



Zaporizhzhya Polytechnic National University  
Faculty of Radio Electronics and Telecommunications  
Department of Radio Engineering and Telecommunications  
specialty 172 "Telecommunications and radio engineering" educational and  
professional program "Telemedicine and biomedical systems"

DESCRIPTION / Syllabus of discipline / module

<b>Short name of the university / department date (month / year)</b>	NU «Zaporizhzhya Polytechnic» 08/2020
<b>Module name / Course name</b>	Modern trends in nanotechnologies
<b>Code:</b>	PPV 03

<b>Teacher(s)</b>	<b>Department</b>
Pogosov Valentin Valterovich Korotun Andriy Vitaliyovich	Micro- and Nanoelectronic

<b>Study cycle</b>	<b>Level of the module</b>	<b>Type of the module</b>
MSc	2	selective

<b>Form of delivery</b>	<b>Duration</b>	<b>Language(s)</b>
Lectures/Hands-on Lab session	15 weeks	Ukrainian

<b>Connection with other disciplines</b>	
<b>Previous:</b> - Embedded biomedical systems and wired sensor networks; - Biomedical materials and structures.	<b>Related (if required):</b>

<b>Credits of the module</b>	<b>Total student workload</b>	<b>Contact hours</b>	<b>Individual work hours</b>
3	90	30	60

**Aim of the module (course unit): competences foreseen by the study programme**

- to form students' ideas about the technological processes developed nanoscale objects, formation and manufacturing of structures, devices and for application in biology and medicine, the physical principles of their work, as well as their capabilities and restrictions on the application;
- mastering the physical foundations and methods of nanobiotechnology at a level sufficient for further self-improvement in one of the areas of this scientific discipline.

<b>Learning outcomes of module (course unit)</b>	<b>Teaching/learning methods</b>	<b>Assessment methods</b>
- be fluent in the state language and communicate foreign language; - the ability to generate new ideas (creative activity), to obtain independently with the help of information technology and	- using during lectures listening and preparing to practical work and labs.	- without separate assessment ;



<p>to use new knowledge and skills in practice, including in new industries and knowledge not directly related to the area of expertise;</p> <ul style="list-style-type: none"> <li>- demonstrate an understanding of the subject area and understanding of professional activity, apply knowledge in practice situations, evaluate and provide quality performed works;</li> <li>- be able to use and improve of the modern software, hardware of telecommunications and radio engineering devices and biomedical systems;</li> <li>- the ability to assess the level of existing technologies in the field of professional activity efficiency of technical solutions and the emergence of objects of intellectual property, find ways and opportunities for the implementation of scientific ideas in profitable business projects and startups;</li> <li>- ability to use information valuable technologies, methods of intellectualization and visualization, artificial intelligence, cloud calculations for research and analysis processes in telemedicine and biomedical systems;</li> <li>- the ability to use standard and develop your own software products, focused on solving project problems-and calculation of components tele- and biomedical systems for optimization of the structure and the research facilities, preparation of the necessary technological documentation;</li> <li>- the ability to choose the best methods of the research, modify and adapt existing, develop new research methods in accordance with existing technical means and form a technique of processing research results.</li> </ul>	<ul style="list-style-type: none"> <li>- theoretical knowledge received during lectures and consultations</li> <li>- independent and under supervising preparation and implementation practical work.</li> <li>- independent and under supervising preparation and implementation labs</li> </ul>	<ul style="list-style-type: none"> <li>- evaluate by the report on laboratory works;</li> <li>- assessment during laboratory work and test.</li> <li>- assessment during laboratory work and exam.</li> </ul>
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Themes	Contact work hours						Time and tasks for individual work	
	Lectures	Consultation	Seminars	Practical work	Laboratory work	Total contact work	Individual work	Tasks
<b>Intro</b>	0,5	-	-	-	-	0,5	2	Evaluation of social and economic-humanitarian aspects of nanotechnology development
<b>Topic 1.</b> Nanomaterials and nanotechnology logic.	1,5	-	-	-	5	6,5	8	Solving individual home task by assessment
<b>Topic 2.</b> Elements of nanobiology.	2	-	-	-	2	4	9	Analysis of modern state of the nanobiotechnology development and future prospects.
<b>Topic 3.</b> Self-assembly and self-organization.	2	-	-	-	2	4	9	Solving individual home task by assessment
<b>Topic 4.</b> Nanobiophysical methods of the bionanostructures processing.	2	-	-	-	2	4	6	Analysis of possible and disadvantages modern research methods bionanostructures
<b>Topic 5.</b> Biomolecular sensory and self-replication.	2	-	-	-	2	4	8	Structural scheme that has a biomolecular sensors
<b>Topic 6.</b> Nanomedicine.	2	-	-	-	2	4	6	Trend analysis current development of modern nanomedicine
<b>Topic 7.</b> Nanopharmacy.	2	-	-	-	-	2	8	Trend analysis this current development of modern nanopharmacy



<b>Topic 8.</b> Biomedical applications of nanoplasmonics.	1	-	-	-	-	1	4	Comparison of achievements on the current stage of nanoscience on creating an application in modern systems nanobiotechnology
<b>Total</b> <b>90 hours</b>	<b>15</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>15</b>	<b>30</b>	<b>60</b>	

Assessment strategy	Weight in %	Deadlines	Assessment criteria
current assessment	10	during the semester	theoretical report on each topic
laboratory work defense	15		defense of laboratory work №1
	15		defense of laboratory work №2
	15		defense of laboratory work №3
	15		defense of laboratory work №4
	15		defense of laboratory work №5
	15	defense of laboratory work №6	
passing the test	60-100	after the module	credited
	35-59		not credited with the possibility of re-taking
	1-34		not credited with mandatory re-study of the discipline

Author	Year of issue	Title	Information about the publication	Place of printing. Printing house or internet link
<b>Compulsory literature</b>				
Pogosov V.V., Kunitsky Yu. A., Babich A.V., Korotun A.V., Shlack A. P.	2011	Nanophysics and nanotechnology	educational manual	Zaporozhye: ZNTU, 2011. - 384 p.
Korotun A.V., Karandas' Ya.V., Pogosov V.V.	2019	Essay on modern directions in nano technologies	educational manual	Uzhhorod: FOP Sabov AM, 2019. - 392
Pogosov V.V., Kunitsky Yu.A., Babich A.V., Korotun A.V.	2009	Elements of physics surfaces, nano-structures and technological	educational manual	Zaporozhye: ZNTU, 2010. - 365 p.



Korotun A.V., Titov I.M., Koval A.O., Stashchuk V.S., Kunitsky Yu.A., Kryuchin A.A.; by ed. Stashchuk V.S. and Kunitsky Yu.A.	2018	Nanophotonics. Physical basics and applications	monograph	Vinnitsia: Works. – 316pp.
<b>Additional literature</b>				
J. M. Martinez- Duart, R. J. Martin- Palma, F. Agullo- Rueda	2007	Nanotechnology for micro- and optoelectronics	book	M.: Technosphere
Nazarov O.M., Nishchenko M.M.		Nanostructures and nanotechnology	book	K.: NAU
Pogosov V.V., Kornich G.V., Vasyutin E.V., Pugin K.V., Kiprich V.I.	2016	Fundamentals of Nanophysics and nanotechnology	[Electronic source]	Zaporozhye: ZNTU, Access mode <a href="http://www.zntu.edu.ua/base/persons/51.htm">http://www.zntu.edu. ua/base/persons/51.ht m</a>

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