COURSE DESCRIPTION CARD - SYLLABUS

Course name

Integrated energy systems

Course

Field of study

Aerospace Engineering

Year/Semester

3/5

Area of study (specialization)

Onboard systems and aircraft propulsion

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

30

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Wydział Inżynierii Środowiska i Energetyki

ul. Piotrowo 3 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

The student should have basic knowledge in the field of energy machinery and equipment and relations with other areas of knowledge. In addition, he should know and understand the basic methods and practical tools in the field of technical thermodynamics in the aspect of thermal energy as well as the main tasks of energy systems in the field of thermal energy and economic development.

The student should also have the ability to use concepts and methods in the description of energy facilities and to solve specific problems arising in thermal energy. He can also collect and process information from databases, literature and the Internet.

Course objective

Providing students with theoretical knowledge and technical aspects related to the analysis of thermal

energy systems and deepening the knowledge of basic energy technologies, in particular in terms of minimizing their negative impact on the human environment.

Course-related learning outcomes

Knowledge

He has extended knowledge necessary to understand the profile subjects as well as specialist knowledge about the construction, production, operation, safety systems, economic, social and environmental impact in the field of energy for the specialty On-Board Systems and Aviation Drives

He knows the basic processes taking place in the life cycle, technical and technical points in energy, in particular in energy.

Has a basic knowledge of the basic processes occurring in the life cycle of technical devices, facilities and systems, as well as their technical description in the field of aerospace engineering.

Skills

He can organize and plan the process of designing and maintenance of a simple device, machine or technical energy facility.

Can create a description of the principle of operation of a simple machine or its components from the group of energy machines.

Can analyze objects and technical solutions, can search in catalogs and on manufacturers' websites ready components of machines and devices, including energy resources and devices, assess their suitability for use in their own technical and organizational projects.

Social competences

Is aware of the importance of maintaining the principles of professional ethics.

Understands the need for critical assessment of knowledge and continuous learning.

Can inspire and organize the learning process of other people.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: The knowledge acquired during the lecture is verified during an examination consisting of 12 choice questions with a score from 0 to 1 and 6 open questions with a score from 0 to 2. Passing threshold: > 50% of points. Final issues, on the basis of which the questions are developed, will be sent to students by e-mail using the university's e-mail system or on the eKursy platform.

Tutorials: Continuous assessment of skills and competences in each class through solving engineering tasks and analysis of special cases, assessment of the student's knowledge and skills on the basis of a final written test consisting of 5 tasks . Passing threshold: > 50% of points.

Programme content

Lecture: Basic thermodynamic and economic characteristics of thermal power machines and devices. Heat plants, heat and power plants. Problems of heat regeneration. Steam and gas power plants. Cogeneration and trigeneration. Use of waste energy. Physical and chemical recuperation. Problematyka odzyskiwania niskotemperaturowej energii odpadowej, absorpcyjne i sprężarkowe pompy ciepła. Associated energy-technological processes. Co-production of electricity and heat from renewable resources. Problems and methods of energy accumulation. Rational use of energy.

Tutorials: Analysis of the failure of machines and energy devices. Analysis of the circulation and efficiency of heating plants and power plants. Analysis of low-temperature waste energy recovery systems. Analysis of the combined production of electricity, heat and cold.

Teaching methods

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

Laboratory: A multimedia presentation, students' performance of practical tasks indicated by the teacher.

Bibliography

Basic

J. Szargut, A. Ziębik: Podstawy energetyki cieplnej, PWN, Warszawa 1998

T. Chomielniak: Technologie energetyczne, WNT, Warszawa 2008

A. Miller, J. Lewandowski: Układy gazowo-parowe na paliwo stałe, WNT, Warszawa 1993

R. Domański: Magazynowanie energii cieplnej, PWN, Warszawa, 1990

Additional

S. Perycz: Turbiny parowe i gazowe, Wyd. Pol. Gdańskiej,1982

T. Chmielniak: Technologie energetyczne, Wyd. Pol. Śląskiej,2004

R. Janiczek: Eksploatacja elektrowni parowych, WNT W-wa 1980,

S. Wiśniewski: Termodynamika Techniczna

S. Wiśniewski: Wymiana ciepła

Breakdown of average student's workload

	Hours	ECTS
Total workload	74	3,0
Classes requiring direct contact with the teacher	49	2,0
Student's own work (literature studies, making presentations) [1]	25	1,0

[1] delete or add other activities as appropriate