

## DESCRIPTION/Syllabi of Curricula/Module

<b>Short Name of the University/Country code</b> <b>Date (Month / Year)</b>	<b>DSEA</b> <b>Sep 2021</b>
<b>TITLE OF THE MODULE</b>	<b>Code</b>
<b>Biomedical systems, materials and technologies</b>	<b>P11</b>

<b>Teacher(s)</b>	<b>Department</b>
<b>Coordinating:</b> Eduard Grybkov, Doctor of Sciences  <b>Others:</b>	Department of Computer and Information Technology (CIT)

<b>Study cycle</b> <b>(BA/MA)</b>	<b>Level of the module</b> <b>(Semester number)</b>	<b>Type of the module</b> <b>(compulsary/elective)</b>
Bachelor	7 <sup>th</sup> semester (fourth year) for Bachelor	Elective

<b>Form of delivery</b> <b>(theory/lab/exercises)</b>	<b>Duration</b> <b>(weeks/months)</b>	<b>Language(s)</b>
Lectures, Seminary	15 weeks	Ukrainian / English

<b>Prerequisites</b>	
<b>Prerequisites:</b>  the study of disciplines "Higher Mathematics", "Theory of Probabilities and Mathematical Statistics", "Numerical Methods", "Mathematical Methods of Research of Operations".	<b>Co-requisites (if necessary):</b>  none

ECTS (Credits of the module)	Total student workload hours	Contact hours	Individual work hours
7	210	75	135
<b>Aim of the module (course unit): competences foreseen by the study programme</b>			
Students should be able to: <ul style="list-style-type: none"> <li>- Understand the fundamental concepts of digital signal processing, master the use of digital filters for converting sound and images.</li> <li>- Master the skills testing, data collection and processing digital signals biomedical purpose, use different methods of conversion and signal analysis in a computerized medical systems.</li> <li>- Master the techniques of modeling and statistical signal processing</li> </ul>			
Learning outcomes of module (course unit)	Teaching/learning methods (theory, lab, exercises)	Assessment methods (written exam, oral exam, reports)	
<b>Knowledge:</b> - acquaintance with the basic theoretical positions of realization of methods of processing random samples and their use in specific tasks; - Familiarization with the definition of different types of models, their use, testing of hypotheses, the difference between model predictions, concepts of suitability and model constraints.	Work with the lecture notes as well as on the available fundamental subject literature	Knowledge test	
<b>Skills:</b> - formation of theoretical knowledge and acquiring practical skills for the formalization of tasks arising in various spheres of human activity; - formation of the ability to create algorithms for statistical simulation; - development of skills in the use of different methods of conversion and signal analysis in a computerized medical systems	Lectures, practical work, consultation	Active attendance on lectures, individual project and presentation	
<b>Competences:</b> Study the subject literature, exchange knowledge, working in group	Lectures, practical work, consultation	Individual project and presentation	

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. Biological systems as an object of research and general characteristic of modern methods of their research. System of medical and biological research methods. Measurement in medical and biological practice.	15				10		25	45	Study exam/ complete exercise
2. Methods of physiological research.	15				10		25	45	Study exam/ complete exercise
3. Active and analytical research methods	15				10		25	45	Study exam
<b>Total</b>	<b>45</b>				<b>30</b>		<b>75</b>	<b>135</b>	

Assessment strategy	Weight in %	Deadlines	Assessment criteria
written exam theory	40%	during the semester / exam	Good response to the questions
Practical exam on a computer	60%	during the semester / exam	the work is done completely without mistakes or minor errors

<b>Author</b>	<b>Year of issue</b>	<b>Title</b>	<b>No of periodical or volume</b>	<b>Place of printing. Printing house or internet link</b>
<b>Compulsory literature</b>				
Semmlow, J.	2017	Circuits, Signals and Systems for Bioengineers: A MATLAB-based Introduction.		Academic Press. – 782 p.
Leondes, C. T.	2005	Medical Imaging Systems Technology: Methods in cardiovascular and brain systems (Vol. 5)		World Scientific. – 408 p.
Northrop, R. B.	2016	Signals and systems analysis in biomedical engineering		CRC press. – 654 p.
<b>Additional literature</b>				
И.В. Смирнов, А.М. Старшов	2008	Функциональная диагностика. ЭКГ, реография, спирография		Издательство: Эксмо, 2008 . - 224 с.
В.П. Олейник, С.Н. Кулиш	2004	Аппаратные методы исследований в биологии и медицине		Учеб. пособие. - Харьков: Нац. аэрокосм, ун-т "Харьк. авиац. ин-т", 2004. – 110 с.