COURSE DESCRIPTION CARD - SYLLABUS

Course name
Building Construction 2 [S1Arch1>KB2]

Course

Field of study
Architecture

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other
0

Tutorials
30

Projects/seminars
0

Number of credit points

4,00

Coordinators

Lecturers

Prerequisites

Student has explicit, theoretically based knowledge including the key issues of mathematics, the theory of structures, and strength of materials. Student has basic knowledge in the general building and executed project in the construction branch and professional responsibility of the designer. Student can acquire information from publications, data bases and other sources, can interpret the said information and can integrate the acquired information. Student is able to conceptually design the structural layout for earlier developed mass of facility of industrial or general type. Student understands the need for lifelong learning; can inspire and organize process of learning other people. Student is aware of the importance of non-technical aspects and effects of engineering activities. Student can work and can cooperate in a team, assuming a number of different roles therein.

Course objective

Presentation of general issues related to essence of the work and the use of reinforced concrete in building constructions. Presentation of work specifics, load capacity and utility of reinforced concrete constructions on the basis of designing methods. Presentation of the stability aspects of steel and timber structural elements (beam, columns). Design of timber and steel trusses. Traditional timber trusses. Acquired the ability to implementation of course knowledge for basic structural solution in various cases of structural elements work.

Course-related learning outcomes

Knowledge:
Student knows and understands:
B.W4. mathematics, space geometry, statics, material strength, shaping, construction and dimensioning of structures, to the extent necessary to formulate and solve tasks in the field of architectural and urban design;
B.W5. issues of construction, construction technologies and installations, construction and building physics, covering key issues in architectural, urban and planning design as well as issues related to fire protection of buildings;
B.W6. investment economics and organization methods as well as the course of the design and investment process; basic principles of design and implementation quality management in the construction process;
B.W9. principles of occupational health and safety.

Skills:
Student can:
B.U3. use properly selected computer simulations, analyzes and information technologies, supporting architectural and urban design;
B.U4. develop solutions for individual building systems and elements in terms of technology, construction and materials;
B.U5. make a preliminary economic analysis of planned engineering activities;
B.U6. properly apply standards and legal regulations in the field of architectural and urban design.

Social competences:
Student is capable of:
B.S2. reliable self-assessment, formulating constructive criticism regarding architectural and urban planning activities.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - exam during session.
Project - execution of the project and its oral defense.
Grading scale:
5.0 - the student obtained more than 90% of the points in the colloquium or defense of the project,
4.5 - the student obtained from 80% to 90% of the points in the colloquium or project defense,
4.0 - the student obtained from 70% to 80% of the points in the colloquium or project defense,
3.5 - the student obtained from 60% to 70% of the points in the colloquium or project defense,
3.0 - the student obtained from 50% to 60% of the points in the colloquium or project defense,
2.0 - the student obtained less than 50% of the points from the colloquium or project defense

Programme content

Lecture (30h) + Exercise (30h)
- General principles of structural design.
- The participation of structural solutions in architectural designs.
- Durability of the structure. Corrosion and exposure classes.
- Loads in static calculations.
- Impact of loads on the work of various building structures.
- Calculation of structures for horizontal loads.
- Limit states of the load-bearing capacity of steel, reinforced concrete, timber and masonry structures.
- Limit states of use of steel, reinforced concrete, timber and masonry structures
- Shaping the structure of building structures, taking into account general stability.
- Design of elements and objects of steel structures.
- Design of elements and objects of reinforced concrete and prestressed structures.
- Design of elements and objects of timber and glulam structures.
- Design of elements and objects of masonry structures.
- Mixed-construction facilities.
- Construction details.
- Prefabricated reinforced concrete structures.
- Direct and indirect foundation of building structures.
- Diagnostics of structures in terms of ultimate and serviceability limit states.

Course topics

Lecture (30h)
1. Concrete structures. Eccentrically compressed cross-sections and elements (2h)
2. Steel structures. Tension and compression sections and elements (2h)
3. Hall buildings. Principles of construction. Spatial Stiffness (2h)
4. Building stiffening elements (shields, vertical and horizontal bracing) (2h)
5. Ceilings. Classification (2h)
6. Ceilings. Calculation and construction rules (2h)
7. Flat ceilings with heads and headless ceilings (2h)
8. Direct and indirect foundations. Special foundations (2h)
9. Direct foundations. Calculation and construction rules (2h)
10. Foundation slabs (2h)
11. Underground garage structures (2h)
12. Stairs. Classification (2h)
13. Stairs. Calculation and construction rules (2h)
14. Wooden roof trusses (2h)
15. Glued laminated timber structures (2h)

Exercise (30h)
1. Designing a reinforced concrete column/wall (6h)
2. Design of steel columns (4h)
3. Design of wooden columns (4h)
4. Collecting vertical and horizontal loads on the frame system (2h)
5. Computer design of mixed-design layout (14h)

Teaching methods

Lectures illustrated with slides and films - problem lecture / seminar lecture / lecture with multimedia presentation. Projects - design of a rafter made of steel, timber and reinforced concrete.

Bibliography

Basic
1. EN 1990: Eurocode - Basis of structural design
2. EN 1991-1-1: Eurocode 1: Actions on structures - Part 1-1 / Part 1-3 / Part 1-4
3. EN 1992-1-1: Eurocode 2: Design of concrete structures.
4. EN 1993-1-1: Eurocode 3: Design of steel structures.
5. EN 1995-1-1: Eurocode 5: Design of timber structures
6. Ioannis Vayas, John Ermopoulos, George Ioannidis, Design of Steel Structures to Eurocodes, doi. 10.1007/978-3-319-95474-5
7. Threlfall Tony, Worked Examples for the Design of Concrete Structures to Eurocode 2, Taylor & Francis, 2013, ISBN13 (EAN): 9780415468190
8. Porteous Jack, Structural Timber Design to Eurocode 5, Willey-Blackwell, 2013, ISBN13 (EAN): 9780470675007

Additional
1. Theodossopoulos Dimitris, Structural Design in Building Conservation, Taylor & Francis, 2012, ISBN13 (EAN): 9780415479462
2. Ching Francis D. K., Building Construction Illustrated, John Willey & Sons Inc, 2020, ISBN13 (EAN): 9781119583080
3. Edward Allen, Fundamentals of Building Construction: Materials and Methods 6th Edition, ISBN-13: 978-1118138915

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50