COURSE DESCRIPTION CARD - SYLLABUS

Course name
Heat Production in Industry

Course

Field of study
Power Engineering

Year/Semester
2/3

Area of study (specialization)
Industrial thermal power engineering

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
15

Other (e.g. online)

Tutorials
15

Projects/seminars
15

Number of credit points

6

Lecturers

Responsible for the course/lecturer:
dr hab. inż. Rafał Ślefarski

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Faculty of Environmental Engineering and Energetic

ul. Piotrowo 3 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Student has basic knowledge in the field of mechanics, thermodynamics and fluid mechanics and knowledge about construction of energetic machines such as gas turbine, gas engines, heat exchanger, boilers. He is able to use the scientific method for problem solving, experimenting, and making conclusions.

Course objective

To acquaint students with knowledge about modern, high efficiency and innovative systems for electricity and heat production fired by fossil fuels.

Course-related learning outcomes

Knowledge

Student has extended knowledge in field of heat transfer and thermodynamic transformations existing in energetic industry.

Student has theoretical knowledge about numerical software and codes for energetic application.

Student has extended knowledge and practical skills in fields of fuel supply network, economical policy and law in energetic energy sector.

Skills

Define the analytical and experimental methods as well as mathematical models needed during designing process of energetic systems.

Known how to provided and tested hypothesis connected to energetic systems and its parts using numerical tools.

Social competences

Understands the need for lifelong learning; is able to inspire and organize the learning process of others. Is aware of and understands the importance and impact of non-technical aspects of mechanical engineering activities and its impact on the environment and responsibility for own decisions. Is able to obtain information from the literature, internet, databases and other sources. Can integrate the information to interpret and learn from them, create and justify opinions.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - the written examination. The evaluation of student knowledge will be held based on an answers on 5 questions from the material presented during the lectures.

Tutorials - final test and rewarding knowledge necessary for the accomplishment of the problems in the area of the subject

Laboratory classes - evaluation reports made exercises and final test (10 questions, min. 51%)

Project - presentation of solutions to the scientific problem in the form of a report

Programme content

Dispersed energy systems, CHP plants, Organic Rankine Cycle systems, supercritical cycles, energy balance of energetic devices and machines, post-combustion systems for emission reduction (nitric oxides, sulphur dioxide), Power plant, CCGT units, simple cycle efficiency, manganese, Trends of development of gas turbines, energy storage systems

Teaching methods

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

Tutorials: multimedia presentation, performing theoretical calculations on the board.

Project: solving of an engineering tasks and scientific problems with using databases and numerical programs.

Laboratory: solving practical tasks delivered by a teacher.

Bibliography

Basic

Dobski T.: Combustion Gases in Modern Technologies, 2scd Ed., Wydawnictwo Politechniki Poznańskiej,

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

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

T. Chmielniak – Turbiny cieplne, Wyd. Pol. Śląskiej, 2004

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

Additional

P. Jansohn. Modern Gas Turbine Systems

J. Skorek: Gazowe układy kogeneracyjne,

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	4,0
Classes requiring direct contact with the teacher	75	3,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	75	3,0

[1] delete or add other activities as appropriate