COURSE DESCRIPTION CARD - SYLLABUS

Course name
Sustainable building [S2Bud1E-IPB>BZ]

Course

Field of study
Civil Engineering

Year/Semester
1/2

Area of study (specialization)
Construction Engineering and Management

Profile of study
general academic

Level of study
second-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
15

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

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 prepere 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:

Learning outcomes presented above are verified as follows:
Lecture - Written final test to check the student"s knowledge of the material presented at the lectures. Lecture Grading scale determined on the basis of points: 91-100 very good (A) 81 - 90 good plus (B) 71 - 80 good (C) 61 - 70 sufficient plus (D) 51 - 60 satisfactory (E) less than 50 insufficient (F)
Tutorials: making calculations for a selected building - energy demand (minimum 3 variants) - weight 60% written collegium - 40%
Classes - Grading scale based on points: 91-100 very good (A) 81 - 90 good plus (B) 71 - 80 good (C) 61 - 70 sufficient plus (D) 51 - 60 satisfactory (E) less than 50 insufficient (F)
Lab: Conducting a usable, final and primary energy analysis for heating, ventilation and cooling for the base building and a sensitivity analysis to various inputs. Consolidation of the principles of designing energy-efficient buildings. Preparation of a report on each task and presentation of the results.
The presentation is conducted for the entire laboratory group and is combined with the discussion of the obtained results. 91-100 very good (A) 81 - 90 good plus (B) 71 - 80 good (C) 61 - 70 sufficient plus (D) 51 - 60 satisfactory (E) less than 50 insufficient (F)

Programme content

Sustainable development - goals.
Legal bases in the field of sustainable development and energy-efficient construction

Course topics

Sustainable development - goals.
Legal bases in the field of sustainable development and energy-efficient construction
Environmental and Eco-signs
Passive systems of direct and indirect profits Phase change materials.
New generation thermal insulation Sick building syndrome.
The issue of the selection of properties of construction materials / products in the environmental aspect.
Pro-ecological construction and material solutions for buildings Infrastructure and sustainable transport:

urban transport, regional transport, logistics.
Analysis of examples of different agglomerations. Examples of energy-saving and passive buildings, Pro-ecological construction and material solutions for buildings Energy sources based on renewable energy

Teaching methods

Information (multimedia) lecture and design thinking.
Exercises - information - presentation of issues necessary to perform the tasks, discussion, calculations, consultations Laboratories - information - presentation of issues necessary to perform tasks, discussion, work with a building energy assessment program (e.g. designPH, PHPP), consultations

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
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 ROZPORZADZENIE 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
Law regulation
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.
Own education materials

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00