



## Subject card

Subject name and code	Computer aided design (CAD), PG_00063344						
Field of study	Nanotechnology						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2025/2026		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study 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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		6.0		
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	30.0	15.0	0.0	60
	E-learning hours included: 0.0						
	eNauczanie source addresses: Moodle ID: 1226 Komputerowe wspomaganie projektowania (CAD) <a href="https://enauczanie.pg.edu.pl/2025/course/view.php?id=1226">https://enauczanie.pg.edu.pl/2025/course/view.php?id=1226</a>						
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	60		10.0		80.0	150
Subject objectives	<p>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:</p> <ul style="list-style-type: none"><li>- creating standard 2D product documentation (CAD2D: standard, lightweight and free LibreCAD, optionally AutoCAD)</li><li>- 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)</li></ul> <p>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.</p>						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U03] has programming skills in a selected language, and is able to use basic software packages.		The student has the ability to program in a selected language and use selected software packages.		[SU2] Assessment of ability to analyse information		
	[K6_U07] can conduct preliminary economic analysis of proposed solutions and undertaken engineering activities within the scope of nanotechnology.		The student is able to perform a preliminary economic analysis of the proposed solutions and engineering activities undertaken in the field of nanotechnology.		[SU1] Assessment of task fulfilment		
	[K6_W04] Has knowledge of IT tools (word processors, spreadsheets, etc.), preparing multimedia presentations, programming and computer graphics		The student has knowledge of IT tools (word processors, spreadsheets, etc.), creating multimedia presentations, and programming and computer graphics.		[SW1] Assessment of factual knowledge		

Subject contents	For the laboratory/project section, I plan to: @ LibreCad (introductory exercises, designing a room e.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
	Student participation intensity	80.0%	50.0%
	Completing design tasks	70.0%	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: <a href="https://learn.onshape.com">https://learn.onshape.com</a> <a href="https://www.youtube.com/@AnsysLearning">https://www.youtube.com/@AnsysLearning</a> <a href="https://www.youtube.com/@MufasuCAD">https://www.youtube.com/@MufasuCAD</a>	
	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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