GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Advanced CAD/CAE design, PG_00064793		
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	Obligatory subject group in the field of study 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	Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Artur Olszewski	
	Teachers		

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	0.0	15.0	0.0	15
	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	15	11.0	24.0	50

Subject objectives	The student knows the philosophy of designing machine parts using the latest computer tools using solid modeling (3D). Has knowledge of history and contemporary opportunities the latest CAD and MES programs. Is able to build a computer computational model of a virtual one element. Analyzes the limitations of computer simulation and the impact of various model parameters on obtained results.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U04] creatively designs or modifies, either entirely or at least in part, a mechatronic system or process according to a given specification, considering both technical and non-technical aspects, estimating costs and utilizing design techniques appropriate for tasks within the scope of mechatronics	Student is able to use 3D solid models and FEM for solving the technical problem. .	[SU4] Assessment of ability to use methods and tools
[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	Student is able to use 3D solid models and FEM for solving the technical problem. .	[SW2] Assessment of knowledge contained in presentation
[K7_W01] explains and describes, based on general knowledge in the field of scientific disciplines forming the theoretical foundations of Mechatronics, the construction and principles of operation of mechatronic systems, processes and their components, as well as methods and means of their integration	Student can independently develop a restraint model and forces acting on the analyzed object.	[SW2] Assessment of knowledge contained in presentation
[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	Student is able to use 3D solid models and FEM for solving the technical problem. .	[SU4] Assessment of ability to use methods and tools

Subject contents

Course content – project

The philosophy of designing machine parts using the latest computer tools solid modeling (3D). The history and contemporary capabilities of the latest CAD and MES programs. Modern design methodology from idea to product, using the possibilities of creation three-dimensional virtual machine models and their optimization. Methodology of engineering calculations using the Finite Element Method. Advantages and disadvantages of MES. How to create models computer-based real objects, including modeling of constraints and loads, with particular emphasis on taking into account the impact of the degree of simplification of the computer model on the obtained results.

Prerequisites and co-requisites

Knowledge of the subject: Basics of machine design. Knowledge of the subject: Mechanics. Knowledge of the subject Strength of materials. Basic knowledge of using 3D CAD programs.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Evaluation of the completed project	60.0%	100.0%

Recommended reading

Basic literature	1. Autodesk Inventor user manual. 2. Projektowanie elementów maszyn z wykorzystaniem programu Autodesk Inventor .Autor Paweł Płuciennik. 3. Autodesk Inventor Professional 2024 PL \/ 2024+ \/ Fusion 360. Metodyka efektywnego projektowania. Andrzej Jaskulski
Supplementary literature	1. Autodesk Inventor 2025 Essentials Plus. Banach Daniel T.
eResources addresses	

Example issues/ example questions/ tasks being completed

1. Analysis of the structure and functioning of a mechatronic turntable.

2. Analysis of the structure and functioning of linear mechanisms.

3. Analysis of the influence of the shape of restraints in bending elements.

Practical activites within the subject	Not applicable

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