

DESCRIPTION/Syllabi of Curricula/Module

Short Name of the University/Country code	PSTU Ukraine
Date (Month / Year)	June 2021
TITLE OF THE MODULE	Code
Nanostructures and nanocapsules	

Teacher(s)	Department
Coordinating: Assoc. Prof. Sorochan E. Others:	Department of Biomedical Engineering

Study cycle (BA/MA)	Level of the module (Semester number)	Type of the module (compulsary/elective)
MA	10th semester	Compulsary

Form of delivery (theory/lab/exercises)	Duration (weeks/months)	Language(s)
Lectures, Seminars	17 weeks	Ukrainian/English

Prerequisites	
Prerequisites: Knowledge: Materials engineering. Skills: Ability to search information. Competences: Team work on presentation.	Co-requisites (if necessary): Students should have skills to work in basic computer software (eg. MS Word, MS PowerPoint)

ECTS (Credits of the module)	Total student workload hours	Contact hours	Individual work hours
3	90	51	39
Aim of the module (course unit): competences foreseen by the study programme			
Students should be able to: - Take part in a discussion on new trends in nanomaterials; - Find, analyze and compare information of new nanostructures; - Make a presentation on a selected topic.			
Learning outcomes of module (course unit)	Teaching/learning methods (theory, lab, exercises)	Assessment methods (written exam, oral exam, reports)	
Knowledge: Knowledge of basic information of nanotechnology, various nanomaterials, nanostructures and nanocapsules, specific of nanoscale, processing methods and toxicity of nanostructures. Knowledge of nanostructures and nanocapsules application in bioimaging and biosensors, drug delivery systems, tissue engineering, hyperthermia, gene therapy and also bio-NEMS.	Lectures	Open questions test	
Skills: Ability to analyze, compare and verify information on a selected topic. Proper project presentation.	Seminar	Project in the form of presentation	
Competences: Awareness of the impact of nanotechnology on people and the environment.	Lectures	Open questions test	

Themes	Contact work hours							Time and tasks for individual work	
	Lectures	Consultations	Seminars	Practical work	Laboratory work	Placements	Total contact work	Individual work	Tasks
1. Introduction, basic information on nanotechnology, nanostructures and nanocapsules, nanomaterials, specific of nanoscale, processing methods and toxicity of nanostructures. Topics of team presentations for students.	6		4				10	6	Study of theoretical material, case study
2. Carbon nanostructures and nanocapsules such as nanodiamond, fullerenes, carbon onions, carbon nanotubes, graphene, nanohorns, nanocones and nanocoils.	6		2				8	5	Study of theoretical material, case study
3. Metallic nanostructures, metallic nano-oxides, quantum dots and silica nanostructures.	4		2				6	5	Study of theoretical material, case study
4. Polymeric nanostructures and nanocapsules, micelles and liposomes.	4		2				6	5	Study of theoretical material /case study/ presentations
5. Nanostructures and nanocapsules in bioimaging.	6		2				8	5	Study of theoretical material /case study/ presentations
6. Biosensors and application of selected nanostructures and nanocapsules.	4		2				6	5	Study of theoretical material /case study/ presentations
7. Nanostructures and nanocapsules in drug delivery systems, gene therapy, hyperthermia, tissue engineering, bioMEMS and bioNEMS.	4		2				5	5	Study of theoretical material /case study/ presentations
8. Final open questions test	1						1	3	
Total	35		16				51	39	

Assessment strategy	Weight in %	Deadlines	Assessment criteria
Presentation	50	17 th week	Attendance, activity, presentation
Final exam	50	17 th week	Open questions test

Author	Year of issue	Title	No of periodical or volume	Place of printing. Printing house or internet link
Compulsory literature				
D. P.Nikolelis, G.P.Nikolelis	2018	Nanotechnology and Biosensors, 1st Ed.		Elsiever. - 470 p.
C.M. Hussain, A.K. Mishra	2018	Nanotechnology in Environmental Science		Wiley-VCH Verlag GmbH & Co. (Germany). - 872 p.
D. P. Kothari, V. Velmurugan, R.R. Singh	2018	Nanotechnology and Nanoelectronics		Alpha science international limited, (United Kingdom). - 216 p.
S.M. Goodnick	2018	Semiconductor Nanotechnology: Advances in Information and Energy Processing and Storage. Ed. by A. Korkin, R. Nemanich		Springer (Switzerland). - 235 p.
Additional literature				
Edited by B.Bhushan	2016	Encyclopedia of nanotechnology		Dordrecht: Springer. - 2868 p.
J.J. Ramsden	2018	Applied nanotechnology: the conversion of research results to products		University of Buckingham, Oxford (UK), imprint of Elsevier. - 292 p.
Edited by T.J.Webster, H. Yazici	2016	Biomedical nanomaterials: from		The Institution of Engineering and

		design to implementation		Technology, London. - 337 p.
Colm Durkan	2019	Size really does matter: the nanotechnology revolution		World Scientific Publishing Europe Ltd. - 221 p.