1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2018/2019 (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