COURSE DESCRIPTION CARD - SYLLABUS

Course name
Building Construction 1 [S1Arch1>KB1]

Course

Field of study
Architecture

Year/Semester
2/3

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 the general issues related to the essence of the work and the use of steel, reinforced concrete and timber in building constructions. Presentation of basic assumptions to design the steel, reinforced concrete and timber constructions with the ability to use parameters contained in course publications. The ability to implementation of course knowledge for basic structural solution in various work cases of structural elements.

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 - final colloquium during the end of semester.
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
Lecture:
Formative assessment:
periodic control of learning progress, active participation in classes
Accepted grading scale: 2,0; 3,0; 3,5; 4,0; 4,5; 5,0.
Percentage of grades: 0–50% - 2.0 (insufficient); 50-60% - 3.0 (sufficient); 60-70% - 3.5 (sufficient plus); 70-80% - 4.0 (good); 80-90% - 4.5 (good plus); 90-100% - 5.0 (very good).
Summative assessment:
a final test or (if an exam is included in the curriculum) a written exam
Accepted grading scale: 2,0; 3,0; 3,5; 4,0; 4,5; 5,0.
Percentage of grades: 0–50% - 2.0 (insufficient); 50-60% - 3.0 (sufficient); 60-70% - 3.5 (sufficient plus); 70-80% - 4.0 (good); 80-90% - 4.5 (good plus); 90-100% - 5.0 (very good).

Tutorials:
Formative assessment:
periodic control of learning progress (tests), active participation in classes
Accepted grading scale: 2,0; 3,0; 3,5; 4,0; 4,5; 5,0.
Percentage of grades: 0–50% - 2.0 (insufficient); 50-60% - 3.0 (sufficient); 60-70% - 3.5 (sufficient plus); 70-80% - 4.0 (good); 80-90% - 4.5 (good plus); 90-100% - 5.0 (very good).
Summative assessment:
a final test
Accepted grading scale: 2,0; 3,0; 3,5; 4,0; 4,5; 5,0.
Percentage of grades: 0–50% - 2.0 (insufficient); 50-60% - 3.0 (sufficient); 60-70% - 3.5 (sufficient plus);

70-80% - 4.0 (good); 80-90% - 4.5 (good plus); 90-100% - 5.0 (very good).

Programme content

Lecture (30h)
Introduction to design of building structures. Process of design. Design philosophy. Introduction to Eurocodes.
Loads and actions according to Eurocode EN 1991 (climatic actions, usefull loads, load category of buildings).
Safety, durability and robustness of building structures according to Eurocode EN 1990. Comibnation of actions. Limit state design concept: ultimate limit states, serviceability limit states.
Introduction to design of steel structures. Mechanical and physical properties of steel grades. Cross-section classification. Cross-section capacity. Preliminary design concept.
Introduction to design of timber structures. Mechanical and physical properties of solid timber and timber made products. Asortment of timber sections. Cross-section capacity. Preliminary design concept.
Introduction to design of reinforced concrete structures. Mechanical and physical properties of reinforced concrete. Classes of reinforced concrete. Components of reinforced concrete. Preliminary design concept.

Exercise (30h)
Definition of roof and floor layers. Determination of a dead weight loads.
Definition of variable loads: climatic actions, usefull loads, service loads.
The transition from cubic to surface to linear loads for the various arrangement of the static scheme of structural elements.
Determination of the internal forces for different static schemes of beam elements (using the software).
Preliminary design of a cross-section made of steel, timber and reinforced concrete.

Course topics

Lecture (30h)
1. Eurocode 0 - Structural design (2h)
2. Eurocode 0 - Reliability design of structures. Ultimate and Serviceability Limit States (2h)
3. Eurocode 1 - Permanent and variable loads. Climatic loads (2h)
4. Eurocode 1 - Snow, wind, temperature, realization, exceptional loads (2h)
5. Eurocode 2 - Design of concrete structures. Materials (2h)
6. Designing concrete structures. Material models. Calculation assumptions (2h)
7. Concrete Structure Design Bending (2h)
8. Designing concrete structures. Shearing (2h)
9. Designing concrete structures. Serviceability limit states (2h)
10. Eurocode 3 - Design of steel structures. Materials (2h)
11. Design of steel structures. Bending cross-sections (2h)
12. Design of steel structures. Bending elements (2h)
13. Eurocode 5 - Designing timber structures (2h)
14. Designing wooden structures. Sections and bend elements (2h)
15. Designing wooden structures. Glued laminated timber structures (2h)

Exercise (30h)
1. Collecting loads on the ceiling. Selection of element cross-sections (12h)
2. Design of reinforced concrete bending element (6h)
3. Designing a steel bending member (6h)
4. Wooden bendable element design (6h)

Teaching methods

Lectures illustrated with slides and films - problem lecture / seminar lecture / lecture with multimedia presentation. Projects - preliminary design and definition of the loads and combinations for the given examples.

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