GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Fundamentals of Refrigeration and Air Conditioning, PG_00040106 | | |
| 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<br>Subject group related to scientific research in the field of study |
| Mode of study | Part-time studies | Mode of delivery | at the university |
| Year of study | 3 | Language of instruction | Polish |
| Semester of study | 5 | ECTS credits | 5.0 |
| Learning profile | general academic profile | Assessment form | exam |
| Conducting unit | Zakład Ogrzewnictwa, Wentylacji, Klimatyzacji i Chłodnictwa -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | |
| | Teachers | | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 22.0 | 0.0 | 15.0 | 0.0 | 0.0 | 37 |

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 | 37 | 11.0 | 77.0 | 125 |

**Subject objectives**

Basic knowledge on design and working principles of refrigerating and ventilating systems..

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [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 | The student is able to design a typical structure, mechanical device, subassembly or test bench using appropriate methods and tools taking into account the given functional criteria. | [SU4] Assessment of ability to use methods and tools |
| [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 | The student is able to use mathematical and physical models to analyze processes and phenomena occurring in mechanical devices in the field of material strength, thermodynamics and fluid mechanics. | [SU4] Assessment of ability to use methods and tools |
| [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 | The student has basic knowledge in the field of thermodynamics and fluid mechanics, construction and operation of thermal energy equipment, process equipment, including renewable energy sources and refrigeration and air conditioning. | [SW1] Assessment of factual knowledge |

**Subject contents**

The use of refrigeration and heat pumps. Construction and operation of compressor and thermoelectric refrigerating unit. Direct and indirect cooling systems. Refrigerants and heat carriers: The selected properties. Interaction of basic machinery and apparatus cooling systems. Some operational problems: ice on evaporators, oil in the cooling system. Meaning and purpose of air conditioning. Parameters of thermal comfort of air. Air conditioners: one-and two-lines. Use of Mollier chart for the presentation of processes of thermal-humidity air in air conditioning. Construction and operation of the air conditioning unit. Examples of ventilation and air conditioning systems. Selected problems of operating an air conditioner.

**Prerequisites and co-requisites**

Thermodynamics, Heat Transfer and Heat Exchangers

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Reports from the laboratory experiments</td><td>100.0%</td><td>25.0%</td></tr>
<tr><td>Written exam</td><td>50.0%</td><td>40.0%</td></tr>
<tr><td>Midterm colloquium</td><td>60.0%</td><td>35.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. Bonca Z.: Chłodnictwo okrętowe. Wyd. Akademii Morskiej w Gdyni, 2006. 2. Bonca Z. i in.: Nowe czynniki chłodnicze i nośniki ciepła. Właściwości cieplne, chemiczne i eksploatacyjne. Poradnik. Wyd. MASTA, Gdańsk 2004. 3. Ullrich H.J.: Technika chłodnicza. Poradnik. Tom I, Wyd. MASTA, Gdańsk 1998. 4. Ullrich H.J.: Technika Klimatyzacyjna. Poradnik. Wyd. MASTA, Gdańsk 2001. 5. Jones W.P.: Klimatyzacja. Wyd. ARKADY, Warszawa 2001.</td></tr>
<tr><td>Supplementary literature</td><td>No requirements</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">Construction and operation of compressor and thermoelectric refrigerating unit.<br><br>Direct and indirect cooling systems.<br><br>Refrigerants and heat carriers: selected properties.<br><br>Construction and operation of the air conditioning unit.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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