



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Building engineering (study visit in industry company)

### Course

Field of study

Year/Semester

Civil Engineering

1/2

Area of study (specialization)

Profile of study

Structural Engineering

general academic

Level of study

Course offered in

Second-cycle studies

English

Form of study

Requirements

full-time

compulsory

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

15

0

0

Tutorials

Projects/seminars

30

0

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

dr inż. Marlena Kucz, prof. PP

Responsible for the course/lecturer:

dr inż. Joanna Sinacka

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### Prerequisites

The student should have knowledge of building materials, general construction, building physics, basics of energy-saving construction. Knowledge of a foreign language enabling the study of world literature in the field of study

### Course objective

Mastering knowledge in the field of sustainable construction, including legal regulations. Acquainting with the subject of communication construction, including sustainable transport. Performing calculations of energy demand for a selected building. Consolidation of the principles of designing energy-efficient buildings Sensitivity to ecological problems in architecture and construction. Understanding the impact of the construction, material and technological solutions used in the building on the natural environment.



### Course-related learning outcomes

#### Knowledge

have detailed and theoretically based knowledge in the field of building physics, related to heat and moisture migration in selected building units

have detailed knowledge of the impact of building investments on the environment and understand the need to implement the rules of sustainable development

know in detail the Act of Building Law, standards and recommendations for building unit design: Polish standards (PN) and European standards (EN) as well as the technical conditions of constructing selected building units.

#### Skills

is able to include correct technical solutions in the building design, taking into account sustainable development and perform calculations of energy demand. Also is able to select materials and technologies for the implementation of traditional, ecological, sustainable and energy-saving construction in complex conditions

is able to prepare a design of a building object and prepare technical documentation in the environment of selected programs, for example Sketch up

are able to obtain information from literature, databases and other properly selected information sources; can integrate the obtained information, interpret and evaluate it as well as draw conclusions, formulate, justify, discuss and present opinions

acquiring the ability to distinguish and correctly name different types of construction: sustainable, environmentally friendly and energy-efficient

#### Social competences

are aware how important is sustainable development in building engineering

understand the need to transfer to the society the knowledge about building engineering, transfer the knowledge in a clear and easily comprehensible manner

are ready to autonomously complete and broaden (extend) knowledge in the field of modern processes and technologies of building engineering

can realise that it is necessary to improve professional and personal competence; are ready to critically evaluate the knowledge and received content

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written test, project evaluation, written and oral exam.

### Programme content



Equations of motion of structures treated as discrete systems. Equations of motion written in terms of state variables. Models of chosen types of structures. Damping models. Free vibration analysis, dynamic characteristics of structures with and without damping. Sensitivities of natural frequencies and modes of vibration with respect to design parameters. Analysis of steady state vibration. Normal coordinates and their applications. Rayleigh quotients. Computer methods of solution of eigenvalue problems. Time integration methods. Dynamic analysis of block foundations. Tuned mass damper. Analysis of structures seismically and para-seismically excited.

### Teaching methods

Monographic lecture, blackboard exercises, correction of project exercises

### Bibliography

Basic

Ana-Maria Dabija, Energy Efficient Building Design, Springer International Publishing, 2020

Sofia-Natalia Boemi, Olatz Irulegi, Mattheos Santamouris, Energy Performance of Buildings. Energy Efficiency and Built Environment in Temperate Climates, Springer International Publishing, 2016

Passive House Details

Feist W.: Podstawy budownictwa pasywnego. PIBP Gdańsk 2007.

Wnuk R.: Instalacje w domu pasywnym i energooszczędnym. Przewodnik Budowlany 2007.

Recknagel H., Sprenger E., Schramek E.R.: Kompendium wiedzy: ogrzewnictwo, klimatyzacja, ciepła woda, chłodnictwo, Wydawnictwo Omni Scala, Wrocław 2008.

Panek A., Suchecka M. Environmental friendly buildings and assessment methods, 50 Executive Committee Meeting of Energy Conservation in Buildings and Community Systems IEA, Technical Presentations, Kraków, November 2001;

2008, 2014: METHODOLOGY ROZPORZĄDZENIE MINISTRA INFRASTRUKTURY w sprawie metodologii obliczania charakterystyki energetycznej budynku

Kronenberg J., Bergier T. (red.), Wyzwania zrównoważonego rozwoju w Polsce, Fundacja Sendzimira, Kraków 2010.

Borys T. (red.), Wskaźniki zrównoważonego rozwoju, Wydawnictwo Ekonomia i Środowisko, Warszawa - Białystok 2005

Obowiązujące regulacje prawne - dyrektywy UE, normy.

Sustainable Development, <https://sdgs.un.org/goals>



Additional

Crowley John S., Zimmerman L.Zaurie., Practical Passive Solar Design.A Guide to Homebuilding and Land Development, New York : McGraw-Hill, 1984. ???

Opracowania własne wykładowców

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	45	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	15	0,5

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