COURSE DESCRIPTION CARD - SYLLABUS

Course name
Energy Protection Building [N2IŚrod1>BE]

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
20

Laboratory classes
8

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

1.Knowledge: Knowledge of thermodynamics, heat transfer and fluid mechanics, heating, ventilation, air conditioning and refrigeration, and general construction. 2.Skills :The ability to perform mathematical transformations, derivation of mathematical formulas and solving classic linear equations and differential equations in the field of heat transfer. The ability to perform hydraulic calculations in the field od ventilation, air conditioning and refrigeration and perform engineering drawings in AutoCAD in the range discussed in the first cycle of study. 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

-Acquiring the knowledge and skills of the new generation of buildings, environmentally friendly and energy-efficient technical solutions saving energy during operation.

Course-related learning outcomes

Knowledge:
1. Has knowledge in the field of construction development from an energy point of view, knows the energy standards of buildings and their evolution.

2. Knows the field of environmental assessment of buildings: LEED, BREEAM and in the area of energy and ecological analysis of a building in the life cycle.
3. 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. Knows the basic calculation programs for the assessment and design of energy-efficient buildings.
5. Knows the rules of modernizing existing buildings to the energy-saving standard and examples of solutions of energy-saving buildings of various types.

Skills:
1. Can determine the calculation parameters of an energy-efficient building.
2. Is able to perform calculations in the field of energy efficiency of an energy-efficient building.
3. Is able to perform calculations of details and building and installation components for an energy-efficient building and select components for a passive building.
4. Is able to perform economic calculations of the profitability of an energy-efficient building with different standards.
5. Can make drawings as part of a project in the sketch up program.

Social competences:
1. Is aware of the impact of the quality of the building on the health and well-being of
2. Is aware of the need to systematically deepening and broadening of its powers
3. Is aware of the importance of modern buildings for the future and safety of man

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:
written test - duration 60 minutes - knowledge test (10 questions), minimum of 50% poins required.
Laboratories:
The first part of the assessment is a report of the case study tasks performed.
The report assesses: the completeness of the tasks performed, the analyzes described, references to literature in relation to the results obtained (minimum 2-3 scientific articles), diligence of report (charts, tables, descriptions), presented completeness, clarity and transparency of the conclusions regarding the results.
Presenting 5 tasks - grade 3.0; performance of 7 tasks - grade 4.0; performance of 9 tasks - 5.0.
The second part of the assessment is the presentation of the results of two tasks (selected by the teacher) - the presentation can increase, decrease or maintain the grade given in the report.
The presentation assesses: presentation, communication skills, content of the presentation (including the reference of own results to the results in scientific and technical literature), slide readability, clarity and completeness of the results discussed.

Programme content

Historical development of the construction industry. Sustainable development in the construction industry. Methods of assessing the impact of building on the environment. The principles of environmental assessment of buildings. Methods: LEAD, BREEAM. Directive on energy performance and standards support. Changes in energy standards of buildings. Requirements for energy efficient buildings: construction and installation. The definition of passive house standard or nearly zero-energy standard. Way to achieve the standard of those buildings and methods of design calculations. Principles of design partitions and building components for energy-efficient standards. Systems of technical equipment and energy sources for energy efficient buildings. Sources of energy based on renewable energy. Examples of solutions of energy efficient buildings. Principles of the modernization of existing buildings for energy-effici standards. Principles of operation of energy efficient buildings.
Subjects of laboratories: analysis of the impact of input data on building energy consumption and consolidation of the principles of designing energy-efficient buildings. The given building should be drawn in 3D in Sketch up program, model the external partitions, locations and orientation. After the analysis of useful, final and primary energy for heating, ventilation and cooling purposes for the base building, a sensitivity analysis to various input data will be carried out. There are 10 specific tasks to complete. A report on each task and presentation of results should be prepared. The presentation is carried out for the entire project group and joins the discussion of the results obtained.

Teaching methods

Lecture: lecture with multimedia presentation, problem lecture, case studies.
Laboratories: calculations in the programs: designPH, PHPP, Excel, presentation of results, discussion.

Bibliography

Basic:
1. Feist W.: Podstawy budownictwa pasywnego. PIBP Gdańsk 2007.
2. Wnuk R.: Instalacje w domu pasywnym i energooszczędnym. Przewodnik Budowlany 2007.
3. Górzyński J.: Podstawy analizy środowiskowej wyrobów i obiektów. WNT Warszawa 2007.
4. Recknagel H., Sprenger E., Schramek E.R.: Kompendium wiedzy: ogrzewnictwo, klimatyzacja, ciepła woda, chłodnictwo, Wydawnictwo Omni Scala, Wrocław 2008.
5. Haas K-H.: Der Weg zum Null-Energiehaus. VDE GmbH Berlin 2013.

Additional:
1. Harvey Danny L.D.: A Handbook on Low-Energy Buildings and District-Energy Systems. Earthscan London 2007.
2. Tymkow P. i inni: Building Services Design for Energy Efficient Buildings. Earthscan London and New York 2013

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	28	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	47	2,00