GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Finite element method, PG_00064930		
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	Part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	4.0
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	18.0	0.0	0.0	18.0	0.0	36

E-learning hours included: 0.0

eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=8533

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	36	7.0	57.0	100

Subject objectives

The aim of the course is to familiarize students with the fundamental methods that underpin Finite Element Method algorithms. This will be achieved by examining input data, the computation process, and raw output results within the ANSYS software, stripped of the default "embellishments" and "convenience features" typically applied by the program. Students will implement these computational tasks themselves during laboratory sessions using ANSYS's APDL (Ansys Parametric Design Language), drawing on examples discussed in lectures; the lectures will also cover the theoretical principles governing the data, procedures, and results under study.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U12] dvelops 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_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.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
[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 [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>Course content – lecture
1. Fundamentals of the APDL language
2. Comparison of FEM interpolation accuracy: 4-node vs. 8-node elements
3. Introduction to advanced FEM techniques
4. Stress deviation error
5. Basic FEM equations
6. Contact and contact modeling
7. Building beam-based mechanism models for motion simulation
Course content – project
A corresponding computer project accompanies each lecture.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>General knowledge of mechanics and strength of materials; familiarity with the ANSYS Workbench software</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>Completion of 8 tasks during project sessions</td><td>55.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>1. Material covered in lectures
2. Any video or text-based materials regarding ANSYS APDL available online</td></tr><tr><td>Supplementary literature</td><td>None</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>- Comparison of FEM interpolation accuracy: 4-node vs. 8-node elements
- Introduction to advanced FEM techniques
- Stress deviation error
- Basic FEM equations
- Contact and contact modeling
- Building beam-based mechanism models for motion simulation</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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