1	Written examination	Verification of the knowledge based on the lectures content, recommended literature as well as attended classes and consultations.	IM1A_BM_1, IM1A_BM_2, IM1A_BM_3, IM1A_BM_4
IM1A_ BM _w _2	Written test	Checking the acquired skill to associate the metallic biomaterials structure, properties, and interaction with the tissue, adverse effects of such interactions and with application possibilities.	IM1A_BM_1, IM1A_BM_2, IM1A_BM_3, IM1A_BM_4
IM1A_ BM _w _3	Test	Assessment of mastering the basic knowledge necessary for individual performance of a practical exercise.	IM1A_BM_1, IM1A_BM_2
IM1A_ BM_w _4	Report	Assessment of the skill to perceive and understand the specific nature of metallic biomaterials properties as well as possibilities of their application by a correct formulation of conclusions.	IM1A_BM_3, IM1A_BM_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_ BM _fs _1	lecture	The lecture shall enable understanding issues related to systematisation of metallic materials into appropriate groups, shaping properties through forced changes of structure from their application point of view. The lecture is delivered with the use of multimedia and demonstrations.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	50	IM1A_ BM _w_1
IM1A_ BM _fs _2	laboratory classes	Application of the acquired theoretical knowledge to practical learning of relationships: structure - practical properties - potential application possibilities of metallic materials. Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories.	45	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results and formulation of proper conclusions .	60	IM1A_ BM _w_2, IM1A_ BM _w_3, IM1A_ BM_w_4

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Metals and alloys

Module code: IM1A_MiS

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_MiS_1	The understanding of relationships between the structure, mechanical, technological and operating properties of metallic materials; understanding the specific nature of individual groups of metallic materials.	IM1A_W06 IM1A_W07 IM1A_W11	3 3 1
IM1A_MiS_2	Acquiring the skill to select metallic materials for technical applications depending on the structure, properties and conditions of operation.	IM1A_K05 IM1A_U04 IM1A_U09	1 2 3
IM1A_MiS_3	Development of the awareness of economic conditions for various metallic materials use.	IM1A_K02	1

3. Module description

Description	The Metals and alloys module shall enable that students are knowledgeable about individual groups of metallic materials, possibilities to adapt properties in view of their application as well as conditions and scope of their work together. Owing to that students shall achieve the understanding of correlations between those materials structure, possibilities of its shaping and potential conditions of their operation. The understanding of those relationships shall result in honing the skill to select, from individual groups, a material satisfying conditions of operation, manufacturing and operating costs.
Prerequisites	It is required to achieve effects of education of physics, chemistry, crystallography, thermodynamics, and basics of materials science modules

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_MiS _w _1	Written examination	Verification of the knowledge based on the lectures content, recommended literature as well as attended classes and consultations.	IM1A_MiS_1, IM1A_MiS_2, IM1A_MiS_3
IM1A_MiS _w _2	Written test	Checking the acquired skill of associating the structure, properties and application possibilities in individual groups of metallic materials.	IM1A_MiS_1, IM1A_MiS_2, IM1A_MiS_3
IM1A_MiS _w _3	Test	Assessment of mastering the basic knowledge necessary for individual performance of a practical exercise.	IM1A_MiS_1, IM1A_MiS_2
IM1A_MiS _w _4	Report	Assessment of the skill to perceive and understand the specific nature of individual groups of metallic materials properties by a correct formulation of conclusions.	IM1A_MiS_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_MiS _fs _1	lecture	The lecture shall enable understanding issues related to systematisation of metallic materials into appropriate groups, shaping properties through forced changes of structure from their application point of view. The lecture is delivered with the use of multimedia and demonstrations.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	30	IM1A_MiS _w_1
IM1A_MiS _fs _2	laboratory classes	Application of the acquired theoretical knowledge to practical learning of relationships: structure - practical properties - potential application possibilities of metallic materials. Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories.	30	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results and formulation of proper conclusions.	30	IM1A_MiS _w_2, IM1A_MiS _w_3, IM1A_MiS _w_4

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Module University-widy

Module code: IM1A_MO1

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_MO1_1	It has a general knowledge of selected scientific methods and know the discipline unrelated to the field of study	IM1A_W28	5
IM1A_MO1_2	It has the ability to analyze problems in the field of disciplines unrelated to the field of study	IM1A_U26	5
IM1A_MO1_3	He understands the need for an interdisciplinary approach to problem solving, to integrate knowledge from different disciplines and importance of self-study.	IM1A_K07	5

3. Module description

Description	The student selects the module (s) of the University-wide for the specific field of study. The aim of the module is to broaden the knowledge, skills and social competence of the students in the discipline unrelated to the field of study .
Prerequisites	The Faculty Council determines for students of a given field of study number of modules (according to the program of study) and determines the semester of training .

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_MO1_w_1	credit	verification on the basis of an essay or oral verification (according to the syllabus)	IM1A_MO1_1, IM1A_MO1_2, IM1A_MO1_3

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_MO1_fs_1	lecture	Lecture enriched by presentation. Focused on the ideas which are conceptually difficult and pointing out references. Illustration of the content by examples.	30	Studying the topic of the lecture (books , scripts , web sites , etc). Preparing to exam (specified in detail in the syllabus implemented module).	45	IM1A_MO1_w_1

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Module University-widy

Module code: IM1A_MO2

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_MO2_1	It has a general knowledge of selected scientific methods and know the discipline unrelated to the field of study	IM1A_W28	5
IM1A_MO2_2	It has the ability to analyze problems in the field of disciplines unrelated to the field of study	IM1A_U26	5
IM1A_MO2_3	He understands the need for an interdisciplinary approach to problem solving, to integrate knowledge from different disciplines and importance of self-study.	IM1A_K07	5

3. Module description

Description	The student selects the module (s) of the University-wide for the specific field of study. The aim of the module is to broaden the knowledge, skills and social competence of the students in the discipline unrelated to the field of study .
Prerequisites	The Faculty Council determines for students of a given field of study number of modules (according to the program of study) and determines the semester of training .

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_MO2_w_1	credit	verification on the basis of an essay or oral verification (according to the syllabus)	IM1A_MO2_1, IM1A_MO2_2, IM1A_MO2_3

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_MO2_fs_1	lecture	Lecture enriched by presentation. Focused on the ideas which are conceptually difficult and pointing out references. Illustration of the content by examples.	30	Studying the topic of the lecture (books , scripts , web sites , etc). Preparing to exam (specified in detail in the syllabus implemented module).	45	IM1A_MO2_w_1

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Nanomaterials and nanotechnologies

Module code: IM1A_NIN

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_NIN_1	Understanding conceptual basics of nanomaterials built with 0D, 1D, 2D and 3D dimension type units and the relationship between materials structural scale and their properties, their testing and application methods as well as the categorisation of nanoparticles based on the increase in functionality and development prospects.	IM1A_W05 IM1A_W06 IM1A_W11	2 2 1
IM1A_NIN_2	Learning phenomena, processes, methods for nanomaterials obtaining and testing, and also their types and defects role in properties forming and learning their applications.	IM1A_W08 IM1A_W09	2 2
IM1A_NIN_3	The skill to analyse nanomaterials structure, properties and methods for their obtaining as well as their type selection and obtaining methods depending on the required properties.	IM1A_U08 IM1A_U09	2 2

3. Module description

Description	The module Nanomaterials and nanotechnologies shall enable that students are knowledgeable about the classification, structure, defects and properties of nanomaterials and about methods of their obtaining, testing and in applications corresponding with modern technical requirements. Owing to that students will be capable of selecting the material, the method of its obtaining depending on operational parameters of specific elements of equipment and also of obtaining a better understanding of correlations between nanomaterials obtaining methods, their structure and properties as well as mechanisms forming their properties. This will allow honing the skill to form the nanomaterials structure and properties necessary for technical and medical applications.
Prerequisites	It is required to achieve effects of education of the modules: physics, chemistry, crystallography, materials testing methods.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A _ NIN_w _2	Written test	Checking the acquired skills of nanomaterials classification, obtaining methods and forming the structure as well as mechanisms responsible for their properties changing, selected for specific technical and medical applications.	IM1A_NIN_1, IM1A_NIN_2, IM1A_NIN_3
IM1A _ NIN_w _3	Report	Assessment of the skill to understand mechanisms and methods for nanomaterials structure and properties forming by a correct formulation of conclusions.	IM1A_NIN_3
IM1A _NIN_w _1	Oral examination	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_NIN_1, IM1A_NIN_2, IM1A_NIN_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A _ NIN _fs _1	lecture	The lecture shall enable understanding issues related to the classification, structure, properties, methods of obtaining and applications as well as nanomaterials testing. The lecture is delivered with the use of multimedia.	30	The work with the recommended literature comprising independent acquisition of knowledge in the field of issues raised during the lecture.	35	IM1A _NIN_w_1
IM1A _ NIN _fs _2	laboratory classes	The application of the acquired theoretical knowledge in practical learning of nanomaterials structure, their properties, methods for obtaining and application as well as nanomaterials testing and mechanisms enabling their forming. Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories.	30	Preparation of theoretical basics and issues related to the topic of performed exercise as well as an independent preparation of the theoretical introduction. Individual performance of actions, measurements and calculations as well as the interpretation of results and preparation of exercise conclusions.	20	IM1A _ NIN_w_2, IM1A _ NIN_w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Nanomaterials in medicine

Module code: IM1A_NWM

1. Number of the ECTS credits: 6

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_NWM_1	Understanding conceptual basics of nanomaterials application in medicine and characteristics of their structure and properties; understanding relationships between the structural scale of nanomaterials and their properties, being knowledgeable about current development trends of nanomaterials for applications in medicine.	IM1A_W05 IM1A_W11 IM1A_W16 IM1A_W17	2 2 2 2
IM1A_NWM_2	The skill to evaluate basic features and possibilities of nanomaterials application in medicine.	IM1A_U14 IM1A_U25	3 2
IM1A_NWM_3	Development of the awareness of nanomaterials application consequences in medicine.	IM1A_K02	1

3. Module description

Description	The module Nanomaterials in medicine shall enable that students are knowledgeable about the classification, structure, defects and properties of nanomaterials used in medicine and about methods of their obtaining, testing and in applications corresponding with modern medicine requirements. Owing to that students will be capable of selecting the material, the method of its obtaining depending on biometric and operational parameters of specific elements of equipment and also to obtain a better understanding of correlations between bionanomaterials obtaining methods, their structure and properties as well as mechanisms forming their properties. In addition, the module will enable students familiarising with a wide range of nanomaterials medical applications and with principles of their operation. This will allow in turn honing the skill to form nanomaterials structure and properties necessary for diverse medical applications.
Prerequisites	It is required to achieve effects of education of the modules: physics, chemistry, crystallography, materials testing methods .

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_NWM_w_1	Oral examination	Verification of knowledge based on the lectures content and recommended literature.	IM1A_NWM_1, IM1A_NWM_2, IM1A_NWM_3
IM1A_NWM_w_2	Written test	Checking the acquired skills of classification, manufacturing methods, structure shaping, properties and testing methods for nanomaterials used in medicine and mechanisms responsible for changing their properties, selected for specific medical needs.	IM1A_NWM_1, IM1A_NWM_2, IM1A_NWM_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_NWM_fs_	lecture	The lecture shall enable understanding issues related to the classification, structure, properties, methods of obtaining and applications as well as testing nanomaterials used in medicine. The lecture is delivered with the use of multimedia.	30	The work with the recommended literature comprising independent acquisition of knowledge in the field of issues raised during the lecture.	60	IM1A_NWM_w_1
IM1A_NWM_fs_2	laboratory classes	Application of the acquired theoretical knowledge in practical learning of nanomaterials used in medicine Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories.	45	Preparation of theoretical basics and issues related to the process of nanomaterials manufacturing for medical applications as well as examining their properties. Processing of test results, preparing reports.	35	IM1A_NWM_w_2

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Numerical methods and algorithms

Module code: IM1A_MNA

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A MNA_2	The skill to find an appropriate function of the Excel software and to use it to analyse the given data. The skill to create simple numerical programs in the Pascal language on the Delphi platform.	IM1A_K05 IM1A_W08 IM1A_W10	1 2 3
IM1A_MNA_1	Gaining the knowledge about typical numerical methods used in the analysis of experimental results. The skill to apply an appropriate method based on the use of Microsoft Excel spreadsheets and own pieces of software developed in the Pascal language.	IM1A_W19 IM1A_W20	1 3

3. Module description

Description	The Numerical methods and algorithms module shall enable that student gain the knowledge about typical numerical methods, which can be used for the experimental data processing, in numerical calculations or in computer simulations. In particular such methods as the approximation of discrete data (least squares method) as the starting point for such data differentiation and integration. Resolving a system of linear equations and certain non-linear systems. The module shall familiarise students with elements of mathematical statistics - events probability distributions (discrete and continuous), expected value, variance, weighted average and mean square error. Students shall acquire the skill of practical application of the gained knowledge consisting in the application of the learned methods to resolve the given numerical problems.
Prerequisites	It is required to achieve effects of education of mathematics, IT, and and programming languages modules.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A MNA_w	Written examination	Verification of the knowledge based on the lectures content, recommended literature and	IM1A MNA_2, IM1A_MNA_1

_1		attended classes.	
IM1A_MNA_w_2	Written test	Checking the knowledge about theoretical foundations of selected numerical methods.	IM1A MNA_2, IM1A_MNA_1
IM1A_MNA_w_3	Practical test	Checking the skill to use library numerical functions offered by the Excel software, to create an algorithm for the given numerical method and to create an appropriate code in the Pascal programming language.	IM1A MNA_2, IM1A_MNA_1
IM1A_MNA_w_4	Report	Description of the given numerical methods. Providing the results of data analyses after the application of given methods. Discussion of results.	IM1A MNA_2, IM1A_MNA_1

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A _MNA_fs_1	lecture	The lecture shall enable understanding the need for numerical methods used in resolving engineering problems (materials designing, measurement results processing, experiment simulation). The lecture is delivered with the use of audiovisuals, using directly the Excel and Delphi programming environment and the Microsoft PowerPoint computer presentations.	15	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	15	IM1A MNA_w_1
IM1A _MNA_fs_2	laboratory classes	Practical application of available numerical software to resolve computational problems. Creating simple algorithms and numerical programs. Classes on a common or individual topic are performed by students individually using the hardware and software available in the computer laboratory.	30	Preparation to the classes. Preparation of a theoretical description of the planned exercise. Independent testing of the learned or designed numerical methods. Conclusions formulation.	30	IM1A_MNA_w_2, IM1A_MNA_w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Object oriented programming and computer simulations

Module code: IM1A_PSK

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_PSK_1	Understanding basic terms, the idea and principles of object oriented programming.	IM1A_W19 IM1A_W20	1 5
IM1A_PSK_2	The skill to analyse the content of an engineering task and to apply the object oriented programming method in simulations of physical phenomena and processes and of material properties.	IM1A_K05 IM1A_U07 IM1A_U10	1 5 4

3. Module description

Description	The Object oriented programming and computer simulations module shall enable students learning the issues of practical application of the object oriented programming method in simulations of physical phenomena and processes. Owing to that students shall understand the importance of a computer experiment not only in the description of materials physio-chemical properties, but also in designing new engineering materials for technical and medical applications. The accomplishment of the above objectives will require learning a number of issues from the field of the object oriented programming, such as: class declaration and definition, constructors and destructors, operators overloading, nested classes, derived classes, polymorphism and virtual functions.
Prerequisites	The knowledge of issues from the field of mathematics, physics, programming languages and numerical methods is required.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A _PSK_w	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_PSK_1, IM1A_PSK_2

_1			
IM1A _PSK_w _2	Written test	Periodical checking of the knowledge about theoretical foundations of the object oriented programming.	IM1A_PSK_1, IM1A_PSK_2
IM1A _PSK_w _3	Practical test	Checking the skill to create an object oriented algorithm in resolving a computational problem - a physical process simulation. Preparing the report on the class execution.	IM1A_PSK_1, IM1A_PSK_2
IM1A _PSK_w _4	Report	Justification of the selected method for the programming problem solving and discussion of the obtained results.	IM1A_PSK_1, IM1A_PSK_2

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A _PSK _fs _1	lecture	The lecture shall enable understanding the object oriented programming terms and methods. The lecture is delivered with the use of multimedia based on a recommended set of handbooks.	30	The work with the recommended literature comprising independent acquisition of knowledge related to issues presented during the lectures.	40	IM1A _PSK_w_1
IM1A _PSK _fs _2	laboratory classes	Practical application of the object oriented programming and numerical methods to resolve computational problems. Creating numerical algorithms and programs. Classes on a common or individual topic are performed by students individually using the hardware and software available in the computer laboratory.	30	Preparation to classes through independent studying and testing of recommended issues.	30	IM1A _PSK_w_2, IM1A _PSK_w_3, IM1A _PSK_w_4

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Physical education

Module code: IM1A_WF

1. Number of the ECTS credits: 1

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_WF_1	Students can properly perform technical elements from a selected sport; they can successfully pass a test on general fitness (Pilicz test, Cooper test).	IM1A_K03 IM1A_U02	2 2
IM1A_WF_2	Students can apply an appropriate type of training depending on the objective, which they want to achieve (improvement to the circulatory system, improvement to coordination, muscles strengthening, improvement to breathing efficiency).	IM1A_K03 IM1A_U02	2 2
IM1A_WF_3	Students know rules of basic team games or from another selected sport, and also have basic knowledge about sport competitions organisation.	IM1A_K03	2
IM1A_WF_4	Students have basic knowledge of physical culture. They know how physical activities and proper eating affect the health and comfort of life in the future. They can explain the nature of sport.	IM1A_K03	2
IM1A_WF_5	Students observe "fair play" rules on a playing field and in everyday life.	IM1A_K04	2
IM1A_WF_6	Students promote social and cultural importance of sports and physical activity as well as cultivate own likings for the physical culture.	IM1A_K06	2

3. Module description

Description	The university physical culture should be an integral and complementary part of general education syllabus of a university. The physical culture consists of physical education, recreation, sports and tourism. It is the only area creating a possibility to implement values related to the body and health and is a counterbalance against the academic youth load with intellectual work. It should take into consideration the changing reality and to a significant degree participate in students preparation to an adult professional as well as family and social life. Classes in this module are aimed at teaching technical elements of a selected sport. Consolidation of skills acquired at the previous stage of education. Providing with the necessary scope of knowledge about the physical culture. Learning the history and regulations. Familiarising with sport competitions and recreational and tourist events organisation.

	Developing the self-esteem. Mobilisation towards health-oriented attitudes. Cooperation in a group and discipline. Showing the influence of physical activity on the human organism, health and hygiene (work - rest).
Prerequisites	This applies to students actively participating in classes: The main requirement for accepting to a group is the lack of health contraindications. Possession of the skill to swim is not required.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_WF_w_1	Practical examination	Students assessment based on their progress, involvement and activity during classes as well as skills in the field of selected sports.	IM1A_WF_1, IM1A_WF_2, IM1A_WF_3, IM1A_WF_4, IM1A_WF_5, IM1A_WF_6
IM1A_WF_w_2	Practical examination	and Checking the knowledge about a specific sport during refereeing and/or keeping the games documentation (protocols).	IM1A_WF_1, IM1A_WF_2, IM1A_WF_5, IM1A_WF_6
IM1A_WF_w_3	Micro-class	or Assessment of the knowledge and its practical application when the student conducts part of classes.	IM1A_WF_1, IM1A_WF_2, IM1A_WF_3, IM1A_WF_4, IM1A_WF_5, IM1A_WF_6
IM1A_WF_w_4	Control interview	or Oral test of the knowledge about physical culture issues and the nature of physical education during classes.	IM1A_WF_4, IM1A_WF_6

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_WF_fs_1	practical classes	Classes are delivered using the following methods: 1. Visual (demonstration, observation) 2. Verbal (description, explanation, clarification) 3. Practical action: - synthetic - teaching the whole movement, - analytical - breaking the exercise down into fragments, - complex - dividing the whole into fragments and - after mastering them - combining in the whole.	30		0	IM1A_WF_w_1, IM1A_WF_w_2, IM1A_WF_w_3, IM1A_WF_w_4

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Physico-chemistry of biological processes

Module code: IM1A_FCPB

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_FCPB_1	Students know basic physical phenomena and processes occurring in living organisms; know also properties of bioorganic compounds and chemical reactions occurring in selected biological processes.	IM1A_W02 IM1A_W03 IM1A_W17	1 1 5
IM1A_FCPB_2	Students are capable of explaining phenomena occurring in living organisms based on the knowledge of physical and chemical laws and processes.	IM1A_U25	4
IM1A_FCPB_3	Students are aware of the fact that living organisms function as complex systems, in which physical and chemical transformations occur.	IM1A_K02	1

3. Module description

Description	The Physico-chemistry of biological processes module shall enable that students are knowledgeable about physical and chemical phenomena occurring in biological processes as well as about physico-chemical methods enabling testing biological processes and analysing changes of those processes course. Owing to that students should understand phenomena occurring in living organisms as a set of coupled with each other physical and chemical processes.
Prerequisites	It is required to achieve effects of education of physics, chemistry, and thermodynamics modules.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_FCPB_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and classes.	

			IM1A_FCPB_1, IM1A_FCPB_2, IM1A_FCPB_3
IM1A_FCPB_w_2	Test	Assessment of mastering the basic knowledge necessary for performance of a practical exercise.	IM1A_FCPB_1, IM1A_FCPB_2, IM1A_FCPB_3

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_ FCPB _fs_1	lecture	The lecture shall enable understanding basic issues related to physical and chemical phenomena occurring in biological processes. The lecture is delivered by means of multimedia.	30	The work with the recommended literature, comprising contents discussed during the lecture.	15	IM1A_FCPB_w_1
IM1A_ FCPB _fs_2	laboratory classes	Performance of simple physical and chemical experiments illustrating the lecture issues. Independent processing of obtained results, analysis of the experimental error and formulation of conclusions	30	Preparation to classes through independent studying of recommended issues.	30	IM1A_FCPB_w_2

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Physics 1

Module code: IM1A_F1

1. Number of the ECTS credits: 6

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_F1_1	Understanding basic laws of nature written in the form of mathematical equations, learning the ways of inference from those equations as well as learning methods for simple physical problems solving. Acquiring basic knowledge about the Newtonian mechanics, electricity and magnetism, and certain elements of thermodynamics. The skill to analyse, select and assess critically the information acquired from various sources (Internet, academic handbook, lecture, popular-science journals). The skill to explain simple phenomena occurring in the nature.	IM1A_W02	5
IM1A_F1_2	Acquiring the skill to resolve simple physical problems, to analyse computational problems, draw conclusions and write conclusions in the form of mathematical equations. The skill to recognise physical phenomena occurring in the content of computational problems. The skill of drawing conclusions based on deduction and of precise and logical presentation of own assessments and conclusions.	IM1A_U02 IM1A_U10	1 3
IM1A_F1_3	Acquiring the skill to plan and perform simple physical experiments, the skill of analysing and assessing the obtained conclusions, preparing graphs and analysing them. Learning how to prepare a report on personally performed experiments. Mastering of and a practical skill to estimate the measurement uncertainty.	IM1A_U02 IM1A_U10	2 2
IM1A_F1_4	Development and honing of the skill of new knowledge acquisition, problem analysis, drawing conclusions based on mathematical equations, acquiring the skill to interpret ideas and concepts.	IM1A_K01 IM1A_K05	2 3

3. Module description

Description	The Physics 1 module shall enable students learning the basic laws of nature of Newtonian mechanics, electricity and magnetism, and certain elements of thermodynamics. Students shall: i) master the recording of physics laws in the form of vector, differential and/or integral equations, ii) master definitions of basic physical quantities with particular focus on quantities describing the material properties, iii) master the dimensional analysis of physical equations, iv) master the analysis of electrical circuits taking into account material problems, v) learn to perform simple physical experiments, analyse the obtained results and process them in the form of a report.

Prerequisites	The knowledge of mathematics at the level of maturity examination, expanded by elements of vector, differential and integral calculus, is required.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_F1_w_1	Written exam (test) / oral exam	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_F1_1, IM1A_F1_2, IM1A_F1_3
IM1A_F1_w_2	Written tests	Checking the acquired skills of resolving simple physical problems .	IM1A_F1_2, IM1A_F1_3
IM1A_F1_w_3	Weekly reports	The assessment of mastering the skill to perform independently a physical experiment, the measurement results analysis, and the measurement error analysis.	IM1A_F1_3
IM1A_F1_w_4	nterview	Assessment of the laws of physics understanding and their interpretation and application in materials engineering issues.	IM1A_F1_4

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_F1_fs_1	lecture	The lecture shall enable understanding basic laws of physics with particular emphasis on the description of material properties. It illustrates general regularities in the structure of matter in a classical presentation. The whole is illustrated with demonstrations and multimedia presentations - ‘Dindorf lectures’	45	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	50	IM1A_F1_w_1
IM1A_F1_fs_2	practical classes	An independent analysis of simple physical problems based on the use of vector calculus, elements of differential and integral calculus.	15	Preparation to classes by self-studying of recommended issues from a handbook and/ or collection of problems.	20	IM1A_F1_w_2
IM1A_F1_fs_3	laboratory classes	Performance of simple physical experiments illustrating the lecture issues. Independent processing of the obtained results, preparing appropriate graphs, the analysis of experimental error, and formulation of conclusions.	30	Preparation of theoretical basics and issues related to the topic of performed exercise. An independent preparation of a theoretical introduction. Individual preparation of exercise results.	20	IM1A_F1_w_2, IM1A_F1_w_3, IM1A_F1_w_4

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Physics 2

Module code: IM1A_F2

1. Number of the ECTS credits: 5

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_F2_1	Understanding the basic principles of optics and contemporary physics - elements of quantum mechanics in relation to the materials structure, atomic and nuclear physics, and solid state physics. The skill to analyse, select and assess critically the information acquired from various sources The skill to explain simple physical phenomena occurring in the nature in a classical and quantum presentation.	IM1A_W02	5
IM1A_F2_2	Acquiring the skill to resolve simple physical problems from the field of contemporary physics, to analyse computational problems, draw conclusions and write conclusions in the form of mathematical equations. The skill to recognise physical phenomena occurring in the content of computational problems. The skill of drawing conclusions based on deduction and of precise and logical presentation of own assessments and conclusions.	IM1A_U02 IM1A_U10	5 5
IM1A_F2_3	Acquiring the skill to plan and perform simple physical experiments, the skill of analysing and assessing the obtained conclusions, preparing graphs and analysing them. Learning how to prepare a report on personally performed experiments. Mastering of and a practical skill to estimate the measurement uncertainty.	IM1A_U02 IM1A_U10	2 5
IM1A_F2_4	Development and honing of the skill of new knowledge acquisition, problem analysis, drawing conclusions based on mathematical equations, acquiring the skill to interpret ideas and concepts.	IM1A_K01 IM1A_K02 IM1A_K05	2 3 1

3. Module description

Description	The Physics 2 module shall enable students learning the basic laws of nature of optics and contemporary physics - elements of quantum mechanics in relation to the materials structure, atomic and nuclear physics, and solid state physics. In this area students shall: i)) master definitions of basic physical quantities with particular focus on quantities describing the material properties, ii) master the dimensional analysis of physical equations, iii) learn to perform simple physical experiments in the field of contemporary physics, analyse the obtained results and process them in the form of a report, iv) resolve and analyse simple problems from the field of contemporary physics, acquire the skill to apply specific mathematical equations, v) general

	learning of quantum mechanics in relation to the structure of matter, vi) analyse and interpret quantum physics issues related to the atom structure, periodic table of elements, the tunnelling effect etc.
Prerequisites	The knowledge of mathematics at the level of maturity examination, expanded by elements of vector, differential and integral calculus, is required.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A _F2_w_1	Written exam (test) / oral exam	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_F2_1, IM1A_F2_2, IM1A_F2_3, IM1A_F2_4
IM1A _F2_w_2	Written tests	Checking the acquired skills of resolving simple physical problems.	IM1A_F2_2, IM1A_F2_3
IM1A _F2_w_3	Weekly reports	The assessment of mastering the skill to perform independently a physical experiment, the measurement results analysis, and the measurement error analysis.	IM1A_F2_3
IM1A _F2_w_4	Interview	Assessment of laws of physics understanding and their interpretation and application in materials engineering issues.	IM1A_F2_4

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A _F2 _fs _1	lecture	The lecture shall enable understanding basic laws of contemporary physics with particular emphasis on the description of material properties. It illustrates general regularities in the structure of matter in a quantum presentation. The whole is illustrated with demonstrations and multimedia presentations - ‘Dindorf lectures’	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	30	IM1A _F2_w_1
IM1A _F2 _fs _2	practical classes	An independent analysis of simple physical problems based on the use of vector calculus, elements of differential and integral calculus.	15	Preparation to classes by self-studying of recommended issues from a handbook and/ or collection of problems.	15	IM1A _F2_w_2
IM1A _F2 _fs _3	laboratory classes	Performance of simple physical experiments (approx. 10 experiments/semester) illustrating the lecture issues. Independent processing of the obtained results, preparing appropriate graphs, the analysis of experimental error, and formulation of conclusions.	30	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	30	IM1A _F2_w_2, IM1A _F2_w_3, IM1A _F2_w_4

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Polymers

Module code: IM1A_P

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_P_1	Understanding the relationships between the structure of macromolecules and the polymer materials properties, understanding methods and mechanisms of reactions leading to polymers obtaining.	IM1A_W06 IM1A_W07	3 3
IM1A_P_2	Learning physical states of polymers, processes leading to obtaining amorphous polymers, with a crystalline phase and cross-linked, learning liquid crystals and polymers conducting an electric current.	IM1A_W09 IM1A_W11	2 3
IM1A_P_3	The skill to determine the structure and to determine molecular masses of polymer materials, choosing an appropriate analytical method Students can think creatively, analysing relationships between polymers and engineering plastics properties Students act in an entrepreneurial way, showing involvement in the work resulting in obtaining the competence demanded on the labour market.	IM1A_K05 IM1A_U09 IM1A_U11	1 2 2
IM1A_P_4	Students are aware of the need for development of the area of knowledge related to polymers as modern engineering materials.	IM1A_K02	1

3. Module description

Description	The Polymers module shall enable that students are knowledgeable about polymer materials and methods of their obtaining, classifying and analysing. Owing to that students shall achieve a better understanding of correlations between the macromolecules structure and their properties. Understanding the relationships and correlations between polymer materials properties and their structure shall result in honing the skill to apply a broad spectrum of traditional and modern analytical methods leading to finding possibilities of their application in relevant areas of technology.
Prerequisites	It is required to achieve effects of education of physics, chemistry, and basics of materials science modules.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_P_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended laboratory classes.	IM1A_P_1, IM1A_P_2, IM1A_P_3, IM1A_P_4
IM1A_P_w_2	Written test	Checking the acquired basic information related to polymer materials characteristics, classification and obtaining.	IM1A_P_1, IM1A_P_2, IM1A_P_3, IM1A_P_4
IM1A_P_w_3	Test	Assessment of mastering the basic knowledge necessary for individual performance of a practical exercise.	IM1A_P_1, IM1A_P_2
IM1A_P_w_4	Report	Assessment of the skill to identify and analyse polymers, to determine their properties and to classify polymer materials by correct formulation of conclusions.	IM1A_P_3, IM1A_P_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_P _fs_1	lecture	The lecture shall enable understanding the issues related to polymers structure, phenomena, methods for obtaining, and classification because of the structure as well as properties and analytical techniques. The lecture is delivered with the use of multimedia, demonstrations and teaching aids in the form of samples, diagrams and models.	30	The work with the recommended literature sources comprising independent acquisition of knowledge related to issues presented during the lecture.	15	IM1A_P_w_1
IM1A_P _fs_2	laboratory classes	The application of the acquired theoretical knowledge to a practical determination of polymer materials structure and properties. Exercises are performed by students individually with the use of the laboratory equipment.	30	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual analysis of exercise results and formulation of adequate conclusions.	15	IM1A_P_w_2, IM1A_P_w_3, IM1A_P_w_4

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Polymers for medicine

Module code: IM1A_PDM

1. Number of the ECTS credits: 5

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_PDM_1	An elementary knowledge comprising the classification, structural design, properties and manufacturing methods of polymer materials used in medicine and their influence on living organisms; being knowledgeable about current development trends of the chemistry of polymer materials used for medical purposes.	IM1A_W11 IM1A_W17	1 3
IM1A_PDM_2	Distinguishing basic groups of polymer materials for medical applications.	IM1A_W16	3
IM1A_PDM_3	The skill to evaluate basic features and possibilities of a selected polymer material application in medicine.	IM1A_U14 IM1A_U25	3 2
IM1A_PDM_4	Development of the awareness of polymer biomaterials application consequences in medicine.	IM1A_K02	1

3. Module description

Description	The Polymers for medicine module allows students to acquire a basic knowledge about polymer materials used for medical purposes. Owing to that students should be capable of classifying the aforementioned materials, of showing basic criteria for their selection, as well as should be aware of the inevitability of biodegradation processes occurrence. These skills will allow understanding the relation between the chemical and phase structure, the condition of polymer materials surface and the practical properties of the material, as well as being knowledgeable about current development trends of the chemistry of polymer materials used for medical purposes.
Prerequisites	It is required to achieve effects of education of the modules: physics, chemistry, materials testing methods, polymers and introduction to biomaterials.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_PDM_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_PDM_1, IM1A_PDM_2, IM1A_PDM_3, IM1A_PDM_4
IM1A_PDM_w_2	Written test	Checking the acquired skills of basic description of polymer materials and of their classification.	IM1A_PDM_1, IM1A_PDM_2, IM1A_PDM_3, IM1A_PDM_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_PDM _fs_1	lecture	The lecture shall present and explain basic criteria for classification and selection of polymer materials used for medical purposes. The lecture is delivered with the use of multimedia, demonstrations and exhibits.	30	The work with the literature materials recommended as sources, comprising an independent analysis and the acquisition of knowledge about the analysed issues.	45	IM1A_PDM_w_1
IM1A_PDM _fs_2	laboratory classes	The classes are aimed at performing a practical analysis of basic issues related to polymer materials properties, calculating the molecular masses, and determining parameters characteristic of polymer materials. Classes are conducted based on discussion and resolving tasks with the use of multimedia, demonstration and exhibits.	30	Preparation of theoretical basics and issues related to the process of polymers manufacturing as well as examining their properties. Processing of test results, preparing reports.	45	IM1A_PDM_w_2

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Principles of materials designing and selection

Module code: IM1A_ZPIDM

1. Number of the ECTS credits: 5

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_ZPIDM_1	Knowledge of general rules of designing and methodology for materials selection when designing engineering structures. Acquiring general knowledge about materials used in the engineering practice and their properties, which determine the application. Detailed learning of engineering materials selection graphs - the ability to analyse, interpret as well as apply them in practice. Understanding the idea of functionality indices and the ability to apply them in practice. Learning the rules of materials selection taking into account the shape of product cross section and without it. Learning general knowledge about processes of products manufacturing and procedures for the method selection.	IM1A_W10 IM1A_W13	3 5
IM1A_ZPIDM_2	The skill to use materials selection graphs in the procedure for optimum materials searching for engineering structures, including the application of computer techniques. Students are capable of effective use of a preliminary economic analysis of undertaken engineering activities in the field of materials selection.	IM1A_U01 IM1A_U09 IM1A_U14 IM1A_U16 IM1A_U21	4 4 5 4 2
IM1A_ZPIDM_3	Students creatively combine the gained knowledge at the selection of materials for technical applications.	IM1A_K05	2

3. Module description

Description	The Principles of materials designing and selection module shall enable students learning the general principles of designing and rules used in the methodology for engineering materials selection. Students shall master the basic knowledge about engineering materials and definitions of their properties. Understanding the principles of proceeding in this field shall result in the skill of independent selection of materials based on the application of appropriate methods. Owing to the gained knowledge students shall obtain a better understanding of interrelationships between the material, its structure, properties and the manufacturing methods having a substantial influence on the durability of engineering structures.
Prerequisites	It is required to achieve effects of education in rudiments of materials science, metals and alloys, ceramics, polymers, and composites modules.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_ZPIDM_w_1	Oral examination	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_ZPIDM_1, IM1A_ZPIDM_2
IM1A_ZPIDM_w_2	Written test	Checking the knowledge of principles and methods for engineering materials selection.	IM1A_ZPIDM_2
IM1A_ZPIDM_w_3	Report	Assessment of the skill to select engineering materials with the use of computer software.	IM1A_ZPIDM_2, IM1A_ZPIDM_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_ZPIDM_fs_1	lecture	The lecture shall enable understanding the principles in force in the process of engineering materials designing and selection. The lecture is delivered with the use of multimedia.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	35	IM1A_ZPIDM_w_1
IM1A_ZPIDM_fs_2	laboratory classes	The application of the gained theoretical knowledge to acquire the skill to use computer techniques in the process of materials selection. Exercises are performed by students individually with the use of teaching laboratories equipment.	30	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	60	IM1A_ZPIDM_w_2, IM1A_ZPIDM_w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Professional training

Module code: IM1A_PrZ

1. Number of the ECTS credits: 6

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_PrZ_1	Students expand the practical knowledge about engineering materials, their manufacturing and processing methods as well as methods for characterisation of the engineering materials properties.	IM1A_W06 IM1A_W07 IM1A_W09	3 3 3
IM1A_PrZ_2	Students expand the practical knowledge about a company and enterprise management, about a company establishment and development, rational management of engineering materials, apply the learned rules of health and safety at work.	IM1A_W24 IM1A_W25 IM1A_W26 IM1A_W27	3 3 3 3
IM1A_PrZ_3	Students 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.	IM1A_U02	3
IM1A_PrZ_4	Students can prepare the documentation related to the performed task.	IM1A_U04	3

3. Module description

Description	The Professional training module shall enable students developing the skills of using the knowledge acquired during the studies, developing skills necessary in the future professional work, preparing to be independent and responsible for the entrusted tasks and creating favourable conditions for the professional activation on the labour market.
Prerequisites	Delivering the required documents specified in the regulations of studies.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_PrZ_w_1	Report, training documentation.	Assessment of the prepared report of the course of professional training.	IM1A_PrZ_1, IM1A_PrZ_2, IM1A_PrZ_3, IM1A_PrZ_4

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_PrZ_fs_1	internship	Students participate in the work of the work place, institution, company, enterprise, which was chosen when performing tasks resulting from the training schedule.	0	Students process the results obtained during the professional training and prepare a report of the training.	160	IM1A_PrZ_w_1

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Programming languages

Module code: IM1A_JP

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_JP_1	Students 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. Students know basic structures and statements in a selected programming language as well can read the program code in the selected programming language.	IM1A_W20	5
IM1A_JP_2	Students 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.	IM1A_U04 IM1A_U07	2 5
IM1A_JP_3	Students are aware of the role of IT achievements change motivating to continuous learning. Students have the skill of creative thinking. .	IM1A_K01 IM1A_K05	3 3

3. Module description

Description	The Programming languages module shall enable students gaining knowledge about types of programming languages and their role in creating the computer software, learning the structure of programming languages using the example of Pascal language and familiarising with an integrated programming environment using the example of Delphi programming platform. Students shall acquire the skill of practical use of the gained knowledge consisting in understanding the program code in a selected programming language and in developing simple numerical programs.
Prerequisites	It is required to achieve effects of education of mathematics and IT modules.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_JP _w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_JP_1, IM1A_JP_2, IM1A_JP_3
IM1A_JP _w_2	Written test	Checking the acquired skill of creating block diagrams for the set algorithms.	IM1A_JP_1, IM1A_JP_2
IM1A_JP _w_3	Practical test	Checking the skill of creating the program code based on the set block diagram.	IM1A_JP_1, IM1A_JP_2
IM1A_JP _w_4	Report	A design of a simple numerical program together with the description of its work and operation.	IM1A_JP_1, IM1A_JP_2

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_JP _fs_1	lecture	The lecture shall enable understanding the issues related to the role and types of programming languages. Typical structure and elements of those languages. Learning the technique of program development - from a problem via the block diagram to the code. The lecture is delivered with the use of audiovisuals, using directly the programming environment and the MS PowerPoint computer presentations.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	30	IM1A_JP _w_1
IM1A_JP _fs_2	laboratory classes	Practical creation of program flowcharts, coding those flowcharts, compilation and running programs. Exercises are performed by students individually on a common subject or on separate subjects for each student, using the computer laboratories equipment.	30	Individual development of simple programs on the hardware made available by the University or on private hardware. Preparation of a numerical problem description, its diagram and preparing comments to the developed program.	20	IM1A_JP _w_2, IM1A_JP _w_3, IM1A_JP _w_4

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Psychological aspects of working environment

Module code: IM1A_PASP

1. Number of the ECTS credits: 2

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_PASP_1	Learning the issues related to physical, psychological, and social working conditions in the situation of technological changes and ecological challenges.	IM1A_W24	5
IM1A_PASP_2	The skill of decision making and communicating within an organisation, anticipating and overcoming problems related to working conditions changes.	IM1A_K05 IM1A_U15	1 5
IM1A_PASP_3	Students are aware of responsibility for own work and are ready to submit to the team work rules and to bear responsibility as well as behaving professionally, observing the professional ethics rules.	IM1A_K03 IM1A_K04	5 5

3. Module description

Description	The Psychological aspects of working environment module shall enable students understanding and sensitising to the issues of physical, psychological, and social working conditions in the situation of technological changes and ecology challenges. Students shall acquire the skill of decision making and communicating within an organisation, anticipating and overcoming problems related to working conditions changes.
Prerequisites	The knowledge within the secondary school scope is required: physics, chemistry, and biology .

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A _PASP _w_1	Written test	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_PASP_1, IM1A_PASP_2, IM1A_PASP_3

IM1A _PASP _w_2	Continuous assessment	The skill of the theoretical knowledge application in a practical activity of an organisation, including the student’s activity in the area of the university and outside it.	IM1A_PASP_1, IM1A_PASP_2, IM1A_PASP_3

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A _PASP _fs_1	lecture	The lecture shall enable learning the issues related to physical, psychological, and social working conditions in the situation of technological changes and ecological challenges.	15	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	20	IM1A _PASP _w_1
IM1A _PASP _fs_3	discussion classes	The application of the learned theoretical knowledge in a practical use with respect to the decisions taken and to communicating within the organisation, anticipating and overcoming problems related to working conditions changes.	15	Preparation to classes through independent studying of recommended issues from the literature.	15	IM1A _PASP _w_2

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Selected marketing issues

Module code: IM1A_WZM

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_WZM_1	Students have elementary knowledge about marketing, know general rules of companies establishment and development, of markets surveying and matching the organisation offer to the customers' expectations.	IM1A_W27	5
IM1A_WZM_2	Students have skills of applying the marketing theory in practice; can survey the market and analyse the environment, competitors and the company potential as well as build marketing strategies.	IM1A_U02 IM1A_U17	2 5
IM1A_WZM_3	Students understand the need for markets building and operation of the organisation in accordance with the customers demand.	IM1A_K01 IM1A_K04	1 3
IM1A_WZM_4	Students 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.	IM1A_U02	5
IM1A_WZM_5	Students have the skill of self-education among others to update the knowledge and to raise the professional competences.	IM1A_U06	3
IM1A_WZM_6	Students 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.	IM1A_U18	3
IM1A_WZM_7	Students are aware of the responsibility for the own work and are ready to submit to the team work rules and to bear responsibility for tasks implemented together.	IM1A_K03	5

3. Module description

Description	The Selected marketing issues module shall enable students learning the basic terms related to the rules of companies establishment and development, of markets surveying and matching the own offer to the customers' expectations as well as acquiring the skill to analyse the environment, competitors and the enterprise potential and market position. Subject-matter contents: premises for marketing activities in the enterprise; the environment influence on the marketing operations; the target market of

	the enterprise; the marketing-mix concept; the marketing product planning, product development; the product distribution organisation; the concept of promotional activities; promotion-mix instruments; the price as a marketing tool; marketing strategies;
Prerequisites	The knowledge of the basics of management and microeconomics is required.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_WZM _w_1	Written examination - a knowledge test	A test of theoretical knowledge acquired during lectures, during own work with the recommended literature and during classes; in the form of a test comprising questions covering all subject areas of classes.	IM1A_WZM_1, IM1A_WZM_2, IM1A_WZM_3, IM1A_WZM_4, IM1A_WZM_5
IM1A_WZM _w_2	Project	A written team work - the application of the theoretical knowledge to resolve the entrusted practical task.	IM1A_WZM_1, IM1A_WZM_2, IM1A_WZM_3, IM1A_WZM_4, IM1A_WZM_5, IM1A_WZM_6, IM1A_WZM_7

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_WZM_fs_1	lecture	The lecture on theoretical contents from the field of basic marketing issues in the form of a multimedia presentation .	15	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	40	IM1A_WZM _w_1
IM1A_WZM_fs_2	discussion classes	The classes delivered in a seminar form, consist in resolving case study type problems based on theoretical contents, group discussion and presentation of group work results at the forum.	15	Preparation to classes through independent studying of recommended issues from the literature; preparation of a written work within a student team, in accordance with the conducting person requirements.	20	IM1A_WZM _w_2

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Specialised subject 1

Module code: IM1A_PS1

1. Number of the ECTS credits: 2

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_PS1_1	Students have basic knowledge about development trends in the field of the most recent intelligent materials. Students know mechanisms causing an appropriate response of an intelligent material to external stimuli. Students have basic knowledge about methods for chemical and electrochemical analysis of engineering materials.	IM1A_W06 IM1A_W07 IM1A_W08 IM1A_W11	3 1 1 5
IM1A_PS1_2	The skill of self-education to expand the knowledge about materials engineering.	IM1A_K05 IM1A_U06	1 5
IM1A_PS1_3	Inspiration towards education on level two of studies.	IM1A_K01 IM1A_K05	5 1

3. Module description

Description	The Specialised subject 1 module shall enable students expanding the knowledge about new engineering materials, being the group of intelligent materials. Students learn mechanisms of material response and action to external stimuli. They learn examples of such materials application in practice. Moreover, they expand the knowledge gained on the materials testing methods by possibilities provided by methods of chemical and electrochemical analysis. Students learn basic measurement principles and the construction of specialised instruments. Lectures are also aimed at preparing students to write the engineer thesis and to the diploma exam.
Prerequisites	Passing modules related to engineering materials groups.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM1A_PS1_w_1	Test	Verification of knowledge based on the lectures content and recommended literature.	IM1A_PS1_1, IM1A_PS1_2, IM1A_PS1_3

5. Forms of teaching						
code	**form of teaching**			**required hours of student's own work**		**assessment of the learning outcomes of the module**
	type	**description (including teaching methods)**	**number of hours**	**description**	**number of hours**	
IM1A_PS1_fs_1	lecture	The lecture shall enable understanding the new trends in engineering materials and in technology and ecology problems. The lecture is delivered with the use of multimedia.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	30	IM1A_PS1_w_1

1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Specialised subject 2

Module code: IM1A_PS2

1. Number of the ECTS credits: 2

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_PS2_1	Students have basic knowledge about development trends in the field of the most recent materials for the development of fuel cells and hydrogen technology, materials analysis methods and problems of contemporary technology and ecology Students have basic knowledge about spectroscopic nuclear methods used in the analysis of engineering materials.	IM1A_W11	5
IM1A_PS2_2	The skill of self-education to expand the knowledge about materials engineering.	IM1A_K05 IM1A_U06	1 5
IM1A_PS2_3	Inspiration towards education on level two of studies.	IM1A_K01 IM1A_K05	5 1

3. Module description

Description	The Specialised subject 2 module shall enable students expanding the knowledge about new trends in the most recent materials for the development of fuel cells and hydrogen technology, problems of contemporary technology and ecology as well as spectroscopic nuclear methods used in the testing of engineering materials. Lectures are also aimed at preparing students to write the engineer thesis and to the diploma exam.
Prerequisites	Passing modules related to engineering materials groups.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_PS2_w_1	Test	Verification of knowledge based on the lectures content and recommended literature.	IM1A_PS2_1, IM1A_PS2_2, IM1A_PS2_3

5. Forms of teaching						
code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_PS2_fs_1	lecture	The lecture shall enable understanding the new trends in engineering materials and also problems of contemporary technology and spectroscopic methods. The lecture is delivered with the use of multimedia.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	30	IM1A_PS2_w_1

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Technical drawing

Module code: IM1A_RT

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_RT_1	Students have basic knowledge about the rectangular projection in the representation and restitution of space elements	IM1A_U04 IM1A_W22	2 2
IM1A_RT_10	Students can draw an assembly drawing and a set of working drawings for a given subassembly.	IM1A_U04 IM1A_W22	3 4
IM1A_RT_2	Students have basic knowledge about shaping technical forms using polyhedron solids and surfaces.	IM1A_W22	3
IM1A_RT_3	Students have basic knowledge about the isometric drawing.	IM1A_U04	3
IM1A_RT_4	Students have skills to apply appropriate types of cross-sections.	IM1A_U04 IM1A_W22	3 3
IM1A_RT_5	Students can use elements of standardisation in the structure recording.	IM1A_U04 IM1A_W22	3 2
IM1A_RT_6	Students can dimension flat and rotary elements.	IM1A_W22	4
IM1A_RT_7	Students can graphically present joints of machine components.	IM1A_U04 IM1A_W22	3 3
IM1A_RT_8	Students can apply the marking of the surface state, tolerance and fit.	IM1A_W22	3
IM1A_RT_9	Students can prepare technical documentation of subassemblies.	IM1A_U04 IM1A_W22	3 4

3. Module description	
Description	The classes are aimed at the skill to present spatial objects on a drawing sheet plane using basic rules of rectangular projection. References: T. Dobrzyński, Rysunek techniczny maszynowy /Engineering Drawing/, WNT – Warszawa, T. Lewandowski, Rysunek techniczny dla mechaników /Technical drawing for mechanics/, WSziP 2009, A set of Polish technical drawing and engineering drawing standards.
Prerequisites	-

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_RT_w_1	Control papers	Performing designs during laboratory classes.	IM1A_RT_1, IM1A_RT_10, IM1A_RT_2, IM1A_RT_3, IM1A_RT_4, IM1A_RT_5, IM1A_RT_6, IM1A_RT_7, IM1A_RT_8, IM1A_RT_9
IM1A_RT_w_2	Homework	Making drawings from the field of axonometry and dimensioning in the form of designs.	IM1A_RT_1, IM1A_RT_10, IM1A_RT_2, IM1A_RT_3, IM1A_RT_4, IM1A_RT_5, IM1A_RT_6, IM1A_RT_7, IM1A_RT_8, IM1A_RT_9
IM1A_RT_w_3	Semester paper	Preparing documentation in the form of an assembly drawing.	IM1A_RT_1, IM1A_RT_10, IM1A_RT_2, IM1A_RT_3, IM1A_RT_4, IM1A_RT_5, IM1A_RT_6, IM1A_RT_7, IM1A_RT_8, IM1A_RT_9
IM1A_RT_w_4	Credits test	Test consisting of 10 multiple-choice questions.	IM1A_RT_1, IM1A_RT_10, IM1A_RT_2, IM1A_RT_3, IM1A_RT_4, IM1A_RT_5, IM1A_RT_6, IM1A_RT_7, IM1A_RT_8, IM1A_RT_9

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_RT_fs_1	lecture	Lecture with the use of audiovisuals, models and graphs on transparent foils.	15	Active participation in classes.	15	IM1A_RT_w_4
IM1A_RT_fs_2	laboratory classes	Performing credits tests during laboratory	30	Own student’s work during laboratory	30	

		classes on individual topics.		classes.		IM1A_RT_w_1, IM1A_RT_w_2, IM1A_RT_w_3

1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Technical thermodynamics

Module code: IM1A_TERM

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_TERM_1	Understanding basic notions and definitions of the technical thermodynamics and also of relationships between heat and work, capability to determine energy balances.	IM1A_K05 IM1A_W02 IM1A_W04	1 1 5
IM1A_TERM_2	Students can use the learned thermodynamic models for the materials engineering needs.	IM1A_K05 IM1A_U10	1 2

3. Module description

Description	The Technical thermodynamics module familiarises students with basic methods and mechanisms of thermal energy generation and its conversion during thermodynamic cycles. Students gain knowledge about basic energy issues, energy balances and carriers, and also about possibilities to use unconventional energy sources and the energy equipment used in materials engineering.
Prerequisites	It is required to achieve effects of education of physics and chemistry modules.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_TERM_w_1	Written test	Checking the understanding of basic notions and definitions, relationships between heat and work, energy balances.	IM1A_TERM_1, IM1A_TERM_2
IM1A_TERM_w_2	Test	Assessment of mastering the basic knowledge necessary to perform an individual engineering project.	IM1A_TERM_1, IM1A_TERM_2

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_TERM_fs_1	lecture	The lecture, enhanced with demonstrations, is delivered with the use of multimedia.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	35	IM1A_TERM_w_1
IM1A_TERM_fs_2	practical classes	Classes verifying the mastering of basic notions of thermodynamics, delivered based on discussion and problems solving.	15	Preparation to classes through independent studying of recommended issues.	15	IM1A_TERM_w_2