



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Refrigeration and air conditioning equipment [S1MiBP1>UChIK]

Course

Field of study

Mechanical and Automotive Engineering

Year/Semester

2/4

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

2,00

Coordinators

dr hab. inż. Krzysztof Bieńczak prof. PP
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Lecturers

Prerequisites

Knowledge: Has a general knowledge of the impact of technical facilities and technologies on the environment Skills: Is able to define categories of threats to the environment that are a specific technological process implemented in the field of production and operation of food machinery and refrigeration equipment and indicate ways of counteracting these threats. Social competences: Work in an interdisciplinary team. Ability to lead a team and expand team knowledge

Course objective

Learning the basic principles of building refrigeration, air conditioning and heating devices

Course-related learning outcomes

Knowledge:

Has basic knowledge in the field of chemistry, in the construction of the periodic table of elements and their properties, the theory of chemical bonds, organic and inorganic compounds, types of chemical reactions, chemical analysis: in the scope enabling the understanding of lectures on metal and non-metallic materials, environment, fuels and lubricants, building materials and soil, biomechanics and biological materials processed by agricultural and food machinery.

Has extended basic knowledge necessary to understand specialist subjects and specialist knowledge about the construction, construction methods, manufacturing and operation of a selected group of working, transport, thermal and flow machines covered by the diploma path.
Has elementary knowledge of the life cycle of machinery, recycling of machine elements and construction and consumables.

Skills:

Can obtain information from literature, the Internet, databases and other sources. Can integrate the obtained information, interpret and draw conclusions from it, and create and justify opinions.
Can use the experience gained in an environment professionally involved in engineering activities related to the maintenance of devices, facilities and systems typical for the field of study.
Has the ability to self-educate with the use of modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books.

Social competences:

Is ready to critically assess his knowledge and received content
Is ready to fulfill social obligations and co-organize activities for the benefit of the social environment.
Is ready to fulfill professional roles responsibly, including:
- observing the rules of professional ethics and requiring this from others,
- caring for the achievements and traditions of the profession.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Final tests

Programme content

Principles of construction of cooling, air-conditioning and heating devices used in means of transport in order to ensure appropriate temperature conditions. Characteristics of the basic components of refrigeration, air conditioning and heating devices (compressors, heat exchangers, valves, safety elements). Refrigerants. Environmental aspects of using refrigerants.

Course topics

Lecture content:

Thermodynamic processes in the Carnot cycle - efficiency of the cycle. Thermodynamic transformations in Linde cycles (wet and dry). Methods of improving efficiency in the Linde cycle. Design solution for multi-stage, indirectly cooled and cascade circuits. Requirements for refrigerants. Characteristics of selected refrigerants, lubricating oils and coolants. Construction of heat exchangers and throttling elements. Operation of refrigeration and air-conditioning equipment.

Laboratory exercises:

1. Temperature measuring devices.
2. Compressor refrigeration devices - structure and principle of operation.
3. Analysis of the operating parameters of a compressor refrigeration device. Assessment of circulation efficiency.
4. Construction of refrigeration compressors.
5. Testing the efficiency of the refrigeration unit.
6. Heat pumps - structure and principles of operation.
7. Thermoelectric refrigeration devices - structure and principle of operation.

Teaching methods

lecture with presentation, experimental classes

Bibliography

Basic

1. B. Gaziński Klimatyzacja pojazdów samochodowych, Systherm Serwis, Poznań 2016
2. B. Gaziński, Chłodnictwo dla praktyków, Systherm Serwis, Poznań 2013

3. S. Kwaśniewski, Pojazdy chłodnicze i izotermiczne, Nawigator, Wrocław 1997

Additional

1. K. Kalinowski, Amoniakalne urządzenia chłodnicze tom.1 i 2, Masta, Gdansk 2005

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00