



## 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 2023		Academic year of realisation of subject		2025/2026		
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 -> Wydziały Politechniki Gdańskiej						
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 interpret the results obtained using numerical codes.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[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.		[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task		
	[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_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		[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information		
	[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		[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		

Subject contents	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		
Prerequisites and co-requisites	mathematics I, II, III, physics, fluid mechanics, thermodynamics		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Presentation	60.0%	40.0%
	Final test	60.0%	60.0%
Recommended reading	Basic literature	Patankar S.V. Numerical Heat Transfer and Fluid Flow, Taylor and Francis, 1980.	
	Supplementary literature	Minkowycz W. J., Sparrow E. M., Schneider G. E., Pletcher R. H., Handbook of Numerical Heat Transfer, Wiley, 1988	
		Dinçer I, Rosen M.A., Ahmadi P. Optimization of Energy Systems Wiley, 2017	
		Alain Vande Wouwer Philippe Saucez Carlos Vilas Simulation of ODE/ PDE Models with MATLAB , OCTAVE and SCILAB	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Pinch analysis, heat exchanger network optimization, combined heat and power generation		
Work placement	Not applicable		

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