



## Subject card

Subject name and code	CAD / CAM solutions in medical electronics, PG_00053356						
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2022/2023		
Education level	second-cycle studies		Subject group		Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Biomedical Engineering -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Adam Bujnowski				
	Teachers		dr inż. Adam Bujnowski  Jacek Ryń  mgr inż. Kamil Osiński				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	15.0	0.0	45
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	45		4.0		51.0	100
Subject objectives	The aim of the course is to acquire knowledge, both theoretical and practical, in the field of CAD / CAM solutions used in medical electronics						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W06] Knows and understands, to an increased extent, the basic processes taking place in the life cycle of devices, facilities and technical systems.		Student - has knowledge of the principles of modeling and designing electronic circuits in medical applications		[SW1] Assessment of factual knowledge		
	[K7_W03] Knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum.		Student - is able to prepare technical documentation of the project for the manufacturer		[SW1] Assessment of factual knowledge		
	[K7_U08] while identifying and formulating engineering tasks specifications and solving these tasks, can:n- apply analytical, simulation and experimental methods,n- notice their systemic and non-technical aspects,n- make a preliminary economic assessment of suggested solutions and engineering workn		Student - knows and uses the tools for designing electronic circuits in medical applications		[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		
Subject contents	1. Introduction to the topic2. CAD / CAM programs - development trends of modern applications3. The process of designing electronic devices, taking into account the requirements for medical equipment4. IPC classes in the field of electronic devices5. Working with technical documentation6. Requirements for the preparation of electrical diagrams7. The process of designing printed circuit boards8. 3D modeling for printing on 3D printers9. Preparation of product documentation10. The specificity of designing flexible circuits						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory	50.0%	40.0%
	Project	50.0%	40.0%
	Lecture	50.0%	20.0%
Recommended reading	Basic literature	<ul style="list-style-type: none"><li>• <b>EMC and the Printed Circuit Board: Design, Theory, and Layout Made Simple.</b> Mark I. Montrose Copyright 1999 Institute of Electrical and Electronics Engineers, Inc. ISBN: 0-780-34703-X</li><li>• <b>Printed Circuit Board Design Techniques for EMC Compliance: A Handbook for Designers 2nd Edition.</b> Mark I. Montrose, Wiley-IEEE Press; 2nd edition (July 4, 2000)</li><li>• <b>Wprowadzenie do CAD Podstawy komputerowo wspomaganego projektowania</b> Maciej Sydor, Wydawnictwo Naukowe PWN, Warszawa 2012</li><li>• <b>Complete PCB Design Using OrCad Capture and Layout 1st Edition</b> Kraig Mitzner, Newnes 2007, ISBN: 9780750682145</li><li>• <b>Medical Device Design - Innovation from Concept to Market,</b> Peter J. Ogrodnik, Academic Press; 2nd edition</li></ul>	
	Supplementary literature	available from the teacher	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		