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: 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