COURSE DESCRIPTION CARD - SYLLABUS

Course name

Technical thermodynamics

Course

Field of study

Energetics

Year/Semester

2/3

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

20

Laboratory classes

Other (e.g. online)

Tutorials

10

Projects/seminars

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

dr hab inż. Agnieszka Wróblewska, prof. PP

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tel. 61 665 2201

Responsible for the course/lecturer:

Prerequisites

The student starting this subject should have basic knowledge of the basics of thermodynamics and processes of energy flow and conversion in thermo-flow machines and devices. He should also be able to describe and calculate basic thermodynamic processes and simple thermal energy conversion systems and be aware of the need to expand his competences, readiness to cooperate within a team.

Course objective

Acquainting with basic thermodynamic processes, thermodynamic transformations and energy conservation equations. Getting to know the methods of description of various thermodynamic factors and thermodynamic cycles implementing the assumed processes of thermal and mechanical energy conversion in order to modernize or rebuild technological systems in the field of thermal energy. Practical mastery of the ability to describe the implementation of thermal processes.

Course-related learning outcomes

Knowledge

1. Has advanced knowledge in physics, including mechanics, thermodynamics, fluid mechanics, electricity and magnetism, optics, nuclear physics and solid state physics, including the knowledge necessary to understand the basic physical phenomena occurring in electrical, energy and electronic components and systems, and in their surroundings.

2. Knows and understands at an advanced level - selected facts, objects and phenomena as well as their methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of chemistry and electrochemistry, including the processes of combustion and gasification of fuels, analysis of chemical processes occurring in energy.

3. Has ordered and theoretically founded knowledge of basic technologies for converting primary energy into work, heat and electricity, knows the construction and operation of energy machines.

4. Knows and understands the impact of energy transformation processes on the natural environment.

5. Has systematic knowledge in the field of renewable energy sources, including wind, water, solar, biomass and geothermal energy; knows and understands phenomena, processes and devices that allow the conversion of energy from renewable sources into electricity and heat.

Skills

1. Is able to obtain information from literature, databases and other sources; is able to integrate the information obtained, interpret it, as well as to infer and formulate and justify opinions.

2. Can work individually and in a team; knows how to estimate the time needed to complete the task; can develop and implement a work schedule to ensure that deadlines are met.

Social competences

1. Understands the need and knows the possibilities of continuous training, raising professional, personal and social competences (e.g. through second and third cycle studies, postgraduate studies, courses); and is ready to critically assess knowledge, recognizes its importance in solving cognitive and practical problems.

2. Is aware of the importance and understands the non-technical aspects and effects of the power engineering engineer, including its impact on the environment and the associated responsibility for the decisions taken; is ready to fulfill social obligations, co-organize activities for the social environment and initiate activities for the public interest.

3. Is aware of the responsibility for own work and readiness to comply with the principles of team work and to bear the responsibility of the professional role in jointly implemented tasks.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- assessment of knowledge and skills demonstrated on the written test - 1.5 hour exam

Exercises:

Knowledge acquired during the exercises is verified by 90-minute colloquia carried out during the last class

Programme content

Lecture:

Introduction - basic relationships, thermodynamic factor model. First law of thermodynamics. Perfect gases. Basic relationships for open systems. The second law of thermodynamics. Circulation and transformation efficiency. Typical transformations of perfect gas. Real gases. Basics of combustion processes description. Engine circuits. Left-hand cycles. Steam power cycle. Fundamentals of heat flow.

Exercises:

The issues presented in the lecture are solved in the form of tasks.

Teaching methods

1. Lecture: multimedia presentation, illustrated with examples on the board.

2. Exercises: examples given on the board and performance of tasks given by the teacher - practical exercises.

Bibliography

Basic

1. Kalinowski E.:Termodynamika, Wyd. P. Wr. 1994

2. Szargut J.: Termodynamika techniczna, Wyd. P. Śl. 1997

3. Szargut J. I inni: Zadania z termodynamiki technicznej, P. Śl. 1995

4. Wiśniewski St.: Termodynamika techniczna, WNT 1995

5. Tuliszka E. Red.: Termodynamika techniczna. Zbiór zadań, Nr 889, Wyd. P.P. 1980

6. Kestin J.: Course in Thermodynamics, New York, Hemisphere 1979

Additional

1. Tuliszka E.: Teoria maszyn cieplnych, Nr 511, Wyd. P.P. 1974

2. M.J. Morano, H.N.Shapiro: Fundamentals of Engineering Thermodynamics, John Wiley & Sons, New York, 1998

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam) [1]	50	2,0

[1] delete or add other activities as appropriate