GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00058634		
Field of study	Mechatronics		
Date of commencement of studies	February 2022	Academic year of realisation of subject	2022/2023
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Zakład Technologii Maszyn i Automatyzacji Produkcji -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor		
	Teachers		

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30	0.0	0.0	30

Subject objectives	Methods of producing models and prototypes with the use of additive methods for verification of designed mechatronic elements of the structures. Application of reverse engineering in redesign of existing structures. Unconventional machining methods used in manufacturing of mechatronic components.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W01] has extended knowledge in terms of selected areas of mathematics, including discrete and applied mathematics, optimisation methods, mathematical and numerical methods essential for: 1) modelling and analysis of nonstationary mechatronics, continuous and discrete time systems as well as physical phenomena; 2) description and analysis of mechatronic systems that include programmable devices 3) description and analysis of signal processing algorithms 4) synthesis of non-stationary mechatronic systems	The student has an in-depth knowledge of applied reverse engineering methods and its capabilities. The student is able to determine the imprecision of scanning and solid model creation in relation to mechatronic components.	[SW1] Assessment of factual knowledge
[K7_W06] has detailed, supported by the theory knowledge in terms of mechatronic design, mechatronic systems and machines, devices and process where they are used	The student has knowledge of unconventional processing methods including for modern structural materials.	[SW1] Assessment of factual knowledge
[K7_W10] knows development trends and most important new achievements in technical sciences and science disciplines: Mechanical Engineering, Automation, Electronics and Electrical Engineering and related: Informatics and Materials Engineering	The student knows the directions of development of incremental techniques and unconventional processing methods. The student searches technical literature for modern processing methods used in mechatronic elements.	[SW3] Assessment of knowledge contained in written work and projects
[K7_U04] is able to utilise known methods and mathematical models, as well as computer simulations for analysis and evaluation of non-stationary continuous and discrete mechatronic systems and processes	The student is able to use incremental manufacturing methods to prepare and develop technologies for specific structural elements in applied mechatronics.	[SU4] Assessment of ability to use methods and tools

Subject contents

Lecture: Introduction, systematics of modern manufacturing technologies. Incremental technologies, basics of mechatronic elements design using elements made with incremental methods, reverse engineering, methods of processing data obtained during scanning, interferences occurring during scanning and methods of removing measurement noise. Unconventional methods of elements processing for mechatronics purposes, HSC/HSM processing. Characteristics of HSC/HSM, dry machining. Precision and ultra precision machining. Chemical machining, milling, etching. Electrochemical machining, electrochemical grinding, electrical discharge machining, wire EDM. Laser and electron beam machining, surface treatment. Water jet machining, water jet and abrasive machining, abrasive blasting. Micromachining.Laboratory Exercises: Incremental technologies, general knowledge, device programming using Stereolithography, FDM, SLS as an example, principles of design of supporting components, post-processing data format and model resolution, reverse engineering and object analysis, parameterization of typical components.

Prerequisites and co-requisites

Taking a course in Basic Manufacturing Techniques and Metrology.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test	60.0%	55.0%
Laboratory	60.0%	45.0%

Recommended reading

Basic literature	1. Katapian S. Manufacturing Engineering and Technology Pearson Education Inc. Upper Saddle River, New Jersey 2006. 2. Oczoś k. E.: Kształtowanie materiałów skoncentrowanymi strumieniami energii. Wyd. Pol. Rzeszowskiej, Rzeszów 1988. 3. Schmid D.: Mechatronika. Rea, Warszawa 2002.
Supplementary literature	1. Zaborski St.: Obróbka elekrochemiczno-ścierna podstawy i zastosowania, Politechnika Wrocławska 2007, 2. Beer P. Niekonwencjonalne narzędzia do obróbki drewna, nóż ultradzwiękowy, promień świetlny, struga wody, Wydawnictwo Akademii Rolniczej, Poznań 2007, 3. Artykuły naukowe w czasopismach technicznych.

	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	