Short Name of the University/Country code Date (Month / Year)	DSEA January 2019
TITLE OF THE MODULE	Code
Designing and manufacturing of medical products	**P11**

Teacher(s)	Department
Coordinating: Mikhieienko D.Y., Ph.D **Others:**	Department of Computer and Information Technology (CIT)

Study cycle	Level of the module	Type of the module
BA	8th semester	compulsary

Form of delivery	Duration	Language (s)
Lectures, seminars	15 weeks	Ukrainian/English

Prerequisites	
Prerequisites: study of the disciplines "Engineering graphics", "Computer graphics", "Physics", "Engineering mechanics"	**Co-requisites (if necessary):**

ECTS (Credits of the module)	Total student workload hours	Contact hours	Individual work hours
4,0	120	52	68
Aim of the module (course unit): competences foreseen by the study programs			

Students should be able:
- to develop and implement software for creating and manufacturing equipment and implants in MCAD / MCAM packages, integrate with these systems, work with 3D printers and CNC machines

Learning outcomes of the module (course unit)	Teaching/learning methods	Assessment methods
Knowledge: – familiarization with the principles, methods, algorithms, packages of applications for solving problems of computer aided design; – familiarization with the systems of computer-aided design of structures and technological processes for various purpose (CAD / CAE / CAM and other systems); – introduction to the basic technologies of rapid prototyping, varieties and design of 3D printers and CNC machines	Lectures	Test
Skills: – formation of theoretical knowledge and acquisition of practical skills in working with modern MCAD-systems; – formation of the ability to use modern 3D printers for rapid prototyping, in particular for 3D printing of medical implants; – formation of the ability to use modern CNC machine tools for the production of medical implants	Seminar	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 Geometric design of complex objects in modern CAD systems. Design of medical implants	4		4				8	9	Study of theoretical material, case study
2. Assembly of multiple objects in CAD systems. Design of composite models of joint implants	3		3				6	8	Study of theoretical material, case study
3. Modern 3D printing technologies, current status and prospects	4		4				8	9	Study of theoretical material, case study
4. 3D printers and their design features	3		3				6	8	Study of theoretical material /case study/ presentations
5. Materials for 3D printing. Medical implant printing materials	3		3				6	8	Study of theoretical material/case study/ presentations
6. G-code. Basic principles of program design	3		3				6	8	Study of theoretical material /case study/ presentations
7. Design of modern CNC machine tools	3		3				6	9	Study of theoretical material /case study/ presentations
8. Use of 3D printers and CNC machine tools for manufacturing medical devices	3		3				6	9	Study of theoretical material /case study/ presentations

		Total	26		26				52	68	

Assessment strategy	Weight in %	Deadlines	Assessment criteria
Presentation	40	15th week	Participation, activity, presentation
Final test	60	15th week	Open test questions

Author	Year of issue	Title	No of periodical or volume	Place of printing. Printing house or internet link
Compulsory literature				
Charles Bell	2013	Maintaining and Troubleshooting Your 3D Printer		Technology in Action
Richard Salinas	2014	3D Printing with RepRap Cookbook		Packt Publishing Ltd. ISBN 978-1-78216-988-8
Additional literature				
МалюхВ. Н.	2010	Введение в современные САПР: Курс лекций		М.: ДМК Пресс