COURSE DESCRIPTION CARD - SYLLABUS

Course name

Generation of electric energy

Course

Field of study	Year/Semester
Electrical Engineering	2/4
Area of study (specialization)	Profile of study
Electric Power Systems	general academic
Level of study	Course offered in
Second-cycle studies	polish
Form of study	Requirements
part-time	elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
10	10	
Tutorials	Projects/seminars	
	10	

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

drinż. BartoszCeran

email: bartosz.ceran@put.poznan.pl

tel.616652523

The Faculty of Environmental Engineering and Energy

ul. Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Student has a basic knowledge of the basics of energy conversion and energy machine and equipment. He knows the basics of electrical engineering and power engineering. Understand the basic principles of operation of the machines and know the basic construction of conventional energy equipment. Student is aware of the need to expand their skills and readiness to work together as a team.

Course objective

Obtaining skills in the knowledge of methods of generating electricity in power plants and knowledge of the principles of the use of different types of primary energy to produce electricity.

Course-related learning outcomes

Knowledge

1. Student knows the primary form of energy available in nature and presents the possibility of their use in the energy sector. Able to classify and evaluate the types of power plants. Able to identify and assess the impact of generation sources on the environment.

2. Student has an extended knowledge of the structure and operation of various types of power plants and their role in the power system.

Skills

1. Student is able to use mathematical methods to energy analyzis of technological systems of power plants.

2. Student can design a basic technological systems of power plant and CHP power plants, and evaluate them in terms of the efficiency of electricity and heat.

Social competences

1. Student understand the complexity of many aspects of electrical engineering and can present them in an understandable way

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture

- evaluation of the knowledge and skills listed on the written exam,

Laboratory classes

- assessment of knowledge and skills related to the implementation of the exercise task, assessment of the report of the exercise.

Projects

- assessment of knowledge and skills related to the implementation of the project task, assessment of the completed project.

Programme content

Lecture

Characteristic of national power plants. Influence of diurnal variation on the work load power plants. Generation of electricity in thermal power plants. Methods of improve the efficiency of steam power plants. Gas and combined gas-steam power plants. Combined heat and power. Use of nuclear energy for producing electricity. Types of nuclear reactors used in nuclear power plants. The use of water power to generate electricity. Types of hydroelectric power plants and their role in the power system. Principles for the use of wind energy. Power plants and wind farms. The use of solar energy. Photovoltaics. Methods of use of geothermal energy. Electricity generation using fuel cells. Distributed generation and

its impact on power system operation. The influence of the environment and methods of its reduction.Laboratory classes

Laboratoryclasses

Modeling and analysis of work states of selected technologies of electric energy production.

Projects

Design task - selecting a distributed source for a recipient with a specific energy profile.

Teaching methods

Lecture

- lecture with multimedia presentation supplemented with examples given on the board.

Laboratory classes

- laboratory exercises performed with the help of engineering programs

Projects

- independent solution of a project-related problem in the field of work and operation of various types of generation sources.

Bibliography

Basic

1. Skorek J., Kalina J.: Gazowe układy kogeneracyjne. Wydawnictwa Naukowo-Techniczne 2005.

2. Portacha J., Układy cieplne elektrowni i elektrociepłowni konwencjonalnych jądrowych i odnawialnych, Oficyna Wydawnicza Politechniki Warszawskiej, 2016.

3. Ackermann G.: Eksploatacja elektrowni jądrowych, WNT Warszawa 1987

4. Paska J., Elektrownie jądrowe, Oficyna Wydawnicza Politechniki Warszawskiej, 1990

5. Janiczek R.S.: Eksploatacja elektrowni parowych, WNT, 1992.

6. Kowalska A., Wilczyński A., Źródła rozproszone w systemie elektroenergetycznym. Kaprint. 2007

7. Matla R., Gładyś H., Praca elektrowni w systemie elektroenergetycznym. WNT. 1999

8. Paska J., Wytwarzanie rozproszone energii elektrycznej i ciepła. Oficyna Wydawnicza Politechniki Warszawskiej. 2010

9. Chmielniak, Tadeusz, Ziębik, Andrzej, Obiegi cieplne nadkrytycznych bloków węglowych, Wydawnictwo Politechniki Śląskiej, 2010.

10. Paska J., Podstawy elektroenergetyki: metody wytwarzania energii, Ofic. Wydaw.PW,, 1994.

11. Portacha J., Badania energetyczne układów cieplnych elektrowni i elektrociepłowni, Oficyna Wydawnicza Politechniki Warszawskiej, 2002.

12. Tytko R., Odnawialne źródła energii : wybrane zagadnienia, OWG, 2009.

13. Lewandowski W., Proekologiczne odnawialne źródła energii, Wydawnictwa Naukowo-Techniczne, 2013.

14. Klugmann-Radziemska E., Odnawialne źródła energii : przykłady obliczeniowe, Wydawnictwo Politechniki Gdańskiej, 2016.

15. Lewandowski W., Klugmann-Radziemska E., Proekologiczne odnawialne źródła energii : kompendium, Wydawnictwo Naukowe PWN, 2017.

Additional

1. Michałowski S., Plutecki J., Energetyka wodna. WNT. 1975

2. Legutko S.; Podstawy eksploatacji maszyn, Wyd. Politechniki Poznańskiej, Poznań 2002

3. Zdzisław Celiński, Energetyka jądrowa, PWN, Warszawa 1991

4. Szargut J., Ziębik A.: Skojarzone wytwarzanie ciepła i elektryczności - elektrociepłownie. Wydawnictwo Pracowni Komputerowej Jacka Skalmierskiego 2007.

5. Paska J., Rozproszone źródła energii, Oficyna Wydawnicza Politechniki Warszawskiej, 2017.

6. Mokrzycki E., Gawlik L., (red. nauk.) Rozproszone zasoby energii w systemie elektroenergetycznym, Wydawnictwo IGSMiE PAN, 2011.

Breakdown of average student's workload

	Hours	ECTS
Total workload	115	4,0
Classes requiring direct contact with the teacher	55	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)[1]	60	2

[1] delete or add other activities as appropriate