COURSE DESCRIPTION CARD - SYLLABUS

Course name

Building physics

Course

Field of study

SUSTAINABLE BUILDING ENGINEERING

Year/Semester

II/3

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

compulsory

Number of hours

Lecture

30

Laboratory classes

Other (e.g. online)

Tutorials

15

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

Małgorzata Basińska, prof. assistent

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Faculty of Environmental Engineering

Poznan University of Technology

Institute of Environmental Engineering and Building Installations

Piotrowo Str. 5, 60-965 Poznań

tel. *48 61 6475824

Responsible for the course/lecturer:

Andrzej Górka, phD

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Faculty of Environmental Engineering

Poznan University of Technology

Institute of Environmental Engineering and Building Installations

Piotrowo Str. 5, 60-965 Poznań

tel. *48 61 6475825

Prerequisites

Knowledge:

- basic knowledge of mathematics, physics

- basic knowledge of Building Construction and Building Materials

Skills:

- use the available sources of information

- identify and describe building materials and their basic physical characteristics

- can present layers of individual building partitions

Social competencies

- awareness of the need to constantly update and supplement building knowledge and engineering skills

- he can work on a task independently and collaborate in a team

Course objective

Acquisition by the student of theoretical and practical knowledge of basic concepts and selected issues that are necessary for the proper design and construction of buildings – heat and mass exchange in building partitions and energy balance of residential buildings

Course-related learning outcomes

Knowledge

He/she is familiar with commonly used construction and installation materials and their properties (KSB_W14)

He/she knows basics of construction physics in terms of heat and humidity migration in building components and in construction works (KSB_W13)

He/she Has basic knowledge in the area of formation of building components in terms of thermal performance, humidity (KSB_W05)

He/she has knowledge in areas of acoustics (KSB_W01)

Skills

He/she can define the basic concepts of heat transfer and energy balance of a building (KSB_U01)

He/she can explain: the course of basic thermal phenomena in building components (KSB_U03)

He/she can calculate the basic thermal and energy characteristics necessary for the design of buildings partitions and buildings (KSB_U14)

He/she can make calculations to avoid condensation on the surface of the building barrier (KSB_U03)

Social competences

He/she can estimate the impact of modification of building structures on the course of thermal phenomena (KSB_K01)

Is able to interpret and apply building standards and regulations in the field of thermal and energy issues and is able to qualify whether these requirements are met (KSB_K02)

He/she can discuss the thermal properties and energy parameters of building objects (KSB_K02)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

Exam in an exam session. Multiple choice test.

Rating: Skala: 51- 60% – 3,0 61- 70% – 3,5 71- 80% – 4,0 81- 90% – 4,5 91-100% – 5,0

Tutorials:

Final test in the last class. 3 open tasks rated on a scale of 10 points each.

Rating: 51- 60% – 3,0 61- 70% – 3,5 71- 80% – 4,0 81- 90% – 4,5 91-100% – 5,0

Programme content

Lecture:

• Basic terms of thermal physics of the building

• Thermal conductivity in the building materials. Fourier law. Convection. Radiation.

• Hygrothermal properties of the typical building materials

• Steady-state thermal conductivity through the multi-layer building partitions. Thermal resistance and heat transfer coefficient. Simple analysis of steady-state thermal conductivity by the complex elements of the building partitions

• Transparent partitions. Selective gain of solar radiation energy

• Requirements regarding the thermal protection of the buildings. Rules of the building partitions designing

• Thermal bridges

• Basics of moisture exchange in the building

• Internal microclimate. The conditions in the premises during winter or summer

• Thermal comfort. Characteristic of climate of Poland

• Thermovision - detection of thermal defects in the building envelope

• Building acoustics (acoustic parameters of the interior, parameters of the acoustic quality evaluation of the room)

Tutorials:

• Calculation of thermal insulation and temperature distribution in multilayer building partitions: wall, roof and ground floor

• Determining the required thickness of partitions insulation

• Determination of zero isotherm and felt temperature

• Calculations regarding the heat exchange of the building with the ground

• Calculations of thermal insulation of windows

• Calculations of the fRsi coefficient of the external partitions

• Final test

Teaching methods

Informative lecture with seminar elements, lecture with multimedia presentation

Tutorials- exercise method

Bibliography

Basic

Yunus A. Cengel. Heat transfer: A practical approach. International edition. McGRAW-HILL. 2003.

Faye C. McQuiston. Heating, Ventilating, and Air Conditioning. Analysis and design. John Wiley & Sons, Inc.

Fanger P. O. Thermal Comfort. Analysis and Applications in Environmental Engineering. McGraw-Hill Inc.,US. 1973.

ASHRAE Handbook. Fundamentals. SI Edition.

Additional

Neufert. Podręcznik projektowania architektoniczno-budowlanego. Wyd. Arkady. 2011.

Praca zbiorowa pod kier. P .Klemma. Budownictwo ogólne. Tom 2. Wyd. Arkady. 2005.

Płoński, Pogorzelski. Fizyka budowli. Arkady. 1976.

Laskowski L. Ochrona cieplna i charakterystyka energetyczna budynku. Oficyna Wydawnicza Politechniki Warszawskiej. Warszawa. 2005.

Aktualne normy.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	45	2
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	15	1

[1] delete or add other activities as appropriate