DESCRIPTION/Syllabi of Curricula/Module

Short Name of the University/Country code Date (Month / Year)	VNTU / UA Sep 2019
TITLE OF THE MODULE	**Code**
Information wireless networks and medical technologies (discipline - Modern information technologies in the industryof telecommunications and radio engineering)	

Teacher(s)	Department
Coordinating: Professor Sergii Zlepko, Doctor of Technical Sciences **Others:**	Dep. for Biomedical Engineering

Study cycle (BA/MA)	Level of the module (Semester number)	Type of the module (compulsary/elective)
MA	1 semester	Compulsory

Form of delivery (theory/lab/exercises)	Duration (weeks/months)	Language(s)
Lectures, exercises, laboratory work	9 weeks / 2 months	Ukrainian, English

Prerequisites	
Prerequisites: Knowledge: basic knowledge of design, construction of biotechnical systems and information systems, registration of indicators of vital activity of a bio-object, processing of biomedical information. Skills: none Competences: none	**Co-requisites (if necessary):** none

ECTS (Credits of the module)	Total student workload hours	Contact hours	Individual work hours
2	60	31	29

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

Students should be able to:

- to develop a working hypothesis, to plan and set up experiments to test the hypothesis and achieve an engineering goal with the help of appropriate technologies, technical tools and tools;
- to create and improve the means, methods and technologies of biomedical engineering for research and development of bioengineering objects and systems of medical and technical purpose;
- analyze complex medical engineering and bioengineering problems and formalize them to find quantitative solutions using modern mathematical methods and information technologies;
- to study biological and technical aspects of functioning and interaction of artificial biological and biotechnical systems.

Learning outcomes of module (course unit)	Teaching/learning methods (theory, lab, exercises)	Assessment methods (written exam, oral exam, reports)
Knowledge: Producers gain extensive knowledge of the construction and use of appliances; the fundamental principles and models that underpin modern IT; principles and skills of working with the main types of software used to support research and engineering activities; structure of information technology, its components and dynamic description of features of new IT.	Slides, lecture notes, suggested books and literature, personal reports, written papers	Written/oral exam, essays
Skills: Conduct analysis, development and application of information systems and technologies of various types; professionally apply in own IT research; select interface tools for different scientific tasks/	Lectures, working groups, individual work	Exercise and laboratory reports
Competences: Perform critical literature research on the subject, use the knowledge in practice, exchange notions, present the results	Working groups	Exercise reports and presentations

Themes	Contact work hours							Time and tasks for individual work	
	Lectures	Consultations	Seminars	Practical work	Laboratory work	Placements	**Total contact work**	**Individual work**	**Tasks**
Internet technologies and Internet services	3						**3**	**5**	To study and understand questions: Personal wireless networks. Wireless sensor networks. Small local wireless networks. Large local wireless networks. 1G, 2G, 3G, 4G, 5G mobile communication technologies. Satellite communication.
Distributed information systems for wireless monitoring of vital functions of the human body	4						**4**	**5**	To study and understand questions: Personal PAN technologies. Medical technology for monitoring and distributed data storage and processing. WEAP technology SOAP. Model of interaction of KIC systems. Check-in unit for welcome functions. Scheme of organization of remote monitoring. Remote telemonitoring using implanted devices.
Wireless data technology	3						**3**	**5**	To study and understand questions: BlueTooth technologies and standards, Wi-Fi, ZigBee, their hardware. The functionality of these technologies, their advantages and disadvantages.
Wireless medical technology	4						**4**	**5**	To study and understand questions: Remote monitoring of patients. Glooko MeturSync system (for diabetes). Monitoring of patients' complement; monitoring of asthma and COPD symptoms; non-invasive wireless monitoring of sugar and insulin levels; monitoring of cardiac patients. Monitoring the health and well-being of the elderly; tricoder.
Wireless technologies for determining the functional state of a person in extreme conditions	4						**4**	**5**	To study and understand questions: Hardware technology. Algorithms for the calculation of physiological indicators. How technology works. Wireless network technology for monitoring the state of physiological parameters of laboratory animals. System architecture. The implanted module. Automated researcher workplace. Intellectual technologies in dental implantology.
Engineering-physiological biotechnical systems (BTS).	4						**4**	**4**	To study and understand questions: Purpose and principle of work of BTS for vision study in children. Implanted biotelemetry complex. NI USB-6008 software-based physiological signal

									acquisition system. System software and hardware. Transcutaneous wireless energy transmission technologies using infrared radiation for implanted devices.
Laboratory work					3 3 3		**9**		Development and analysis of wireless network technology to monitor the state of physiological indicators of the object. Development and analysis of BTS structure using wireless data transmission Development and analysis of the structure of the telemedicine system
Final exam									
Total	**22**				**9**		**31**	**29**	

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Assessment strategy	Weight in %	Deadlines	Assessment criteria
Laboratory works attendance and exercise reports	30		Attendance and reports
Colloquium (theory control)	30		Test
Individual tasks	15		Presentations
Final exam	25		Written/oral exam

Author	Year of issue	Title	No of periodical or volume	Place of printing. Printing house or internet link
Compulsory literature				
Terré, Michel, et al.	2013	Wireless telecommunication systems	ISBN:9781848215436	Wiley
Fong, B., Fong, A. C. M., & Li, C. K.	2011	Telemedicine technologies: Information technologies in medicine and telehealth	ISBN: 978-0-470-74569-4	John Wiley & Sons
Pahlavan, K., Krishnamurthy, P.	2011	Principles of Wireless Networks: A Unified Approach	ISBN-13: 978-0130930033	Prentice Hall PTR
Rappaport, T. S., Heath Jr, R. W., Daniels, R. C., & Murdock, J. N.	2015	Millimeter Wave Wireless Communications	ISBN-13: 978-0132172288	Pearson Education
Zhang, K., Shen, X. S	2015	Security and privacy for mobile healthcare networks	ISBN 978-3-319-24717-5	Springer
Additional literature				
Kim, K. J., Joukov, N. (Eds.).	2017	Mobile and Wireless Technologies	ISBN 978-981-10-5281-1	Springer
Гриценко В.І., Котова А.Б., Вовк М.І., Кіфоренко С.І., Бєлов В.М.	2015	Інформаційні технології в біології та медицині. Курс лекцій: навчальний посібник.	382 с.	Наук. думка
Wang, H., Mahmud, M. S., Fang, H., & Wang, C.	2011	Wireless Health	ISBN 978-3-319-47946-0	Springer