GDAŃSK UNIVERSITY OF TECHNOLOGY

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

Modelowanie systemów energetycznych - Moodle ID: 31040
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=31040

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 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

<table>
<tr><td>Subject contents</td><td>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.</td></tr>
<tr><td>Prerequisites
and co-requisites</td><td>thermodynamics, fluid mechanics</td></tr>
<tr><td>Assessment methods
and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Lab reports</td><td>100.0%</td><td>40.0%</td></tr>
<tr><td>Midterm colloquium</td><td>60.0%</td><td>60.0%</td></tr>
</table>
</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Wiśniewski S., Termodynamika Techniczna, WNT Warszawa, 1995.</td></tr>
<tr><td>Supplementary literature</td><td>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.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table>
</td></tr>
<tr><td>Example issues/
example questions/
tasks being completed</td><td>The heating and cooling processes

The phenomenons of expansion and compression

Balance calculations of the Clausis-Rankine'a steam cycle</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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