GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00058634						
Field of study	Mechatronics						
Date of commencement of studies	February 2023		Academic year of realisation of subject	2023/2024			
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	Department of Manufacturing and Production Engineering -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Stefan Dzionk				
	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	Acquainting students with the modern methods of manufacturing models and prototypes, and methods of data capture and data processing.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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 uses models made by incremental methods to verify the designed structure in the field of mechatronics. The student checks the usable features of the designed structure and introduces changes resulting from the usability tests.	[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 development trends in the field of additive manufacturing. The student obtains from the literature information on new applications and design solutions in additive manufacturing.	[SW3] Assessment of knowledge contained in written work and projects
[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 in-depth knowledge of the available methods of additive manufacturing. The student selects the manufacturing method according to the needs in terms of the properties of the designed element.	[SW1] Assessment of factual knowledge
[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	he student programs devices for making elements by incremental methods. The student determines the basic parameters related to the production and knows their impact on the functional properties of the manufactured part.	[SU4] Assessment of ability to use methods and tools

Subject contents

LECTURE Additive manufacturing techniques - basic concepts, meaning, applications. Basic methods and techniques of additive manufacturing. Data formats used in additive manufacturing techniques, data conversion and conversion errors. LABORATORY Creating a CAD model in *.stl format with different resolution. Programming of additive manufacturing equipment. Technology of materials for production preparing, including filament, recycling techniques for incremental produced elements.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Midterm colloquium	60.0%	50.0%
Practical exercise	60.0%	50.0%

Recommended reading

Basic literature	1. Chlebus E.: Innowacyjne technologie Rapie Prototyping/ Rapie Tooling w rozwoju produktu, Oficyna Wydawnicz Politechniki Wrocławskiej, Wrocław 2003 2. Chlebus E.: Techniki komputerowe CAx w inżynierii produkcji, Warszawa WNT 2000
Supplementary literature	No requirements
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

1. Describe what are the techniques of Rapid Prototyping (RP / RT) basic methods for creating prototypes.
2. Types of models and prototypes, replace and characterize.
3. The main phases of modelling using stereolithography.
4. The elimination of the problems of traditional methods of manufacturing.
5. Characterize the method of recording data in the format *. stl.
6. List and describe the typical CAD model conversion errors * .stl format., The use of Euler's formula.
7. Deformation models performed using RP methods, describe the possible causes of their formation.
8. Method to characterize and define the scope of its application due to the accuracy and the materials used

- Stereolitography,
- Microstereolitography,
- SLM/SLS,
- 3D-Printing,
- LOM,
- FDM,
- PollyJet

Work placement

Not applicable