GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Numerical modelling in biomedical engineering, PG_00057492		
Field of study	Mechanical and Medical Engineering		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
Education level	second-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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Katedra Wytrzymałości Materiałów -> Faculty of Civil and Environmental Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Wojciech Witkowski	
	Teachers	prof. dr hab. inż. Wojciech Witkowski dr inż. Karol Daszkiewicz dr hab. inż. Agnieszka Sabik	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	30.0	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	10.0	55.0	125

Subject objectives: Introduction to finite element method modelling of selected anatomical structures

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U06] He/she uses analytical engineering, numerical and experimental methods to state and solve the tasks	student is able to use advanced FEM codes	[SU1] Assessment of task fulfilment
[K7_W08] He/she broad knowledge related to understand social, economic, legal, ecological and other outer techniques conditions of engineering activities in mechanical-medical engineering	The student is given the enhanced fundamentals necessary to understand the social, economic, legal, ecological and other, non-technical needs in engineering activity in mechanical-medical engineering	[SW1] Assessment of factual knowledge
[K7_K01] He/she is aware to acquire the knowledge through the whole life, is able to inspire and to organize to teach himself/herself and others in cooperation and in leading position	The student is aware of the importance of lifelong learning, can inspire and manage the process of teaching and sef-teaching, the group co-operating, playing different group roles	[SK5] Assessment of ability to solve problems that arise in practice
[K7_U04] He/she can use programming-communicative techniques concerning to the scope of engineering tasks	student is able to define correctly the model in the FEM environment, student can carry out advanced analytics numerical analysis of selected anatomical structures in the nonlinear range and at a basic level is able to apply computational techniques together with the critical analysis of the results of calculations	[SU1] Assessment of task fulfilment

Subject contents	Introduction to nonlinear continuum mechanics. Selected problems in nonlinear finite element method (FEM) modeling. Selected problems of constitutive relations in biomechanics. Presentation of finite element method biomechanical models in commercial FEM systems. Case studies in FEM modelling and in imaging of anatomical structures of human body	
Prerequisites and co-requisites		
Assessment methods and criteria		

Subject passing criteria	Passing threshold	Percentage of the final grade
Project	0.0%	50.0%
Lecture	0.0%	50.0%

Recommended reading	Basic literature	FEBio Theory Manual FEBio User Manual
	Supplementary literature	RAKOWSKI G., KACPRZYK Z.: Metody elementów skończonych w mechanice konstrukcji. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1993
	eResources addresses	Adresy na platformie eNauczanie: Modelowanie numeryczne w inżynierii medycznej - Moodle ID: 25930 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=25930
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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