GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	HVAC Installations, PG_00055899		
Field of study	Power Engineering		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
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	4.0
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. Marcin Jewartowski	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	15.0	0.0	60

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	60	4.0	36.0	100

Subject objectives

Students acquire basic knowledge in the field of of heating, refrigeration, ventilation and air conditioning systems in theoretical and practical aspects.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U08] can design the basic parameters of the selected technology related to energy conversion and select auxiliary devices and evaluate the project in terms of technical and economic	Student is able to calculate the thermal load of buildings and design simple heating installations with the use of auxiliary software.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[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	The student is able to measure and calculate the elements of heating, refrigeration, ventilation and air conditioning systems and to analyze the results.	[SU5] Assessment of ability to present the results of task
[K6_W06] knows classic and developmental energy technologies, rules for the selection and operation of heat and energy devices and installations, basic principles of energy systems operation, basic issues regarding the reliability of energy devices and diagnostics, environmental effects of energy technologies used, methods of using renewable energy sources	The student is able to characterize heating, refrigeration, ventilation and air conditioning systems, their components and functioning.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>Course content – lecture
LECTURE: Basic concepts and regulations regarding heating. Heat sources in heating. Designed heat load of buildings. Central heating systems. Guidelines for design and calculations of central heating systems. Pressure losses in the pipes. Hydraulic control. Heating pipes and their thermal insulation. Radiators. Hot tap water systems. Passive buildings. Application of refrigeration units and heat pumps. Design and working principles of a compressor refrigeration plant. Direct and indirect cooling systems. Refrigerants and heat carriers: selected properties. Interaction of basic elements in cooling systems. Selected operational problems in refrigeration. Ventilation systems in buildings. Ventilation systems of industrial spaces. Methods of calculating supply and exhaust streams. Designing ducts. Equipment selection. The aim and application of air conditioning. Comfort and industrial air conditioning. Moist air - characteristics, Mollier chart. Calculation of the thermal load of objects - heat gains and losses. The necessary amount of supply air (including fresh air). Examples of air conditioning systems solutions. Recovery systems demands in air conditioning systems.

LABRATORY: Influence of changes in the operating parameters of a cooling device on its characteristics. The influence of the system configuration on the work efficiency. Operation of various elements of refrigeration automation. Determination of comfort/discomfort indicators in the occupied zone. Determination of heat recovery efficiency of a ventilation and air-conditioning device Determination of air volumetric flow in HVAC installation. Determination of humidification process curve.

PROJECT: Design of central heating installation for a selected building</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge from the course of Thermodynamics</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>Laboratory</td><td>56.0%</td><td>20.0%</td></tr>
<tr><td>Lecture</td><td>56.0%</td><td>60.0%</td></tr>
<tr><td>Project</td><td>56.0%</td><td>20.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>• Pr. zbiorowa pod red. H.Koczyk Ogrzewnictwo Praktyczne, Systherm, Poznań, 2009
• Pieńkowski K., Krawczyk D., Tumel W., Ogrzewnictwo. Politechnika Białostocka, Białystok, 1999
• Recknagel, Sprenger, Schramek, Kompendium ogrzewnictwa i klimatyzacji. Omni Scala, Wrocław, 2008
• Bonca Z., Chłodnictwo okrętowe. Wyd. Akademii Morskiej w Gdyni, 2006
• Bonca Z. i in., Nowe czynniki chłodnicze i nośniki ciepła. Właściwości cieplne, chemiczne i eksploatacyjne. Poradnik. Wyd. MASTA, Gdańsk 2004
• Ullrich H.J., Technika chłodnicza. Poradnik. Tom I, Wyd. MASTA,Gdańsk 1998
• Jaskólski M., Micewicz Z.- Wentylacja i klimatyzacja hal krytych pływalni. IPPU MASTA, Gdańsk, PG
• Szymański T., Wasiluk W., Systemy wentylacji przemysłowej. Skrypt PG</td></tr>
<tr><td>Supplementary literature</td><td>standards and regulations for calculating the design heat load and energy performance of buildings</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>The classification of central heating systems. Pressure losses in pipes. Thermodynamic processes in Linde cycle. Influence of changes in parameters of Linde cycle on its characteristics. List the methods for determining the amount of ventilation air.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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