COURSE DESCRIPTION CARD - SYLLABUS

Course name
Energy technology in construction

Course

Field of study
Civil Engineering
Year/Semester
1/1
Area of study (specialization)
Construction Engineering and Management
Profile of study
general academic
Level of study
Second-cycle studies
Course offered in
english
Form of study
full-time
Requirements
compulsory

Number of hours

Lecture
15
Laboratory classes
15
Other (e.g. online)
Tutorials
Projects/seminars
15

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:
mgr inż. ROMAN MILWICZ

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Prerequisites

knowledge of building materials, basic physico-mechanical features, issues in building physics

Course objective

Recognition of the issues related to minimisation of energy use in buildings and by the building industry, differentiation of various energy sources, with the focus on the renewable ones; implementation of the acquired knowledge in buildings.

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

know in detail the rules of design, construction and operation of selected building units

Skills

are able to prepare and analyse the energy balance of a selected building unit, match the materials and technologies to perform traditional, ecological, sustainable and energy-saving constructions in complex conditions.

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

can make plans autonomously, carry out lifelong learning processes and direct others in this respect; can apply the obtained knowledge into building engineering in order to communicate with different target groups using specialized terminology and discuss important problems of building industry.

Social competences

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

are aware how important is sustainable development in building engineering

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

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

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Exam - A written final test checking the student's knowledge of the material presented in the lectures.

Grade scale determined based on points:

91-100 very good (A) 81 - 90 good plus (B) 71 - 80 good (C) 61 - 70 sufficient plus (D) 51 - 60 sufficient (E) below 50 insufficient (F)

Completing the project - building design (fulfillment of conditions):

- in accordance with the provisions of construction law and Technical Conditions,

- using appropriate material solutions,

- using solar energy in a passive and active way,

- optimizing the space inside the building

- rationally managing materials and costs

Completion of laboratories - performance of calculation tasks presented in laboratories.

Programme content

1. Sustainable construction - goals ...

2. Designing low energy buildings,

3. Energy calculations depending on the geographical location and parts of the world, methodology,

4. Building life cycle and total built-in energy, Optimal solution for specific boundary conditions in the perspective of final costs, payback time of the investment,

5. BEMS structures - Building Management System (control and monitoring of energy consumption), Building energy management - intelligent systems,

6. Rationalization of energy consumption in buildings - practical examples

Project, laboratories: Design of an energy-efficient building based on the latest knowledge in the field of energy-efficient construction and the principles of LCA and LCC

Co-moderators: MSc. Roman MILWICZ,

Teaching methods

lecture - information, multimedia presentation, seminar lecture

projects lecture - information, multimedia presentation, consultations, lierature studies,

laboratories information lecture, multimedia presentation, work in online programs and spreadsheet.

Bibliography

Basic

1. Brown GZ and DeKay M Sun, wind & light, architectural design strategies 2nd ed. John Wiley & Sons 2001

2. Givoni B Man, climate & architecture 2nd ed. Van Nostrand Reinhold 1981

3. Givoni B Climate considerations in building and urban design Van Nostrand Reinhold 1998

4. Douglas Harris: Guide to Energy Management in Buildings,, Routledge; 1 edition (November 30, 2011)

5. Haines, Roger W., Myers, Michael E., HVAC systems design handbook , McGraw-Hill, cop. 2010.

6. 2008, 2014: METHODOLOGY ROZPORZADZENIE MINISTRA INFRASTRUKTURY w sprawie metodologii obliczania charakterystyki energetycznej budynku

7. Włodarczyk J., Podosek Z, Systemy teletechniczne budynków inteligentych : okablowanie strukturalne, instalacje elektryczne, systemy alarmowe, systemy kontroli dostępu, sieci domowe, systemy HVAC, systemy przeciwpożarowe, Przedsiębiorstwo Badawczo-Projektowo-Wdrożeniowe Cyber : Bel Studio, 2002

8. Baird, G. ; Aun, C.S. ; Brauder, W.D.S. ; Donn, M.R. ; Pool, F. Energy performance of buildings ,

9. ISO 13790:2008, Energy performance of buildings - Calculation of energy use for space heating and cooling

Additional

1. Ad van Wijk, Welcome in the green village. IOS Press, Delft 2013

2. Lennart J. Lundqvist, Sweden and ecological governance. Manchester University Press, Manchester 2004

3. Costanza R., Building a Sustainable and Desirable Economy-in-Society-in-Nature,ANU E Press, Canberra 2012

4. Berardi U., Moving to Sustainable Buildings: Paths to Adopt Green Innovations in Developed Countries.Versita,London 2013

5. EN ISO 13790:2006, Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies

6. E. Neufert, P. Neufert, Architects' data, 3rd English Edition, Blackwell Sciences, Oxford 2002

7. D. Phillips, Detail in Contemporary Residential Architecture 2, Laurence King Publisher, 2014

8.Ch. Alexander, Język wzorców, GWP, Gdańsk 2008

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	30	1,0

[1] delete or add other activities as appropriate