



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electric power systems and energy management

### Course

Field of study

Power Engineering

Area of study (specialization)

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Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/4

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

15

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

dr inż. Justyna Michalak

Responsible for the course/lecturer:

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Wydział Inżynierii Środowiska i Energetyki

ul. Piotrowo 3A, 60-965 Poznań

### Prerequisites

Basic knowledge about electrical engineering, energy machinery, and thermodynamics. Basic knowledge about economic

Skills to use mathematics and computing methods to perform simple calculations simulation.

Ability to use economic knowledge in practice<sup>3</sup> Social competencies

Is aware of the need to expand their competence, ability to work in a team

### Course objective

Familiarize with the general principles and conditions of the energy economy, in its technical aspects, economic and legal. Ability to assess the energy situation of the World and Polish. Understanding of the



workings of the energy market. Assessment of energy consumption in the manufacturing process. Provide general principles for energy efficiency. Linking knowledge of the economics of energy and enterprise. Knowledge of electrical power distribution systems for electrical networks, substations and switchgear.

### Course-related learning outcomes

#### Knowledge

1. Has a basic and structured knowledge of electrical distribution systems
2. He has knowledge of the role and importance of energy in the economy of the country, about the size of energy resources and how to use them, taking into account the structure of the energy system generation. Know the characteristics of the different energy sectors: electricity and heating system
3. Knows the structure of the national energy system and subsystems, knows the rules of rational energy conversion processes and use of energy

#### Skills

1. Student is able to estimate the demand for electricity
2. Student is able to balance the various energy facilities in accordance with the principles of rational use of energy
3. Has the ability to solve practical problems in the energy sector

#### Social competences

Is aware of the responsibility for jointly implemented tasks

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

#### Lecture

- evaluation of knowledge and skills listed on the written exam of a problematic or test, continuous evaluation for each course (rewarding activity and quality perception)

#### Projects

- test and favoring the knowledge necessary to carry out the questions posed in the task area exercises, continuous evaluation for each course

- continuous evaluation for each course - rewarding gain skills they met the principles and methods evaluation knowledge and skills related to the implementation of the tasks your practice, the assessment report on performed exercise.

### Programme content

#### Lecture



The role of energy in human development. Rationalization of energy use. Material and energy balances. General information about the role and importance of energy in the economy of the country, about the size of energy resources, taking into account the structure of the national system of energy generation. A national energy system and its subsystems: solid fuels, liquid fuels, gas system, electricity, heat system. Environmental risks in the process of acquisition and conversion of energy and how energy environmental threats. Ways of green energy state. Combined heat and power economy. The accumulation of energy. Rules for the use of waste energy. Energy market segments: fuel, electricity, heat. Natural monopoly. Legal in energy trading. Authority control. The nature and elements of the electricity market. Marketplace of electricity. Practical ways of balancing energy conversion systems, the technical options for the production of heat and electricity in a power plant and power plants, energy auditing issues. Basic concepts of power and energy, load charts, fuel properties and principles of various types of fuel economy. Power distribution systems in industrial plants and utilities for customers. Supply categories: industrial and municipal customers. Design solutions substations and MV switchgear. The criteria and the basic rules for the selection of cables and electrical apparatus.

#### Projects

The role of energy in human development. Rationalization of energy use. Material and energy balances. General information about the role and importance of energy in the economy of the country, about the size of energy resources, taking into account the structure of the national system of energy generation. A national energy system and its subsystems: solid fuels, liquid fuels, gas system, electricity, heat system. Environmental risks in the process of acquisition and conversion of energy and how energy environmental threats. Ways of green energy state. Combined heat and power economy. The accumulation of energy. Rules for the use of waste energy. Energy market segments: fuel, electricity, heat. Natural monopoly. Legal in energy trading. Authority control. The nature and elements of the electricity market. Marketplace of electricity. Practical ways of balancing energy conversion systems, the technical options for the production of heat and electricity in a power plant and power plants, energy auditing issues. Basic concepts of power and energy, load charts, fuel properties and principles of various types of fuel economy. Power distribution systems in industrial plants and utilities for customers. Supply categories: industrial and municipal customers. Design solutions substations and MV switchgear. The criteria and the basic rules for the selection of cables and electrical apparatus.

#### Teaching methods

Lecture with multimedia presentation

#### Projects

Power systems and energy management project implementation, solving tasks from losses

#### Bibliography

Basic

1. Mejro C., Podstawy gospodarki energetycznej, WNT, 1980



2. Niedziółka D., Rynek energii w Polsce, Difin, 2010
3. Soliński I., Ekonomia i organizacja sektorów systemu paliwowo-energetycznego. Uczelniane Wydawnictwa NaukowoDydaktyczne. 2000
4. Soliński J. Sektor energii świata i Polski : początki, rozwój, stan obecny. Instytut Gospodarki Surowcami Mineralnymi i Energią PAN - Wydawnictwo, 2012.
5. Górzyński J., Audyting energetyczny. NAPE S.A. 2002
6. Laudyn D., Rachunek ekonomiczny w elektroenergetyce, Oficyna Wydawnicza Politechniki Warszawskiej, 1997
7. Górzyński J., Urbaniec K., Wytwarzanie i użytkowanie energii w przemyśle. Oficyna Wydawnicza PW, 2000
8. Charun H., Podstawy gospodarki energetycznej ( t1-3). Wydawnictwo Uczelniane Politechniki Koszalińskiej. 2007
9. Ziębik A., Szargut J., Podstawy gospodarki energetycznej, Wyd. Politechniki Śląskiej, 1997
10. Góralczyk I. Tytko R., Racjonalna gospodarka energią, Wydawnictwo: Towarzystwo Słowaków w Polsce, 2013

#### Additional

1. Szargut J., Ziębik A., Podstawy energetyki cieplnej, PWN
2. Kuciński K., Energia w czasach kryzysu, DIFIN, 2006
3. Markiewicz H.: Urządzenia elektroenergetyczne, WNT, Warszawa, 2001.
4. Góra S., Gospodarka elektroenergetyczna, Wydawnictwo Uczelniane politechniki Poznańskiej, 1973
5. Pawłęga A. Rachunek ekonomiczny w elektroenergetyce. Oficyna Wydawnicza Politechniki Warszawskiej, 2011

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	67	2,0
Classes requiring direct contact with the teacher	47	2,0
Student's own work (literature studies, preparation for exam) <sup>1</sup>	20	1

<sup>1</sup> delete or add other activities as appropriate