COURSE DESCRIPTION CARD - SYLLABUS

Course name
Energy Efficient Buildings

Course

Field of study
Environmental Engineering

Year/Semester

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
English

Form of study
full-time

Requirements
elective

Number of hours

Lecture
10

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars
20

Number of credit points

6

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:
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Prerequisites

Basics of architectural design, basics of building physics and general construction. Skills in the ability to assess phenomena in the field of heat transfer in buildings and operating computer programs including Excel, Word, SketchUp.

Course objective

Basics of architectural design, basics of building physics and general construction. Skills in the ability to assess phenomena in the field of heat transfer in buildings and operating computer programs including Excel, Word, SketchUp.

Course-related learning outcomes

Knowledge

The student knows different methods of energy assessment of buildings, including classifications introduced in different countries.

The student knows the principles of energy balancing in buildings and the tool used to design energy-efficient and passive buildings.

The student knows the construction and installation parameters affecting energy consumption in buildings and the value of the balance of heat gains and losses.

Skills

The student is able to use the knowledge acquired in the theoretical part to determine the energy standard of the building.

The student has the skills to plan a computer simulation regarding the adaptation of an existing building to a better energy standard.

Student is able to determine the impact of various construction and installation parameters on the value of useful, final and primary energy in the building.

Student is able to simulate energy consumption and perform calculations for a building so that it reaches the passive building standard.

The student is able to prepare a report (project) of the simulations carried out with reference to their results to the research described in the scientific and technical literature.

Social competences

The student is able to present the results of his work to the group in a communicative way.

The student is aware of the different perceptions of the energy-efficient building standard in different countries.

The student is aware of the constantly changing parameters in force as the standard for energy-efficient building and the need to constantly update knowledge in this area.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Assessment of the completeness and quality of project tasks (simulation) (50% of the evaluation), oral presentation of the results and discussion (50% of the evaluation).

Programme content

Theoretical part:

Definition of the energy standard

Different energy standards - low energy building, energy efficient building, sustainable building, zero energy building, green building

Building certification methods

Usable, final and primary energy balance

Energy assessment of buildings based on ISO EN 13790 and Passive House Planning Package

The project part:

Design and energy simulations of the building in PHPP, Excel and design PH, i.e. using tools dedicated to the design and planning of passive and energy-saving buildings.

The project will include calculations for the base building and adaptation of this building to the selected higher energy standard (energy efficient building) and simulation using different input data (heat transfer coefficients, building shading, location, orientation) along with an assessment of the impact of various parameters on the energy balance.

Teaching methods

Assessment of the completeness and quality of project tasks (simulation) (50% of the evaluation), oral presentation of the results and discussion (50% of the evaluation).

Bibliography

Basic

1. www.passivehouse.com, www.pibp.pl, www.cbp.put.poznan.pl

2. Tymkow P. et al.: Building Services Design for Energy Efficient Buildings. Earthscan London and New York 2013

3. Sinacka, J., Ratajczak, K. Analysis of selected input data impact on energy demand in office building - case study, DOI: 10.1051/matecconf/201822201015

Additional

Current scientific and technical articles on the subject of energy-efficient buildings searched at scholar.google.com

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,0
Classes requiring direct contact with the teacher	35	1,5
Student's own work (literature studies, project and raport preparation, preparation of presentation) [1]	15	4,5

[1] delete or add other activities as appropriate