1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2017/2018 (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