GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Computer-aided design, PG_00061908		
Field of study	Materials Engineering		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Magnetic Properties of Materials -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marek Augustyniak	
	Teachers		

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

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	5.0	50.0	100

Subject objectives

The course aims to provide students with practical skills related to computer-aided design software. The selection of tools is driven by the desire to maintain their broadest possible versatility, within the limited course time, enabling:
- creating standard 2D product documentation (CAD2D: standard, lightweight and free LibreCAD, optionally AutoCAD)
- applying engineering simulation methods, primarily FEM-based, with the creation of 3D models or using pre-built geometries (base program: ANSYS APDL, due to its educational value and wide industrial application)

For extension work or projects, it is recommended to choose one of the programs such as Fusion 360, Blender, FreeCAD, Salome/Calculix, etc., and master its basics. Special support during classes can be provided in the programs: OnShape or Salome.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K01] is ready to continuously expand his knowledge in materials engineering and related sciences, to critically evaluate this knowledge, and to recognise its importance in solving practical and cognitive problems; is aware of his own limitations and knows when to seek expert advice.	Students must have basic or advanced skills. Make it a priority.	[SK2] Assessment of progress of work
[K6_U01] is able to analyse and solve complex and non-standard scientific and technical problems in materials engineering based on his knowledge, using appropriate analytical, computational, numerical, simulation, or experimental methods	The ability to use appropriately selected analytical, simulation and experimental methods as well as devices enabling the measurement of basic quantities characterizing materials and technological processes is increasing.	[SU2] Assessment of ability to analyse information
[K6_W05] has knowledge of mechanics, technology, and electrical engineering, including engineering graphics, as well as the use of computer-aided design and databases in the design of technological processes	Knowledge in the field of mechanics, technology and electrical engineering is increasing, including engineering graphics and the use of computer-aided technology, the use of databases in the design of technological processes	[SW3] Assessment of knowledge contained in written work and projects

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

For the laboratory/project section, I plan to:
@ LibreCad (introductory exercises, designing a roome.g., a research lab)
@ ANSYS APDL (introductory exercises, meshing, more advanced tasks)
@ In the version with 45 hours of lab/project time: also OnShape and one of the additional programs (e.g., Salome/Calculix)
For the lecture section, I plan to:
@ Test the starting knowledge of participants: "What do you already know about CAX? Which programs have you already used?"
@ First Steps in New Engineering Software - pieces of advice
@ My CAE Projects - Trials, Errors, and Successes in Various Industries
@ CAX - Division into CAD/CAM/CAE, Major Programs and Manufacturers, Technical and Economic Issues
@ The Issue of Realism in Computer Design - "The Lost Welder Method" and Other Misconceptions
@ A Review of the Basics of Continuum Mechanics, Essential for Typical FEM Analyses
@ FEM: Geometry and Mesh (Discretization)
@ Introduction to Optimization and DOE
@ The Specifics of Electromagnetic Simulation
@ Supplementary Lectures / Upon Request</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></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>Student participation intensity</td><td>80.0%</td><td>50.0%</td></tr>
<tr><td>Completing design tasks</td><td>70.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
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<tr><td>Basic literature</td><td>Technical Machine Drawing with CAD Elements, Paweł Romanowicz
Finite Element Method in Materials and Structural Mechanics. Solving Selected Problems Using ANSYS
Grzegorz Krzesiński, Paweł Borkowski, Piotr Marek, Tomasz Zagrajek
Onshape for Beginners: Black & White: Tutorial Books (collective author, 2021)
Tutorials on the Internet, including:
https://learn.onshape.com
https://www.youtube.com/@AnsysLearning
https://www.youtube.com/@MufasuCAD</td></tr>
<tr><td>Supplementary literature</td><td>----</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>@ Exercises on sketching and dimensioning objects (e.g., a rotor, a computer mouse)
@ Designing the layout of equipment in a science lab
@ Bending a panel (with an experimental element)
@ Modeling a pipeline section or simple modules of a Mars base
@ Determining the mechanical characteristics of a nanotube using the Finite Element Method
@ Modeling the welding process
@ 3D geometries: created from a paper drawing or by reverse engineering from provided material objects
@ Option: Tuning fork vibration modeling and calculation</td></tr>
<tr><td>Practical activites within the subject</td><td>The acquired skills are directly applicable in industry.</td></tr>
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