COURSE DESCRIPTION CARD - SYLLABUS

Course name
Conventional Energy

Course

Field of study
Industrial and Renewable Energy
Area of study (specialization)

Level of study
Second-cycle studies
Form of study
full-time

Year/Semester
2/2
Profile of study
general academic
Course offered in
Polish
Requirements
compulsory

Number of hours

Lecture
30
Laboratory classes
15
Other (e.g. online)
0
Tutorials
Projects/seminars
0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
prof. dr hab.Eng. E. Tuliszka-Sznitkoemail:
ewa.tuliszka-sznitko@put.poznan.pl
Tel.: +48 61 665 21 11

Responsible for the course/lecturer:

Prerequisites

Student should have basic knowledge in mathematics (integration, differentiation) and in physics, also in thermodynamics (first course). Should be able to obtain information from the library and internet, should be ready to cooperate in a team.

Course objective

The aim of the course is to acquaint the student with the technological processes occurring in the

conventional power plants, and in the combined heat and power plants, as well as with the most modern energy-saving technologies. The acquired knowledge can be useful during modernization of the existing power plants or designing new facilities.

Course-related learning outcomes

Knowledge

1.Student has knowledge of equipment used in the conventional power plants, knows the basic principles occurring in the life cycle of machines.

2.Student has knowledge of the operational parameters impact on the efficiency of energy machines and on the whole energy system.

3.Student has knowledge of the negative influence of the conventional power plants on the natural environment.

Skills

1.Student is able to use the numerical methods and the experimental results to solve the engineering thermodynamic problem.

2.Student is able to use the engineering norms, knows how to use the professional experience of engineers working in power plant to solve the thermodynamic problem.

3.Student is able to lead the engineering team working in the field of the conventional power plant.

Social competences

1.Student is able to critically assess the received information in the field of conventional power plants.

2.Student is prepared to operate effectively in the field of conventional power plants.

3.Student knows his/her role in society and is ready to work effectively in the field of conventional power plant to fulfill expectations.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - written exam. Obtaining credit from a minimum of 51% of the points possible to get. There is a possibility of an oral question to raise the grade. Laboratory classes: tests and raports.

Programme content

General characteristics of energy conversion processes. Thermodynamics of humid air. Thermodynamics of combustion processes. Maxwell thermodynamic equations. The thermodynamics of wet steam. Supercritical fluids. Rankine cycle and methods of its optimization. Elements of the fuel supply system (steam turbines, boilers, condensers, cooling systems). Heat exchangers. Modeling of conventional power plant systems. Impact of energy technologies on the natural environment. Energy audit. The energy balance of supercritical cycle. Determination of the energy balances and efficiency of thermal devices (based on measurement data from selected power plants).

Teaching methods

Lecture: multimedia presentation illustrated with examples on the board. In laboratory classes the measurements are performed using equipment existing in ITE.

Bibliography

Basic

1.Chmielniak, T., Technologie energetyczne, WNT, 2008

2.Szargut, J. Termodynamika, PWN, Warszawa, 2000

3.Gąsiorowski, J. Radwański, E., Zagórski, J., Zgorzelski, M., Zbiór zadań z teorii maszyn cieplnych, WNT Warszawa (wszystkie wydania)

4.Furmański, P., Domański, R., Wymiana ciepła, Przykłady obliczeń i zadania, Oficyna Wydawnicza Politechniki Warszawskiej, 2002

Additional

1.Cengel, Y., Boles, M.A., Thermodynamics, an engineering approach, Mc Graw Hill, 2008.

2. Incropera, F., DeWitt, D., Fundamentals of heat and mass transfer, Wiley, 2008 3. Ghiaasiaan, M., Convective heat and mass transfer, Cambridge University Press, 2014

3. Ghiaasiaan, M., Convective heat and mass transfer, Cambridge University Press, 2014

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work: collecting literature, reading literature, preparing for the next lecture, preparing to final exam, preparing for the next laboratory class, preparing reports) [1]	40	2,0

[1] delete or add other activities as appropriate