



Subject card

Subject name and code	Energy Systems Modeling, PG_00039902						
Field of study	Mechanical Engineering, Mechanical Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject				2022/2023	
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				1.0	
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. Jacek Barański				
	Teachers		dr hab. inż. Jacek Barański				
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	0.0	15
	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	15		3.0		7.0	25
Subject objectives	The aim of the subject is the acquisition of skills by the students of the modeling of energy systems in power stations and power plants. They analyse and evaluate of the processes occurring in each heat circulation devices.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K6_U06] is able to use mathematical and physical models for analysing the processes and phenomena occurring in mechanical devices within the range of material strength, thermodynamics and fluid mechanics		Student is able to use mathematical and physical models to analyze the processes and phenomena occurring in mechanical devices in the field of thermodynamics and fluid mechanics.			[SU3] Assessment of ability to use knowledge gained from the subject	
	[K6_W09] possesses basic knowledge within the range of thermodynamics and fluid mechanics, construction and operation of heat generating devices, process equipment, including renewable energy sources, cooling and air conditioning		Student has basic knowledge of thermodynamics and fluid mechanics, construction and operation of thermal energy devices.			[SW1] Assessment of factual knowledge	
	[K6_U07] is able to design a typical construction of a mechanical device, component or a testing station using appropriate methods and tools, adhering to the set usage criteria		Student is able to design a typical structure, mechanical device or subassembly using appropriate methods and tools, taking into account the given performance criteria.			[SU3] Assessment of ability to use knowledge gained from the subject	
	[K6_W11] possesses knowledge on design, technology and manufacturing of machine parts, metrology, and quality control; knows and understands methods of measuring and calculating basic values describing the operation of mechanical systems, knows basic calculating methods applied to analyse the results of experiments		Student knows and understands the methods of measuring and calculating basic quantities describing the operation of mechanical systems.			[SW1] Assessment of factual knowledge	

Subject contents	LECTURE An overview of basic thermodynamic processes; divergence of real processes from the ideal. Parameters of real media: water steam, fuels, exhaust gases. Use of steam tables and steam modeling programs and macros. Principles of modeling components of heat cycles. Modeling of the Rankine cycle - ideal and actual.		
Prerequisites and co-requisites	thermodynamics, fluid mechanics		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lab reports	100.0%	40.0%
	Midterm colloquium	60.0%	60.0%
Recommended reading	Basic literature	1. Wiśniewski S., Termodynamika Techniczna, WNT Warszawa, 1995.	
	Supplementary literature	Cengel Y., Boles M., Thermodynamics, an Engineering Approach, McGraw-Hill, 1989. Perycz S., Turbiny parowe i gazowe, skrypt Politechniki Gdańskiej. Chmielniak T., Turbiny cieplne, skrypt Politechniki Śląskiej.	
	eResources addresses	Adresy na platformie eNauczenie: Modelowanie systemów energetycznych - Moodle ID: 31040 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=31040	
Example issues/ example questions/ tasks being completed	The heating and cooling processes The phenomenons of expansion and compression Balance calculations of the Clausis-Rankine'a steam cycle		
Work placement	Not applicable		