GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Design of energy systems, PG_00055903		
Field of study	Power Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	5	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Heating Ventilation Air Conditioning and Refrigeration -> 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 inż. Waldemar Targański	
	Teachers	dr inż. Waldemar Targański dr inż. Denys Stepanenko	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	0.0	30.0	0.0	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	Familiarization with systems operating in the power industry and development of the ability to develop assumptions necessary for the design or modernization of these systems. Familiarization with the methods of designing power systems and developing the ability to solve engineering problems in the selection of their structure and equipment.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W02] has a basic knowledge of physics (including optics, electricity and magnetism), chemistry, technical thermodynamics, fluid mechanics and general mechanics needed to understand and describe the basic phenomena occurring in devices and systems, energy plants and transmission networks and their environment	The student has basic knowledge of physics (including optics, electricity and magnetism), chemistry, technical thermodynamics, fluid mechanics and general mechanics, necessary to understand and describe the basic phenomena occurring in energy devices and systems, installations and transmission networks and in their surroundings.	[SW3] Assessment of knowledge contained in written work and projects
[K6_W07] knows the basics of economic calculus in the energy sector; knows the legal, organizational and economic principles of the functioning of energy markets, knows the basic principles of management and running a business	The student knows the basics of economic calculation in the energy sector; knows the legal, organizational and economic principles of functioning of energy markets, knows the basic principles of management and conducting business activity.	[SW3] Assessment of knowledge contained in written work and projects
[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 use basic knowledge of fluid-flow machines and methods related to their design in the analytical and numerical approach to the initial design of the energy installation.	[SU1] Assessment of task fulfilment
[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	The student has structured and theoretically supported knowledge in the field of chemistry, biology, physics, mathematics, including the knowledge necessary to understand technological processes related to water treatment, wastewater treatment, waste management in energy facilities, closed systems management.	[SW3] Assessment of knowledge contained in written work and projects
[K6_W09] knows the dangers of electrical devices and the principles of protection against them, has basic knowledge of heat exchangers, has basic knowledge of power equipment such as pumps, compressors, turbines, combustion engines, boilers, pipelines and their accessories and methods of their selection depending on the needs	The student knows the hazards of electrical devices and the principles of protection against them, has basic knowledge of heat exchangers, has basic knowledge of energy devices such as pumps, compressors, turbines, internal combustion engines, boilers, pipelines and their accessories and methods of their selection depending on the needs.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – project

Types of systems working in the power industry. The specificity of heating, cooling, air conditioning and electrical systems.

Principles for developing assumptions necessary for the design or modernization of energy systems. The principles of developing an energy balance for various facilities.

Methods of designing power systems. Rules for conducting appropriate calculations.

Ways of solving engineering problems in the selection of structure and equipment of power systems.

Prerequisites and co-requisites

Physics, thermodynamics, electrical engineering

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Project	60.0%	100.0%

Recommended reading

Basic literature	Energy Systems and Sustainability. Oxford University Press. 2021.
Supplementary literature	Papers in journals.
eResources addresses	

Example issues/ example questions/ tasks being completed	Energy balance of the cold store. Energy balance of the heated building. Configuration of an air conditioning system. Configuration of a CHP plant system.
Practical activites within the subject	Not applicable

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