

## GDAŃSK UNIVERSITY

## 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	Apparatus -> Faculty of Mechanical			Engineering and Ship Technology				
Name and surname	Subject supervisor		dr hab. inż. Jacek Barański						
of lecturer (lecturers)	Teachers		dr hab. inż. Jacek Barański						
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
of instruction	Number of study hours	15.0	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 classes includ plan	n didactic ed in study	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 powe 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 eNauczanie: Modelowanie systemów energetycznych - Moodle ID: 31040 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=31040				
Example issues/	The heating and cooling processes					
example questions/ tasks being completed	The phenomenons of expansion and compression					
	Balance calculations of the Clausis-Rankine'a steam cycle					
Work placement	Not applicable					