1.	Field of study	Materials Science and Engineering
2.	Academic year of entry	2017/2018 (winter term)
3.	Level of qualifications/degree	second-cycle studies (in engineering)
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Monographic lecture 2. Nanocomposites

Module code: IM2A_WM2_NK

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)
IM2A_WM2_NK_1	Understanding conceptual basics of nanomaterials build with the involvement of 1D, 2D and 3D dimension type units (in particular carbon nanotubes) and the relationship between materials structural scale and their properties, their testing and application methods as well as the categorisation of reinforcing nanoparticles based on the increase in functionality and prospects for nanocomposites development.	IM2A_W07 IM2A_W11	2 1
IM2A_WM2_NK_2	Learning phenomena, processes, methods for nanocomposites obtaining and testing, their types and defects (in particular interphase boundaries) role in nanocomposites properties forming and learning their applications.	IM2A_W12 IM2A_W13	2 2
IM2A_WM2_NK_3	The skill to analyse nanocomposites structure, properties and methods for their obtaining as well as their type selection and obtaining methods depending on the required properties.	IM2A_U11 IM2A_U17	2 1
IM2A_WM2_NK_4	Development of the awareness of the need for development of nanomaterials and their technologies based on complex objects of sub-micrometric scale and understanding related technological, environmental and general-social issues.	IM2A_K02 IM2A_K04	1 1

3. Module description

Description	The module Nanocomposites shall enable that students are knowledgeable about the conceptual basics, classification, structure, defects and properties of nanocomposites and about methods of their obtaining, testing and about applications corresponding with modern technical requirements. Students will be capable of performing a comparative analysis of nanocomposites testing methods, in particular methods based on atomic forces microscopy and scanning tunnelling microscopy. 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 nanocomposites obtaining methods, their structure and properties as well as mechanisms forming their properties. This will allow honing the skill to form nanocomposites 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, nanomaterials and nanotechnologies .

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM2A_WM2_NK_w_1	Oral test	Verification of knowledge based on the lectures content, recommended literature.	IM2A_WM2_NK_1, IM2A_WM2_NK_2, IM2A_WM2_NK_3, IM2A_WM2_NK_4
IM2A_WM2_NK_w_2	Written test	Checking the acquired skills of nanocomposites classification, obtaining methods and forming the structure as well as mechanisms responsible for their properties changing, selected for specific technical and medical applications.	IM2A_WM2_NK_1, IM2A_WM2_NK_2, IM2A_WM2_NK_3, IM2A_WM2_NK_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	
IM2A_WM2_NK_fs_1	lecture	The lecture shall enable understanding issues related to the classification, structure, properties, methods of obtaining and applications as well as nanocomposites 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.	30	IM2A_WM2_NK_w_1