GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	CAE in design calculations, PG_00057406		
Field of study	Mechanical Engineering		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Optional 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	English
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Zakład Konstrukcji Maszyn i Inzynierii Medycznej -> Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Grzegorz Rotta	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	30.0	0.0	45

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	45	8.0	47.0	100

Subject objectives

To familiarize students with the topic of data exchange between CAD programs and FEM calculationprograms. Extending information on strength of the materials, including contact analysis. Introduction tosoftware and internet part generators and catalogs.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W07] possesses profound knowledge on the diagnostics and monitoring of the condition of devices, assemblies and technical systems, as well as measurement methods of process and operation control	Student has wide knowledge of diagnostics and monitoring of the condition of equipment, facilities and technical systems as well as measurement methods for process and operation control	[SW3] Assessment of knowledge contained in written work and projects
[K7_W05] possesses profound knowledge on the operation of complex systems and mechanical devices, including process equipment	Student has wide knowledge of the operation of complex mechanical systems and devices, including process apparatus	[SW3] Assessment of knowledge contained in written work and projects
[K7_U06] when solving engineering problems on design, technology and operation of machines is able to assess and classify typical methods and tools, define systemic and ex-technical aspects using modern calculating methods and design tools or modifying the current ones	When solving engineering tasks in the field of design, technology and machine operation, Student is able to evaluate and classify typical methods and tools, determine system and non-technical aspects using modern calculation methods and design tools or modifying the existing ones	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools

Subject contents	LECTURE1. Transfer of 3D geometry from CAD software to MES software. Overview of the basics ofFEM.Introduction to ANSYS Workbench on examples of strength issues. Division of a geometric model intofiniteelements. Comparison of different types of element meshes.2. Introduction to the Design ModelerANSYS Workbench module on examples of simple strength issues.3. Shell modeling4. Modal analysis, multistepcalculations, analysis of transient states5. Contact issues - basics6. Contact issues - extension7. Theuse of online generators of machine parts in CAD programs.PROJECT CLASSES:Preparation of 7 projects corresponding to the main topics of the lecture. Numericalcalculations performed on 3D models made in CAD programs.
Prerequisites and co-requisites	Basic knowledge of the use of any CAD program

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Active participation in the lecture and implementation of the practice examples presented during the lecture together with the lecturer	50.0%	20.0%
Evaluation of completed projects, (time to complete the project - 1 week, being late reduces the grade)	60.0%	80.0%

Recommended reading

Basic literature	ANSYS Users Manual. Swanson Analysis Systems, Inc., HoustonUSA.Zagrajek T., Krzesiński G., Marek P.: Metoda elementów skończonychw mechanice konstrukcji. Ćwiczenia z zastosowaniemsystemuANSYS. Oficyna Wydawnicza Politechniki Warszawskiej 2005Any books, materials, websites and scientific articles on MES and CAD
Supplementary literature	None
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Strength analysis of the cantilever beam. Comparison of FEM results made in CAD programs (Inventor,Solid Works, NX or other) with FEM results obtained in ANSYS2. Strength analysis of thecantilever beam - comparison of solid and shell modeling3. Cantilever beam modal analysis4. Analysis of transient states of the cantilever beam loaded with impulse force5. Contact issues in the shaft-hub connection6. Strength analysis of a catalog element acquired (3D geometry) from the Internet
Work placement	Not applicable