



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Energy efficiency [S2Elenerg1>EE]

### Course

Field of study

Electrical Power Engineering

Year/Semester

2/3

Area of study (specialization)

Smart Grids

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

15

### Number of credit points

2,00

### Coordinators

dr inż. Radosław Szczerbowski

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### Lecturers

### Prerequisites

Basic knowledge in electrical engineering, electrical power engineering and operation of the energy markets. Ability to analyse the operation of devices and elements of transmission systems, determine energy consumption and energy losses in both receivers and elements of the power grid. Awareness of the need to extend professional, personal and social competences. Willingness to critically assess the knowledge and its importance in solving analytical and practical problems.

### Course objective

The aim of the course is to learn the methods and activities implemented in the energy economy for a better use of natural energy resources as well as improvements in energy generation and transmission by implementing energy efficiency measures. Understanding the legal requirements and achievements in implementing energy efficiency.

### Course-related learning outcomes

Knowledge:

1. student has extended knowledge of energy efficiency improvement measures as well as technical and economic methods of evaluating energy efficiency projects

2. student has knowledge of legal requirements regarding the implementation of the obligation to increase energy efficiency.

Skills:

1. student is able to make a technical, economic and ecological evaluation of energy efficiency projects.
2. student is able to make a critical analysis of the performance of technical solutions in the field of energy management implemented by energy companies and to predict the effects of such actions.

Social competences:

1. student is aware of the need to increase energy efficiency for the proper operation of the power system and environmental protection.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture:

- knowledge and skills assessment through a problem-based written test,
- continuous assessment of student's skills and competences during each class (rewarding attendance and active participation in the classes).

Project:

- assessment of the knowledge and skills concerning the project tasks, evaluation of the project report,
- suggestion and evaluation of energy efficiency measures with a particular methodology.

### Programme content

Energy efficiency of economic departments. Legal regulations related to the improvement of energy efficiency at the national and European levels.

Basic indicators for assessing energy efficiency. Methods of improving energy efficiency. Basics of implementation of energy audits.

### Course topics

Lecture:

Energy efficiency of economic departments. Law on energy efficiency and EU regulations on energy efficiency improvement. Energy efficiency of buildings. National action plan for energy efficiency in Poland. Management of energy efficiency implementation. Indicators of energy efficiency and energy savings. The role of energy labeling. Methods to improve efficiency in energy use including electricity. The system of white certificates. Introduction to energy efficiency audits. Energy audit of enterprises. The role of energy management systems in binding energy efficiency.

Project:

Improving energy and economic efficiency in household electricity consumption. Indicators of energy efficiency and energy savings. Improving energy efficiency in industrial plants in the use of electricity and thermal energy.

### Teaching methods

Lecture: multimedia presentation - informational and problem lectures

Project: individual project tasks related to adjusting energy efficiency measures for residential or industrial electricity consumers

### Bibliography

Basic

1. Billewicz K., Smart metering: inteligentny system pomiarowy, Wydawnictwo Naukowe PWN, Warszawa 2012
2. Górzyński J., Efektywność energetyczna w działalności gospodarczej, Wydawnictwo Naukowe PWN, Warszawa 2017
3. Wąchocki R., Efektywność energetyczna budynków: przepisy z komentarzem, POLCEN 2015

Additional

1. Andruszkiewicz J., Lorenc J., Warunki wdrożenia w Polsce cenowych programów sterowania popytem dla ograniczenia szczytowego zapotrzebowania na energię elektryczną, Przegląd Elektrotechniczny - 2014, nr 8, s. 97-100
2. Bielecki S., Zaleski P., Fortuński B., Wybrane problemy zarządzania energetyką, Texter, Warszawa 2016
3. Efektywność wykorzystania energii w latach 2007-2017, Opracowanie GUS 2019
4. EU Energy Efficiency Directive 2012/27/EU
5. Krajowy Plan Działań dotyczący efektywności energetycznej dla Polski 2017, Ministerstwo Energii 2017
6. Ustawa z dnia 20 maja 2016 r. o efektywności energetycznej (Dz.U. 2016 poz. 831) z późniejszymi zmianami

### Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00