GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Additive manufactruing in design, PG_00064802		
Field of study	Mechatronics		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2027/2028
Education level	second-cycle studies	Subject group	Specialty 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	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Manufacturing and Production Engineering -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Stefan Dzionk	
	Teachers		

Lesson types

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	4.0	16.0	50

Subject objectives

Familiarizing students with additive methods and reverse engineering in mechatronic design. The subject also includes unconventional and combined methods of manufacturing machine parts and components for mechatronic devices.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W03] demonstrates structured and theory supported knowledge encompassing key issues in the field of Mechatronics, enabling developement and synthesis of stationary and non-stationary mechatronic systems, devices, and processes with continuous and discrete operation	The student knows and describes the basic methods of additive manufacturing and the properties of the manufactured elements. The student demonstrates knowledge of methods for acquiring and processing data in the reverse engineering process.	[SW1] Assessment of factual knowledge
[K7_W04] demonstrates knowledge encompassing selected issues in the field of detailed knowledge, particularly in the scope of methods, techniques, tools, and algorithms specific to Mechatronics	The student demonstrates knowledge of detailed issues in mechatronic design using additive manufacturing methods and reverse engineering to verify the design problem.	[SW3] Assessment of knowledge contained in written work and projects
[K7_U11] communicates and justifies opinions on specialized topics in a manner understandable to diverse audiences, including the use of modern techniques, including information technology	The student demonstrates communication skills with various audiences, presenting understandable opinions on the subject of mechatronic design.	[SU3] Assessment of ability to use knowledge gained from the subject
[K7_U03] identifies and formulates task specifications in the scope of stationary and non-stationary mechatronic systems/processes design, including non-standard problems ans taking into consideration their non-technical aspects	The student demonstrates the ability to identify a mechatronic problem and design a solution using additive manufacturing methods and reverse engineering capabilities.	[SU2] Assessment of ability to analyse information

<table>
<tr><td>Subject contents</td><td>Course content – lecture

Lecture: Introduction, systematics of modern manufacturing technologies. Additive manufacturing methods, materials used in these processes. Mechatronic design methods using additive methods. Combined methods in the production of prototype components. CAD model data formats. Reverse engineering scanning methods and acquisition of measurement data. Methods of processing measurement data. Methods of eliminating errors and supplementing measurement data.

Laboratory Exercises: Additive technologies - programming devices on the example of Stereolithography, FDM, SLS and others, principles of designing supporting elements, postprocessing, data format and model resolution, reverse engineering and analysis of the object, parameterization of typical construction elements.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Taking a course in Basic Manufacturing Techniques and Metrology.</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Test</td><td>60.0%</td><td>50.0%</td></tr>
<tr><td>Laboratory</td><td>60.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>1. Ian Gibson , David Rosen , Brent Stucker , Mahyar Khorasani: Additive Manofacturing Technologies, Springer 2021
2. Wego Wang: Reverse Engineering Technology of Reinvention : Taylor& Francis INC 2010.
3. B. Dang, A.e Gazet, E. Bachaalany, S. Josse : Practical Reverse Engineering, Willey, 2021
4. Katapian S. Manufacturing Engineering and Technology Pearson Education Inc. Upper Saddle River, New Jersey 2006.</td></tr>
<tr><td>Supplementary literature</td><td>1. Scientific articles on the above topics (e.g. Additive Manufacturing Journal and others)</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>Additive manufacturing methods.

Stages of the CAD model preparation process for additive manufacturing.

The influence of technological parameters on the accuracy of additive manufacturing.

Surface scanning methods in reverse engineering.

Factors influencing errors in surface mapping.

Methods for removing measurement noise from data.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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