GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Modern thermal power plants and hydrogen technologies, PG_00055911		
Field of study	Power Engineering, 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	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	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Fluid-Flow Machinery -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marian Piwowarski	
	Teachers		

Lesson types

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	2.0	18.0	50

Subject objectives

Gaining knowledge of modern, advanced power plants for professional and distributed energy, including hydrogen technologies

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W12] has basic knowledge of the life cycle and repairs of energy equipment in the field of thermal power stations, thermal and energy systems and heating systems, internal combustion engines and compressors as well as rotating machines	Students know the main principles of operation of power plants	[SW1] Assessment of factual knowledge
[K6_U06] is able to use the basic knowledge on the operation of energy equipment in the field of thermal power plants, thermal and energy and heating systems, combustion engines, compressors and rotating machines to assess the technical condition of the system	Students can: - perform preliminary design calculations of large output power plants and distributed energysystems, - describe modern power plants	[SU2] Assessment of ability to analyse information
[K6_W08] has basic knowledge in the field of intellectual property protection and patent law, knows and understands the basic processes of energy production and use, knows and understands the principles of modern heating and power systems	The student is able to characterize the main parameters of power plant operation and has knowledge of intellectual property protection and patent law.	[SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>Course content – lecture
Modern supercritical steam power plants (diagrams, main design parameters, materials used, and basic equipment).
Modern, high-efficiency gas turbine units (parameters, structural elements, materials used).
High-efficiency combined gas and steam systems (diagrams, parameters).
Nuclear power plants with Generation III+ and IV reactors.
Hydrogen production technologies.
Hydrogen power plants.
Power plants for distributed energy (e.g., Organic Rankine Cycle, microturbine power plants).

Course content – seminar
Independent preparation and presentation of a multimedia presentation on selected topics related to the subject matter discussed during the lectures.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></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>presentation</td><td>100.0%</td><td>50.0%</td></tr><tr><td>term paper</td><td>60.0%</td><td>50.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>Kosowski K. et al.: Steam and gas turbines. Principles of operation and design. ALSTOM; Francja, Szwajcaria, Wielka Brytania, Polska 2007</td></tr><tr><td>Supplementary literature</td><td>Boyce, M. P. Gas turbine engineering handbook, Oxford, UK, 2006;

Giampaolo Gas Turbine Handbook Principles and Practice, Fifth Edition, River Publishers New York, 2014,

Giampaolo Compressors Handbook Principles and Practice, River Publishers New York, 2023,</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Discuss the parameters of the working medium in steam power plants for supercritical parameters.
Derive a formula for the efficiency of a gas-steam cycle with a waste heat boiler.
Briefly discuss fourth-generation nuclear power plants.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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