COURSE DESCRIPTION CARD - SYLLABUS

Course name
Energy-efficient Building II [N2IŚrod1-ZwCKiOP>BII]

Course

Field of study
Environmental Engineering

Year/Semester
2/3

Area of study (specialization)
Heating, Air Conditioning and Air Protection

Profile of study
general academic

Level of study
second-cycle

Course offered in
polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
0

Laboratory classes
8

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

1,00

Coordinators

dr inż. Joanna Sinacka
joanna.sinacka@put.poznan.pl

Lecturers

Prerequisites

1.Knowledge: Basics of architectural design, basics of building physics and general construction. 2.Skills: to assess phenomena in the field of heat transfer in buildings and operating computer programs including Excel, Word, SketchUp. 3.Social competencies: The student should be aware of the consequences of decisions. The student understands of the need to constantly update and supplement knowledge and skills.

Course objective

Learning about methods of building energy assessment and building energy balance (monthly method) for architectural and construction parameters used in Europe. Consideration of renewable and non- renewable energy sources in building energy balance. Designing a passive house located in Europe.

Course-related learning outcomes

Knowledge:
1. The student knows the principles of energy balancing in buildings (monthly method)
2. The student knows the construction and installation parameters affecting energy consumption in buildings and the value of the balance of heat gains and losses.
3. The student knows the requirements for energy-saving buildings: construction and in the field of

technical equipment and understands the needs for passive and almost zero-energy buildings
4. The student knows the basic calculation programs for the assessment and design of energy-efficient buildings

Skills:
1. The student can determine the calculation parameters of an energy-efficient building and passive building.
2. The student is able to select components for a passive building.
3. The student is able to perform energy analysis using building energy simulation software (designPH) and passive house planning package (PHPP), which are commercially used for energy assessment of these buildings.
4. The 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
5. 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:
1. The student is aware of the need to systematically deepening and broadening of its powers.
2. The student is aware of the importance of modern buildings for the future and safety of man.
3. The student is able to present the results of his work to the group in a communicative way
4. The student is aware of the different perceptions of the energy-efficient building standard in different countries.
5. The student is aware of the changes in energy indicators, the need to ensure low energy consumption in buildings and to constantly update knowledge in this area because of changing directives, including those of the European Union.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Report of the case study tasks
The report assesses: the completeness of the tasks performed, the analyzes described, references to literature in relation to the results obtained, diligence of report (charts, tables, descriptions), presented completeness, clarity and transparency of the conclusions regarding the results.

Programme content

Preparation of the building design in Passive House Planning Package (PHPP) - in a program dedicated to passive building certification. Entering the building, entering structural parameters, entering and describing the installations in the building, taking into account renewable energy sources.

Teaching methods

Calculations in the programs: designPH, PHPP, Excel, presentation of results, discussion.

Bibliography

Basic:
1. Sinacka, J. Ratajczak, K. Analysis of selected input data on Energy demand in Office buildings – case study, DOI: 10.1051/matecconf/201822201015
2. Tymkow P. et al. Building Services Design for Energy Efficient Buildings. Eartscan London and New York 2013
3. Feist W.: Podstawy budownictwa pasywnego. PIBP Gdańsk 2007.
4. Wnuk R.: Instalacje w domu pasywnym i energooszczędnym. Przewodnik Budowlany 2007.
5. Górzyński J.: Podstawy analizy środowiskowej wyrobów i obiektów. WNT Warszawa 2007.
6. Recknagel H., Sprenger E., Schramek E.R.: Kompendium wiedzy: ogrzewnictwo, klimatyzacja, ciepła woda, chłodnictwo, Wydawnictwo Omni Scala, Wrocław 2008.
5. www.passivehouse.com

Additional:
1. Harvey Danny L.D.: A Handbook on Low-Energy Buildings and District-Energy Systems. Earthscan London 2007.

2. 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	25	1,00
Classes requiring direct contact with the teacher	8	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	17	0,50