GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Numerical methods in fluid flow problems, PG_00055947		
Field of study	Power Engineering, Power Engineering, Power Engineering		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-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	3	Language of instruction	Polish
Semester of study	6	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Energy and Industrial Apparatus -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Wojciech Włodarski	
	Teachers	dr inż. Wojciech Włodarski	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	0.0	30.0	0.0	30

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 4570 Metody numeryczne w zagadnieniach przepływowych E 2026
https://enauczanie.pg.edu.pl/2025/course/view.php?id=4570

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	8.0	37.0	75

Subject objectives

The aim of the course is to familiarise students with CFD problems and methods in flow problems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W12] has basic knowledge of the life cycle and repairs of energy equipment in the field of thermal power stations, thermal and energy systems and heating systems, internal combustion engines and compressors as well as rotating machines	The student has a basic knowledge of the life cycle and overhaul of power equipment in the field of thermal power plants, thermal power and heating systems, internal combustion engines and compressors and rotating machinery	[SW1] Assessment of factual knowledge
[K6_U08] can design the basic parameters of the selected technology related to energy conversion and select auxiliary devices and evaluate the project in terms of technical and economic	Students will be able to design the basic parameters of a selected energy conversion technology and select auxiliary equipment and evaluate the design from technical and economic points of view.	[SU4] Assessment of ability to use methods and tools
[K6_U07] is able to use basic knowledge of fluid flow machines and methods related to their design in an analytical and numerical approach to the preliminary design of an energy installation	The student is able to apply basic knowledge of turbomachinery and methods related to their design in an analytical and numerical approach to the preliminary design of an energy plant	[SU1] Assessment of task fulfilment

Subject contents

Course content – project
The topics coveres the basics of CFD software, correct setting of boundary conditions and the basics of turbulence modelling. The characteristics of methods for solving systems of equations, convergence criteria and possibilities to assess the correctness of the obtained solution will be presented. During the class, the individual modelling steps will be performed using a commercial software as an example: - generation of meshes for selected geometries - correct definition of the computational model and selection of computational parameters - execution of simulations for several selected flow systems - visualisation and interpretation of results

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Basics of thermodynamics and fluid mechanics.</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Practical exercise</td><td>100.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1. Tesch K. Numeryczna Mechanika Płynów, Wyd. PG. 2022

2. Tesch K. Mechanika Płynów, Wyd. PG 2014</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">Fletcher C.A.J. Computational Techniques for Fluid Dynamics</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">1. Conservation equations

2. Boundary conditions

3. Dimensionless numbers

4. Turbulence</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="3">Not applicable</td></tr>
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