

GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Mechatronics								
October 2021		Academic year of realisation of subject			2023/2024			
first-cycle studies		Subject group			Obligatory subject group in the field of study Subject group related to scientific research in the field of study			
Full-time studies		Mode of delivery			at the university			
3		Language of instruction			Polish			
5		ECTS credits			5.0			
general academic profile		Assessment form			assessment			
Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology								
Subject supervisor dr inż. Daw			wid Zieliński					
Teachers		dr inż. Dawid						
dr inż. Piotr Sender								
Lesson type	Lecture	Tutorial	Laboratory	Project	t	Seminar	SUM	
Number of study hours	30.0	0.0	15.0	15.0		0.0	60	
E-learning hours inclu	uded: 0.0					•		
Learning activity			Participation in consultation hours		Self-study SUM		SUM	
Number of study hours	60		5.0		60.0		125	
		mputer-aided m	nanufacturing, e	especial	ly prog	ramming CN0	c machines	
Course outcome		Subject outcome		Method of verification				
		Group design of the technological process with the use of a computer system.		[SU4] Assessment of ability to use methods and tools				
[K6_U11] is able to evaluate usefulness of methods and tools to solve simple, practical engineering task, distinctive for mechatronics and is able to choose the proper method and tools		The manufacturing process selection depending on the class, type of parts, material, dimensional and shape requirements as well as time and cost of production. The student applies the practical use of CAD/ CAM systems to present the designed technology for the production of mechanical components.		[SU1] Assessment of task fulfilment				
		The student can design technological processes of typical machine parts for the available means of production, including measuring devices and analysis of experimental results.			[SW2] Assessment of knowledge contained in presentation			
[K6_U05] is able to use properly choosen tools to compare design solutions of elements and mechatronics systems according to given application and economic crtierions (e.g. power demand, speed, costs)		Analysis of the production process using computer simulation for a specific manufacturing system.			[SU3] Assessment of ability to use knowledge gained from the subject			
	Full-time studies 3 5 general academic proding Institute of Manufacture Technology Subject supervisor Teachers Lesson type Number of study hours E-learning hours inclue Learning activity Number of study hours Learning the basic terwith the use of CAM and the use of the use the use of the use	Full-time studies 3 5 general academic profile Institute of Manufacturing and Mater Technology Subject supervisor Teachers Lesson type Lecture Number of study 30.0 hours 20.0 Learning hours included: 0.0 Learning activity Participation in classes includ plan Participation in classes includ plan Number of study hours 60 Learning the basic techniques of conwith the use of CAM software. Course outcome [K6_U08] is able - according to a given specification - design, calculate costs and develop a simple device, object, system or process typical for mechatronics, using approproate methods, techniques and tools [K6_U11] is able to evaluate usefulness of methods and tools to solve simple, practical engineering task, distinctive for mechatronics and is able to choose the proper method and tools [K6_U05] is able to use properly choosen tools to compare design solutions of elements and simple mechatronic devices [K6_U05] is able to use properly choosen tools to compare design solutions of elements and economic criterions (e.g. power demand, speed, costs)	first-cycle studies Subject growth Full-time studies Mode of de 3 Language of 5 ECTS cred general academic profile Assessmer Institute of Manufacturing and Materials Technology Subject supervisor Subject supervisor dr inż. Dawid Teachers dr inż. Dawid Lesson type Lecture Tutorial Number of study hours 30.0 0.0 Learning nours included: 0.0 Learning nours included: 0.0 Learning the basic techniques of computer-aided in with the use of CAM software. Group design process included in study plan Number of study hours 60 Group design process with to calculate costs and develop a simple device, object, system or process typical for mechatronics, using approproate methods, techniques and tools The manufact selection dep type of parts, dimensional a requirements cost of produc applies the proper method and tools The manufact selection dep type of parts, dimensional a requirements cost of produc applies the proper method and tools [K6_U05] is able to use properly choosen tools to compare design solutions of elements and mechatronic devices The student c technological measuring de experimental [K6_U05] is able to use properly choosen tools to compare design solutions of elements and mechatronic devices Analysis of th usning comput	first-cycle studies Subject group Full-time studies Mode of delivery 3 Language of instruction 5 ECTS credits general academic profile Assessment form Institute of Manufacturing and Materials Technology -> Faculty of Technology Subject supervisor dr in2. Dawid Zieliński Teachers dr in2. Dawid Zieliński Lesson type Lecture Tutorial Laboratory Number of study hours 30.0 0.0 15.0 Learning nours included: 0.0 Learning nours included: 0.0 E-learning hours included: 0.0 E-learning the basic techniques of computer-aided manufacturing, or with the use of CAM software. Course outcome Subject outcome Group design of the technolog process with the use of a cording to a given specification - design, calculate costs and develop a simple device, object, system or process typical for mechatronics, using approproate methods, techniques and tools The manufacturing process sell as time, dimensional and shape requirements as well as time chaorolics of oroduction. The stude applies the practical use of CAM systems to present the design and production processes of the chanical components. [K6_U08] knows and understands of elements and mechatronic seystems and ceronomic criterions (e.g. power demand, tesperimental results. [K6_U05] is able to use properly choosen tools to compare design or	first-cycle studies Subject group Full-time studies Mode of delivery 3 Language of instruction 5 ECTS credits general academic profile Assessment form Institute of Manufacturing and Materials Technology -> Faculty of Mechar Technology Subject supervisor dr in2. Dawid Zleliński Teachers dr in2. Dawid Zleliński Lesson type Lecture Tutorial Laboratory Projec Number of study hours 30.0 0.0 15.0 15.0 Learning hours included: 0.0 Learning the basic techniques of computer-aided manufacturing, especial with the use of CAM software. Participation in consultation hours Number of study hours 60 5.0 5.0 Learning the basic techniques of computer-aided manufacturing, especial with the use of CAM software. Group design of the technological given specification - design, calculate costs and develop a simple device, object, system or process typical for mechatronics, using approproate methods, techniques and tools The manufacturing process selection depending on the class, type of park, material, dimensional and shape requirements as well as time and cost of production, in technological production, in cludent and shape [K6_U11] is able to use properly choose the proper method and tools The student can design technological proc	first-cycle studies Subject group Oblige Field of Subject Full-time studies Mode of delivery at the 3 Language of instruction Polish 5 ECTS credits 5.0 general academic profile Assessment form assess Institute of Manufacturing and Materials Technology -> Faculty of Mechanical En Technology dr inz. Dawid Zieliński assess Subject supervisor dr inz. Dawid Zieliński Project Number of study nours 30.0 0.0 15.0 15.0 E-learning hours included: 0.0 E-learning hours included: 0.0 Subject outcome Subject outcome Iserier of study nours 60 5.0 60.0 60.0 Number of study nours 60 5.0 60.0 Number of study nours 60 5.0 60.0 K6_U08] is able - according to a given specification - design, calculate costs and develop a simple device, object, system or process typical for mechatronics, tuse fulness of methods and tools to solve simple, practical engineering task, distinctive for mechatronics and is able to choose the proper method and tools The manufacturing process swith the use of CAD/ CAM systems to preasent the designed technological processes of typical of elements and simple mechatronic devices The student can design technological processes of typical machine parts for the available massuring devices and analysis of experimental resuits. SW210 (s	first-cycle studies Subject group Obligatory subject of field of study Full-time studies Mode of delivery at the university 3 Language of instruction Polish 5 ECTS credits 5.0 general academic profile Assessment form assessment Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Technology dr in2. Dawid Zieliński General dr in2. Dawid Zieliński Eseminar Teachers dr in2. Dawid Zieliński General Lesson type Lecture Tutorial Laboratory Number of study hours 30.0 0.0 15.0 0.0 Learning hours included: 0.0 Learning hours included: 0.0 E-learning hours included: 0.0 E Learning the basic techniques of computer-aided manufacturing, especially programming CNC with the use of CAM software. Subject outcome Method of vei computer system. [K6_U10] is able - according to a given specification - design, calculate costs and develop a simple device, object, system or process typical for mechatronics, techniques and tools Group design of the technological protess with the use of a computer system. [SU1] Assessment o use methods and tools [K6_U10] is able to valuate usefine and sinple engineering task, distinctive for mechatronics and is able to cohoose the proper method and tools The manufacturing process selection depending on the c	

Subject contents	Systems for computer-aided manufacturing. Integration of CAD and CAM systems. The exchange of data between systems. Declaration of the workpiece, semi-finished product, tools and fixtures. Definition of machining cycle. Types of turning and milling machining cycles. Selection of machining strategy for specific areas treated. Declaration of cutting parameters. Treatment of free surfaces. High speed machining HSM. Databases in CAM systems. Files containing data access tools. Postprocessors machine tool. Simulation with an analysis of collision. Modification of machining programs. Trends in the development of computer aided manufacturing. Additive technologies and reverse engineering.						
Prerequisites and co-requisites	Technical drawing, basics of manufacturing techniques, Computer Aided Design CAD						
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	Practical exercises during laboratories	60.0%	20.0%				
	Active participation in lectures	80.0%	20.0%				
	Projects	60.0%	20.0%				
	Exam	60.0%	40.0%				
Recommended reading	Basic literature	 Przemysław Kochan. EdgeCAM. Wieloosiowe frezowanie CNC. Wydawnictwo Helion. Gliwice 2014. Grzesik W., Niesłony P., Bartoszuk M.: Programowanie obrabiarek NC/CNC. WNT, Warszawa 2020, Wyd. IV. Przybylski W., Deja M.: Komputerowo wspomagane wytwarzanie maszyn. Podstawy i zastosowanie. WNT, Warszawa 2007. Augustyn K.: EdgeCAM. Komputerowe wspomaganie wytwarzania. Wydanie II. Helion, Gliwice 2006. 					
	Supplementary literature	theory, modelling and application 2. Kosmol J.: Automatyzacja ob WNT,Warszawa 2000.	3. Chlebus E.: Techniki komputerowe CAx w inżynierii produkcji. WNT, Warszawa 2000.				
		Komputerowo wspomagane wytwarzanie - Moodle ID: 34616 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34616					

Example issues/	1. The range of applications of CAD/CAM manufacturing support systems.			
example questions/ tasks being completed				
	2. Use and integration of CAx techniques.			
	3. Generating NC programs using the CAD/CAM system.			
	4. Data exchange - between different systems.			
	5. Design and technological compliance in computer-aided manufacturing.			
	6. Object modeling - Feature Modeling.			
	7. Generating variants of technological solutions.			
	8. Trends in the development of CAx techniques in the field of computer-aided manufacturing.			
	9. Integration of CAD / CAM systems with CAE systems.			
	10. The structure of the standard of working time in terms of computer-aided production.			
	11. Process planning for turning technology with the use of the CAD/CAM system.			
	12. Process planning for milling technology with the use of the CAD/CAM system.			
	13. List the steps to be followed when designing technology using the CAM system (EdgeCam) with the use of 2D models.			
	14. List the steps to be followed when designing technology using the CAM system (EdgeCam) with the use of 3D models.			
	15. Designations of the axes of the coordinate system for: turning, milling and designation of additional axes.			
	16. List the types of models used in CAM systems.			
	17. List the designs of CNC lathes (positioning of the tool head) and the consequences of tools, spindle revolutions, etc.			
	18. Characterize the solid models.			
	19. Characterize the surface models.			
	20. Present the essential differences between the solid model and the surface model.			
	21. Characteristics of parametric CAD design.			
	22. Ways of determining the center of the coordinate system on the workpiece.			
	23. Ways of determining the blank in CAM systems.			
	24. Tasks of the technical preparation of production (TPP) department.			
Work placement	Not applicable			