



Subject card

Subject name and code	, PG_00056106						
Field of study	Mechanical and Medical Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group					
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			Polish -		
Semester of study	6	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Zakład Maszyn Przepływowych -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Krzysztof Tesch				
	Teachers		prof. dr hab. inż. Krzysztof Tesch				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	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		0.0		0.0	45
Subject objectives	The aim of the course is to familiarise students with the CFD methods applied to the modelling of thermal-fluid processes in medicine						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W09] he/she has basic knowledge related to numerical methods and engineering software used to analyze, model and design a given mechanical system	The student has elementary knowledge of numerical methods or basic knowledge of computer programs used in the analysis and simulation of mechanical systems and in the design process.			[SW1] Assessment of factual knowledge		
	[K6_U05] he/she is able to use analytic and modelling methods to formulate and solve engineering tasks related to the mechanical-medical area	The student is able to use analytical, simulation and computer methods to formulate and solve engineering tasks in the field of mechanical-medical engineering			[SU1] Assessment of task fulfilment		
	[K6_U08] he/she is able to assess whether proposed methods and tools can be used in practice to solve simple engineering task related to machine design, manufacturing and utilization	Students will be able to assess the suitability of routine methods and tools for solving a simple engineering task of a practical nature in the design, manufacture and operation of machinery and select and apply the appropriate method and tools.			[SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_U03] he/she is able to use information-communication skills to solve typical engineering tasks related to design, production and utilization	Students will be able to use information and communication technology appropriate to the performance of tasks typical of engineering activity, in the field of design, manufacture and operation of machinery.			[SU2] Assessment of ability to analyse information		

Subject contents	<p>LECTURES Basics of CFD. Problem of properly defined boundary conditions and basics of turbulence modelling. Basic features of computational fluid dynamics solvers, mesh generators, convergence criteria and results analysis</p> <p>PRACTICAL EXERCISES In the computer laboratory classes, the various modelling steps will be performed using a commercial programme as an example: generation of meshes for selected geometries, correct definition of the computational model and selection of computational parameters, visualisation and interpretation of results</p>		
Prerequisites and co-requisites	Basics of thermodynamics and fluid mechanics.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Practical exercise	100.0%	100.0%
Recommended reading	Basic literature	<p>1. Tesch K. Mechanika płynów, Wyd. PG 2014</p> <p>2. Tesch K. Numeryczna mechanika płynów, Wyd. PG 2021</p>	
	Supplementary literature	Fletcher C.A.J. Computational Techniques for Fluid Dynamics	
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>Procesy ciepno-przepływowe w medycynie, W/L, IMM, sem. 5, letni 23/24 (PG_00056106) - Moodle ID: 36703</p> <p>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36703</p>	
Example issues/ example questions/ tasks being completed	<p>1. Conservation equations</p> <p>2. Boundary conditions</p> <p>3. Dimensionless numbers</p> <p>4. Turbulence</p>		
Work placement	Not applicable		