



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Energy audit and certificate

### Course

Field of study

Year/Semester

Power Engineering

2/3

Area of study (specialization)

Profile of study

Sustainable Development of Power Engineering

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

0

Tutorials

Projects/seminars

0

10

### Number of credit points

4

### Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

dr inż. Robert Wróblewski

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Faculty of Environmental Engineering and  
Energy

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### Prerequisites

Basic knowledge of technical drawing, mathematical calculations, basics of heat transfer processes. Is able to obtain information from literature, databases and other properly selected sources; also in the English language in the field of energy, is able to integrate obtained information from many fields, make their interpretation and critical assessment, as well as draw conclusions and formulate and comprehensively justify opinions. Is ready to critically assess and analyze issues and recognizes the importance of knowledge in solving cognitive and practical problems in the field of energy.



## Course objective

The aim of the course is to learn the rules for preparing energy performance certificates for buildings and the rules for performing energy audits of buildings and industrial facilities.

## Course-related learning outcomes

### Knowledge

The student has knowledge of the energy standards of buildings and the ability to meet their energy needs and reduce energy consumption. The student knows the rules for performing certificates and energy audits of buildings. The student has a knowledge in the field of measuring energy consumption in municipal and industrial facilities. The student has detailed and theoretically founded knowledge of the principles of construction, modeling, life cycle processes of energy system elements

### Skills

The student is able to carry out the analysis of energy consumption in buildings. The student is able to make a critical analysis of existing technical solutions and propose their improvement and make an initial analysis and economic assessment of the proposed solutions.

### Social competences

The student is able to think and act in a creative and entrepreneurial way; understands the need to formulate and provide the public with information and opinions on the achievements of the energy sector and industries related to it

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

### Lecture:

assessment of knowledge and skills demonstrated during the written exam,

laboratory classes:

assessment based on ongoing monitoring of messages and reports made

### Projects:

assessment on the basis of ongoing monitoring of the news and performance of the final work

## Programme content

### Lecture:

Energy standards of buildings. Fundamentals of thermal physics of buildings. Thermal comfort. Calculation of heat losses and gains. Energy demand. Technological and material solutions of energy-saving buildings elements and principles of designing buildings of such buildings. Thermal bridges. Energy needs of buildings (heating, hot water, ventilation and lighting). Rules for preparing energy performance certificates for buildings. - Rules for performing energy audits of buildings.

Laboratory classes:



Performing an energy audit of a residential building using dedicated software. Analysis of the impact of the solutions used to reduce energy consumption in the building on its energy performance.

Projects:

Hygrothermal calculations for building partitions. Determining the energy demand factor. Adaptation of the technical design of the residential building to the parameters of the energy-efficient object

### Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board

Laboratory classes: classes at computer stations

Projects:

independent execution of a design task

### Bibliography

Basic

1. Dylla A.: Fizyka ciepła budowli w praktyce. Obliczenia ciepłno-wilgotnościowe. PWN. Warszawa 2015
2. Laskowski L.: Ochrona ciepła i charakterystyka energetyczna budynku. Oficyna Wydawnicza Politechniki Wrocławskiej. Wrocław 2008
3. Ogrzewnictwo praktyczne, Halina Koczyk, Bronisława Antoniewicz i inni Systherm 2014
4. Ustawa o charakterystyce energetycznej budynków z dnia 29 sierpnia 2014.

Additional

1. Nowoczesne wyposażenie techniczne domu jednorodzinnego Instalacje sanitarne i grzewcze, Halina Koczyk, Bronisława Antoniewicz
2. Rozporządzenie Ministra Infrastruktury z dnia 12 kwietnia 2002 r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie.
3. Rozporządzenie Ministra Infrastruktury z dnia 6 listopada 2008 r. w sprawie metodologii obliczania charakterystyki energetycznej budynku i lokalu mieszkalnego lub części budynku stanowiącej samodzielną część techniczno-użytkową oraz sposobu sporządzania i wzorów świadectw ich charakterystyki energetycznej.



### Breakdown of average student's workload

	Hours	ECTS
Total workload	102	4,0
Classes requiring direct contact with the teacher	52	2,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests/exam, project preparation) <sup>1</sup>	50	2,0

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