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 2025	Academic year of realisation of subject	2026/2027
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 -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marek Augustyniak	
	Teachers	dr inż. Marek Augustyniak	

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	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_W05] Has the knowledge of mechanics, technology and electrical engineering, including engineering graphics and using computer aid, the use of 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
[K6_U01] Can properly use selected analytical, simulation and experimental methods, as well as devices for measuring the fundamental properties of materials and technological processes.	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_U03] Can critically analyze and evaluate the functioning – particularly in the context of materials engineering –existing technical solutions, particularly equipment, objects, systems, processes.	The ability to critically analyze the functioning and evaluate - especially in connection with materials engineering - existing technical solutions, in particular devices, facilities, systems, processes, increases.	[SU1] Assessment of task fulfilment
[K6_K01] Understands the need to improve professional and personal competencies; is conscious of own limitations and knows when to turn to experts, properly establishes priorities helping to accomplish tasks defined by oneself or others.	Students must have basic or advanced skills. Make it a priority.	[SK2] Assessment of progress of work

Subject contents

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

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Completing design tasks	70.0%	50.0%
Student participation intensity	80.0%	50.0%

Recommended reading

Basic literature	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
Supplementary literature	----
eResources addresses	

Example issues/ example questions/ tasks being completed	@ 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
Work placement	The acquired skills are directly applicable in industry.

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