GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Modern district heating systems, PG_00057332		
Field of study	Power Engineering, Power Engineering, Power Engineering		
Date of commencement of studies	February 2022	Academic year of realisation of subject	2022/2023
Education level	second-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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Electrical Power Engineering -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Tomasz Minkiewicz	
	Teachers		

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	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	6.0	14.0	50

Subject objectives

The purpose of this course is to familiarize students with development of district heating in Poland and worldwide.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U01] is able to acquire information from literature, databases and other sources, has the ability of self-education in order to improve his/her professional competence (also in English), is able to prepare a simple scientific paper and its summary in English, as well as an oral presentation	The student prepares and performs a presentation using Polish and English literature sources.	[SU5] Assessment of ability to present the results of task
[K7_U06] is able to apply basic and advanced knowledge of power equipment and transmission network and internal installations to the preliminary design of a modern power plant or part thereof	The student is able to make a preliminary design of a modern heating system.	[SU3] Assessment of ability to use knowledge gained from the subject
[K7_W02] has extended and deepened knowledge of physics, chemistry, thermodynamics, fluid mechanics, material science, necessary to understand and describe basic thermal and flow phenomena occurring in and around power equipment and systems, transmission networks and internal installations	The student learns the rules of making heat-flow calculations in heating networks.	[SW1] Assessment of factual knowledge
[K7_W10] knows the basic installations of advanced energy systems, transmission networks and internal installations and their impact on the environment	The student learns the requirements of a modern heating systems.	[SW1] Assessment of factual knowledge

Subject contents

Challenges for district heating. The current state of district heating in Poland and in selected countries in the world. Heat transfer and distribution. District heating generation sources. High-efficiency cogeneration systems. Renewable energy sources in district heating. Heating storage.

Prerequisites and co-requisites		
Assessment methods and criteria		

Subject passing criteria	Passing threshold	Percentage of the final grade
lecture test	50.0%	75.0%
seminar presentation	50.0%	25.0%

Recommended reading	Basic literature	1. A. Szkarowski - Ciepłownictwo. Wydawnictwo Naukowe PWN, WArszawa 2019. 2. European Commission, Directorate-General for Energy, Bacquet, A., Galindo Fernández, M., Oger, A., et al., District heating and cooling in the European Union : overview of markets and regulatory frameworks under the revised Renewable Energy Directive. Annexes 6 and 7 : final version, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2833/96390 3. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/Mar/IRENA_REmap_DHC_Report_2017.pdf
	Supplementary literature	1. https://doi.org/10.1016/C2014-0-01422-0 2. https://doi.org/10.1007/978-3-319-91893-8
	eResources addresses	
Example issues/ example questions/ tasks being completed	Present the current state of district heating in Poland. Describe the structure of the selected pre-insulated pipe system. Define a high-efficiency cogeneration. Describe a way of using renewable energy in heating. Describe a selected method of district heating storage.	
Work placement	Not applicable	