GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Numerical Modelling in flow systems design (WM), PG_00042087		
Field of study	Power Engineering, Power Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2024/2025
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	English
Semester of study	6	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Energy and Industrial Apparatus -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Tomasz Muszyński	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	0.0	15.0	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	5.0	65.0	100

Subject objectives

Presentation of the basics of computer modelling of processes from the area of heat technology so that the student could be able to understand and interprete the results obtained using numerical codes.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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 formulate and solve simple energy balances in power devices and systems	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
[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	Student jest w stanie sporządzić projekt prostego układu lub systemu energetycznego	[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K6_W14] has a theoretical knowledge in the field of chemistry, biology, physics and mathematics including knowledge necessary to understand the technological processes related to water treatment, wastewater treatment, waste management in energy facilities, circular economy	Student describes and analyzes gas and steam transformations and thermodynamic cycles as well as mechanisms of heat flow. Calculates gas and steam cycles and simple cases of heat transfer. He measures the basic thermodynamic parameters and analyzes the balance of machines and thermal devices using elements of engineering programming.	[SW3] Assessment of knowledge contained in written work and projects
[K6_U14] can use properly selected methods and devices for hydraulics and hydrology, enabling determination of basic parameters characterizing the flow of medium in channels, pipelines and flow objects and can design installations, networks in the field of sanitary engineering	The student describes and analyzes the basic thermodynamic parameters and analyzes the balance of machines and thermal devices using elements of engineering programming.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

<table>
<tr><td>Subject contents</td><td colspan="3">1 Introduction to the calculation possibilities of the Matlab calculation code 2. Introduction to the computational capabilities of the Simulink computational code. 3. Implementation of an individual project</td></tr>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">mathematics I, II, III, physics, fluid mechanics, thermodynamics</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>Final test</td><td>60.0%</td><td>60.0%</td></tr>
<tr><td>Presentation</td><td>60.0%</td><td>40.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">Patankar S.V. Numerical Heat Transfer and Fluid Flow, Taylor and Francis, 1980.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">Minkowycz W. J., Sparrow E. M., Schneider G. E., Pletcher R. H., Handbook of Numerical Heat Transfer, Whiley, 1988

Dinçer I,Rosen M.A., Ahmadi P. Optimization of Energy Systems Whiley, 2017

Alain Vande Wouwer Philippe Saucez Carlos Vilas Simulation of ODE/ PDE Models with MATLAB , OCTAVE and SCILAB</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">Pinch analysis,heat exchanger network optimization,combined heat and power generation</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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