GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Computer Modeling of Materials I, PG_00039818		
Field of study	Materials Engineering, Materials Engineering, Materials Engineering		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
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	3	Language of instruction	Polish polish
Semester of study	6	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	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	0.0	0.0	30.0	0.0	0.0	30
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	30	3.0	17.0	50

Subject objectives

The aim of the course is to provide the Student with the ability to perform engineering analyzes using Finite Element Methods. Currently, all branches of the industry use these methods, including production of vehicles and machinery, civil engineering, household, medicine, military ...). FEA is one of the "fast paths" leading from basic knowledge to applications, enabling the acquisition of analysts' job, and motivating the Student/Engineer to a deeper understanding of the physical basis of a given issue - whether it its nature is mechanical, thermal, electromagnetic, or flow-related.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_K01	The course participant understands the need to improve professional and personal competences; is aware of their own limitations and knows when to turn to experts, is able to properly define priorities for the implementation of tasks specified by themselves or others	[SK1] Assessment of group work skills
K6_W05	The student acquires knowledge in the field of mechanics, technology and electrical engineering, 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_W06	The student will be able to demonstrate the techniques needed to develop engineering skills in the field of materials science	[SW2] Assessment of knowledge contained in presentation
K6_U04	Student skills include proficiency in information and communication techniques to effectively perform standard engineering tasks. Additionally, he uses known methods and mathematical and physical models to precisely describe and explain chemical phenomena and processes.	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

1. THE BOW (mechanics: composite, chord modelling, calculating the strength of the shot, correlation with the experiment)

2. THE TOWING HOOK (mechanics: weight optimization without loss of load capacity)

3. THE O-RING (non-linear mechanics: constitutive equation of a hyperelastic material, contact issues)

4. THE TUNING FORK (modal vibrations + design in CAD)

5. THE YACHT (modal vibrations, harmonic oscillations, model amendments)

6. THE EGG (unsteady heat exchange - boiling of an egg)

7. THE WELD (coupling of mechanics and heat exchange, analysis in time - testing of post-weld distortions)

8. LATTICE MATERIAL (examination of typical LM structures, then own design, with focus on mechanical and thermal properties)

9. NDT (magnetic yoke on steel plate - a question of the distribution of magnetic, static and variable fields)

10. ELECTRICAL CIRCUITS (tuning the RLC resonant circuit and optimising the heating coil)

Prerequisites and co-requisites

Willingness to obtain a job closely associated with the curriculum.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Classroom exercises	70.0%	100.0%

Recommended reading

Basic literature	None
Supplementary literature	None
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. THE BOW (mechanics: composite, chord modelling, calculating the strength of the shot, correlation with the experiment) 2. THE TOWING HOOK (mechanics: weight optimization without loss of load capacity) 3. THE O-RING (non-linear mechanics: constitutive equation of a hyperelastic material, contact issues) 4. THE TUNING FORK (modal vibrations + design in CAD) 5. THE YACHT (modal vibrations, harmonic oscillations, model amendments) 6. THE EGG (unsteady heat exchange - boiling of an egg) 7. THE WELD (coupling of mechanics and heat exchange, analysis in time - testing of post-weld distortions) 8. LATTICE MATERIAL (examination of typical LM structures, then own design, with focus on mechanical and thermal properties) 9. NDT (magnetic yoke on steel plate - a question of the distribution of magnetic, static and variable fields) 10. ELECTRICAL CIRCUITS (tuning the RLC resonant circuit and optimising the heating coil)
Work placement	Not applicable

Document generated electronically. Does not require a seal or signature.