COURSE DESCRIPTION CARD - SYLLABUS

Course name
Building Construction 2 [S1Arch1E>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
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
0

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

dr inż. Jacek Ścigałło
jacek.scigallo@put.poznan.pl

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:
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.W7. ways of communicating the idea of architectural, urban and planning projects and their development;
B.W9. principles of occupational health and safety.

Skills:
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:
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
Design of a foundations (shallow and deep foundations). Footing and foundations. Definition of a basic building parts. Design of a beam and columns made of reinforced concrete. Design of a beam made of steel, timber and reinforced concrete (lateral stability problem). Design of a column made of steel, timber and reinforced concrete (flexural buckling problem). Design of a truss made of steel. Bracings systems. Design of a traditional timber roofs.
Project
Design project of a rafter made of steel, timber and reinforced concrete.

Course topics

Principles of calculating and constructing ceilings:
- monolithic ceilings,
- prefabricated ceilings,
- one-way reinforced slabs,

- cross-reinforced plates,
- densely ribbed ceilings,
- slab-ribbed ceilings,
- flat ceilings,
- panel ceilings,
- coffered ceilings.
Principles of designing cubature objects:
- hall buildings,
- multi-storey buildings,
- frame buildings,
- buildings with a wall layout,
- buildings with a mixed structural layout,
- core buildings,
- high-rise buildings,
- underground garages.

Spatial work of buildings:
- general stability of objects,
- horizontal transverse and longitudinal bracing,
- vertical bracing,
- flaccid, rigid and wall bracing,
- gable walls,
- operation of core buildings.
Communication elements of buildings:
- slab stairs,
- slab-beam stairs,
- stringer stairs,
- single-flight stairs,
- two-flight stairs,
- three-flight stairs,
- winder stairs,
- spiral staircase,
- entrance ramps,
- elevator shafts.
Principles of calculating and constructing foundations:
- direct foundations,
- intermediate foundations,
- foundation footings,
- strip foundations for walls,
- strip foundations for columns.
- foundation slabs,
- diaphragm walls.
Overview of special designs:
- shell structures,
- structural structures,
- crane girders,
-Tanks
-Silos
-Trays
-Masts.

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	65	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50