



Subject card

Subject name and code	CAE in design calculations, PG_00064862						
Field of study	Mechanical Engineering						
Date of commencement of studies	February 2026		Academic year of realisation of subject		2026/2027		
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		English		
Semester of study	2		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Division of Machine Design and Medical Engineering -> 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 inż. Grzegorz Rotta				
	Teachers		dr inż. Grzegorz Rotta				
Lesson types	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						
	eNauczanie source addresses: Moodle ID: 8615 CAE in design calculations 2026/2027 https://enauczanie.pg.edu.pl/2025/course/view.php?id=8615						
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		4.0		26.0	75
Subject objectives	A course covering the fundamentals of ANSYS Workbench, a software package belonging to the FEA (Finite Element Analysis) family. The training will cover methods for creating 3D geometry of the objects under analysis, preparing the computational analysis, performing calculations, and analyzing, interpreting, and presenting the results.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_U12] develops her/his own potential and independently plans own, lifelong learning, while also being able to guide others in this regard		He knows what he wants in the field of mechanical engineering sciences and is a lifelong learner.		[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject		
	[K7_W01] explains and describes, on the basis of general knowledge of the scientific disciplines forming the theoretical basis of Mechanics and Mechanical Engineering, the structure and principles of operation of mechanical systems and processes		Based on a photograph or technical drawing (or both), the person is able to identify the device, describe its operating principle, and list the names and functions of its basic components.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation		
	[K7_U02] formulates and solves technical problems specific to Mechanics and Mechanical Engineering using appropriate tools including CAD and MES systems, and prepares technical documentation		Using CAD and FEM software, the individual is capable of designing new solutions or modifying existing ones typical of the field of Mechanics and Machine Design. They can present the resulting design through appropriate technical drawings and documentation.		[SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment		

Subject contents	Course content – lecture 1. Static FE analysis in CAD software 2. Transfer of a 3D model created in CAD software to ANSYS (FEA software) and analysis; comparison of results from CAD and FEA software 3. Creating 3D geometry in ANSYS – DesignModeler module 4. 3D shell model – DesignModeler module 5. Modal analysis 6. Transient analysis 7. Analysis of contact problems 8. Concepts: geometric model symmetry and cyclicity, "stress singularity" 9. Presentation and discussion of common issues encountered during FEA analyses		
	Course content – project The project entails completing six distinct, relatively simple design projects covering fundamental concepts presented in the lectures, as well as a final project of greater complexity (involving a mechanism, a ready-made 3D model from a manufacturer's catalog of simple mechanical components; involving contact phenomena, and potential stress singularities) and a student presentation of the results of final project		
Prerequisites and co-requisites	Knowledge of the fundamentals of mechanics and the strength of metallic materials Proficiency in using a popular CAD program (Autodesk Inventor is preferred due to its availability on university computers, though other software is acceptable)		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture - final project	55.0%	40.0%
	Project classes - 6 projects with specific themes	55.0%	60.0%
Recommended reading	Basic literature	Lecture held at the university	
	Supplementary literature	Any book or online sources regarding the topics presented in the lecture.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Static strength analysis of a cantilever beam with various cross-sections – solid and shell models 2. Modal analysis of a cantilever beam with various cross-sections – solid and shell models 3. Analysis of pressure exerted by a plastic component on a flat surface – contact problems 4. Analysis of a shaft-hub press fit – contact problems 5. Simple pressin/clamping/locking mechanisms – contact problems		
Practical activites within the subject	Not applicable		

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