GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Computer modeling and design of nanomaterials, PG_00055528		
Field of study	Nanotechnology		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Optional 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	2	Language of instruction	Polish
Semester of study	3	ECTS credits	5.0
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		
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	45.0	0.0	0.0	60
	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	60	5.0	60.0	125

Subject objectives	The class is supposed to guide students in practical skills related to the computer-aided design. The choice of tools is based on the desire to provide solutions as versatile as possible. In particular, the student shall be helped with: - understanding and creating standard paper product documentation (CAD 2D) - understanding the specifics of 3D design, based on at least one of the currently popular programs (Fusion) - application of engineering simulation methods, primarily based on the FEA (free Salome pre-processor, ANSYS computing system)

Learning outcomes

Course outcome	Subject outcome	Method of verification
K7_U06	Some classes (ANSYS or a similar program) provide the opportunity for various simulations.	[SU4] Assessment of ability to use methods and tools
K7_W05	These classes have elements of nanotechnology (e.g. simplified modeling of a nanotube), while most of the proposed tools and methods apply to the millimeter scale and higher.	[SW2] Assessment of knowledge contained in presentation
K7_K04	The student tries to complete all tasks, including those with a higher degree of difficulty.	[SK2] Assessment of progress of work
K7_U03	The student knows the commands of CAD 2D; he/she is able to use software such as OnShape or Fusion 360, Salome, Ansys.	[SU4] Assessment of ability to use methods and tools
K7_W02	These classes have elements of nanotechnology (e.g. simplified modeling of a nanotube), while most of the proposed tools and methods apply to the millimeter scale and higher.	[SW2] Assessment of knowledge contained in presentation

Subject contents

AutoCAD or equivalent program, e.g. LibreCAD: interface basics, commands, 2D exercises.

ANSYS or equivalent program: physics simulation of single parts (mechanics, heat transfer, optional electromagnetism) - comparison with analytical solutions and experiment, where possible

SALOME + Calculix - free software for 3D modeling and FEM calculations

OnShape - a CAD 3D software with several extensions, which currently gains on popularity on the engineering design marker

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	Software manuals (PDF, online training courses)
Supplementary literature	----
eResources addresses	Adresy na platformie eNauczanie: Computer design of materials 2024-25 - Moodle ID: 41777 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=41777

Example issues/ example questions/ tasks being completed

CAD 2D: Appartment drafting

OnShape: Designing a Simple Part or an assembly from Scratch

Salome + Calculix: simple part vibration calculation; work with models from the GrabCAD portal

ANSYS: prediction of the durability of the car towbar

Work placement

The acquired skills are directly applicable in industry.

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