



Innovative materials

Version	2022/1
Effective from (date of when the course was developed)	27/06/2022

ECTS Credits	2 ECTS
Level/Year	Bachelor, Master and PhD students
Teaching (contact) hours	20
Total learner managed hours (incl. self-work)	52
Total hours of student learning	72

Pre-requisites	Knowledge of the following disciplines is desirable: <ul style="list-style-type: none"> – General physics: mechanics, optics, electrodynamics. – Atomic scale structure of materials. – Basics of chemistry.
Co-requisites	None
Alignment to graduate profiles	This course contributes to achievement of the graduate outcomes of the following qualifications: <ul style="list-style-type: none"> – Bachelor in Physics – Master of Science in Physics – Certificate in Physics
Course aim	The course is devoted to the fundamental properties and applications of nanostructured materials, including composite materials and 2D materials. This includes the analysis and modeling of properties, the main methods of synthesis and characterization, as well as areas of practical application of nanostructured materials.
Indicative Course content	Nanostructured materials. Composite nanomaterials - basic concepts and definitions. How the properties of materials change at the nanoscale. 2D materials. Modeling the properties of nanostructured composite materials. Effective medium theory. Nanomechanics of composite materials. Modeling properties of 2-D materials. Practical application of nanostructured composite materials. Application of composite materials with plasmonic nanoparticles. Functionalization of graphene-based materials, and their industrial application. Application of nanostructured materials in extreme conditions.

LEARNING OUTCOMES

On successful completion of this course students will be able to:	
1	Understand the physical and chemical bases for the production of composite materials.
2	Describe the characteristics of nanostructured composite materials.
3	Describe the main methods for obtaining and characterization of composite materials.
4	Demonstrate knowledge of the main areas of practical application of nanostructured composite materials.
5	Perform calculations to obtain the characteristics of nanostructured composite materials.

ASSESSMENTS

Basis of assessment	Achievement based assessment
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Methods of assessment	Learning Outcomes	Pass criteria (Minimum)	% Weightings
Final test	1,2,3,4	50%	70%
Summative of practices	5	50%	30%

REQUIREMENTS FOR SUCCESSFUL COURSE COMPLETION

Requirements	Mark of 50% or more in every summative assessment
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RESULTS

Assessment results	The results of the assessments are given in percentage points
Course results	<ul style="list-style-type: none">• Each summative assessment is assigned a percentage weight.• The overall grade for the course is calculated by adding up the weighted results for all summative assessments.

LEARNING AND TEACHING

Learning and teaching approaches	Lectures, group discussions, tutorials, exercises, presentations, research.
Learning and teaching resources	Textbooks, journals and library resources, use of Internet, computer software.
Learner managed activities	<ul style="list-style-type: none">• Completion of coursework and assignments• Reading course materials• Preparation for classes• Homework• Application of relevant practical skills/methods/techniques• Gathering relevant information/questions/ideas to broaden knowledge of the subject