1.	**Field of study**	**Materials Science and Engineering**
2.	Faculty	Faculty of Science and Technology
3.	Academic year of entry	2019/2020 (winter term), 2020/2021 (winter term), 2021/2022 (winter term), 2022/2023 (winter term)
4.	Level of qualifications/degree	first-cycle studies (in engineering)
5.	Degree profile	general academic
6.	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