



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Civil Engineering 1 [S1Arch1E>BO1]

Course

Field of study
Architecture

Year/Semester
1/2

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

2,00

Coordinators

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Lecturers

Prerequisites

- The student has a basic knowledge of general construction, materials science, physics and mathematics, - the student has a basic knowledge of technical drawing and general construction related to the architectural object, - the student knows the basic methods, techniques, tools and materials used in the development of simple tasks in the field of freehand technical drawing. - The student is able to obtain information from literature, databases and other properly selected sources, including in English, he/she is able to integrate information, interpret it, as well as draw conclusions and formulate and justify opinions, - the student has the ability of self-education, - the student is able to use hand-drawing techniques appropriate for the implementation of technical drawings. - The student understands the need for lifelong learning, is able to inspire and organize the learning process of others, - the student is able to think and act in an analytical manner.

Course objective

- Learning about the components of buildings, the functioning of the building structure as a whole; - getting acquainted with loads occurring in the building, load differentiation depending on purpose of the object; - providing basic information about "invisible" elements of the building influence of ground and water conditions on the whole design process; - getting to know with variety of ceilings structures and possibilities of their forming, - providing basic information about other horizontal elements and their purpose in buildings; - presentation of vertical partitions and vertical load-bearing elements of buildings, and verticality transmission of loads; - acquainting with the variety of wooden roof constructions, and possibilities of their use not only in housing construction; - providing knowledge allowing for proper design of flat roofs; - acquaintance with elements of insulation occurring in buildings, and with requirements in this respect concerning not only anti-moisture and anti-water insulation, but also sound insulation; - Introduction of basic information about communication elements in buildings; - providing knowledge about prefabrication, including that "coming back" to housing construction;

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.W7. ways of communicating the idea of architectural, urban and planning projects and their development;

B.W9. principles of occupational health and safety.

Skills:

Student can:

B.U4. develop solutions for individual building systems and elements in terms of technology, construction and materials;

B.U6. properly apply standards and legal regulations in the field of architectural and urban design.

Social competences:

Student is capable of:

B.S1. formulating opinions on the achievements of architecture and town planning, their determinants and other aspects of the architect's activity, as well as providing information and opinions;

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:

The lecture series in Civil engineering 1 ends with a credit colloquium.

1. The lecture series is completed by a colloquium on the PUT eKursy platform after logging in through individual student accounts.

2. The assessment colloquium consists of two parts - a drawing task and a multiple-choice test.

Formative assessment: -

Summative assessment: Assessment obtained during the credit colloquium.

Adopted grading scale: 2,0; 3,0; 3,5; 4,0; 4,5; 5,0

Programme content

The lectures and classes will cover topics such as:

- Basic building components;
- Structural systems and their types;
- Typization in construction;
- Structural elements;
- Loads in construction;

- Technical documentation, elements of the Construction and Executive Design (Documentation).

Course topics

Lecture #1: Introductory Lecture. presentation of the course program, credit requirements, discussion of what is general construction on the basis of projects and realization of selected buildings. Basic definitions of the subject (construction, buildings, structures).

Lecture #2 and #3: Components and building parts. Discussion of the basic building components (foundations, load-bearing walls, curtain walls, lintels, binders, columns, ceilings, trusses), Structural systems (longitudinal, transverse, mixed, unidirectional, bidirectional), construction types (with load-bearing walls, frame, cantilever, hanging, etc.), typification in construction - giving basic modular spans for individual structural elements - with particular reference to the structural and clear dimensions.

Lecture #4: Loads in building. Discussion of basic load standards i.e. permanent loads, basic process and installation (variable) loads, wind load and snow load with particular reference to variable loads depending on the function of the building. Discussion of basic design concepts, design stages, preliminary selection of structural system, materials, selection of floors. Design example for preliminary ceiling selection.

Lecture #5: Building foundations. Discussion of foundation methods - Direct foundations and indirect foundations, discussion of types of foundations for buildings (footings, grates, piles, slabs, slurry walls), materials, construction technology, and general principles of using particular types of foundations, discussion of basic information on soil-water investigations and hydrogeological conditions.

Lecture #6 and #7: Horizontal elements of buildings - part I "Floors". Discuss the function of floors in a building. Ceilings division due to division of floors depending on used materials: reinforced concrete, reinforced concrete and steel, ceramic and steel, wooden. Division of ceilings according to the technology of execution: prefabricated, semi-prefabricated, dense rib, monolithic (including mushroom and mushroomless ceilings). Basic floor construction systems: single and multi-span, one-way and two-way. Advantages and disadvantages of each solution. Discuss conditions affecting selection of a particular solution and floor thickness.

Lecture #8: Horizontal elements of buildings - part II "other horizontal elements". Discussion of other horizontal building elements: lintels (monolithic, prefabricated), beams (reinforced concrete and steel), balconies and terraces (construction, application possibilities, construction requirements), frames and frame systems, trusses. Provide rules for initial sizing of individual components, presentation of non-standard structural solutions such as Vierendeel beam, "hanging" ceiling. The functions of the various elements in the building.

Lecture #9: Vertical elements of buildings. Discuss the function of walls in a building, walls (load bearing, curtain, partition, foundations), discussion of the role in buildings, discussion of wall technology and materials of which walls are made. Criteria for selection of technology, material and size (load capacity, load distribution load, service conditions - acoustic and thermal insulation), columns - types of columns, due to material used, scheme, shape - wooden, masonry, reinforced concrete, steel columns. Inter-window pillars - basic requirements. Pilasters. Technology of walls constructing (masonry on mortar, glued, prefabricated, monolithic). Layered wall systems of lightweight housing.

Lecture #10: Roofs - wooden roof structures. Discussion of wooden roof structures - rafter, rafter and purlin, collar beam, hipped, mansard. Components of each structure along with basic dimensions. Conditions of application of different types of trusses, materials used for roof structures. Ways of joining wooden structures - carpentry joints, nail and screw joints, steel fasteners. Types of roofing used in roof trusses. Structural elements made of glued laminated timber.

Lecture #11: Flat roofs and roof coverings. Presentation of solid and ventilated - hatch and non-hatch - roof structures, materials used to design flat roofs and flat roof coverings (minimal decreases). Steel roof structures - trusses and sheet metal trusses. Metal flashings on roofs.

Lecture #12: Insulation in buildings. Waterproofing, damp proofing, thermal and acoustic insulation - types, design, application. Details of the design and execution of insulation with particular taking into account typical "dangerous" places in buildings.

Lecture #13: Communication elements in buildings. Stairs, ramps, cranes, escalators, entrances and driveways to buildings. Division of communication elements by materials used. Types of communication elements, construction, structural requirements of applications of selected communication elements. Design - basic patterns ("comfortable stairs"), taking basic dimensions of communication elements.

Lecture #14: Repetition of the material.

Lecture #15: Credit Colloquium. Credit for the semester.

Teaching methods

1. Lectures,
2. Lecture with multimedia presentation,
3. Lecture with slideshows of photos from construction projects,
4. eKursy PUT eLearning platform (a system for supporting the teaching process and distance learning).

Bibliography

Basic

1. Markiewicz P., Budownictwo ogólne dla architektów, Archi-Plus,
2. Praca zbiorowa, Poradnik majstra budowlanego, Arkady, Warszawa 1992.
3. Żeńczykowski W., Budownictwo ogólne 2/1, Arkady , Warszawa 1981.
4. Żeńczykowski W., Budownictwo ogólne 2/2, Arkady , Warszawa 1981.
5. Żeńczykowski W., Budownictwo ogólne 3/1, Arkady , Warszawa 1987.
6. Żeńczykowski W., Budownictwo ogólne 3/2, Arkady , Warszawa 1987.
7. Course on PUT eLearning platform eKursy for "Civil Engineering 1"

1. PN-82 B-02001 Obciążenia Budowli- Obciążenia stale
2. PN-82/B-02003 Podstawowe obciążenia technologiczne i montażowe)
3. PN-77/B-02011 Obciążenie wiatrem
4. PN-82/B-02004 Obciążenia pojazdami),
5. PN-EN 1991-1-3:2005 Eurocod 1 Oddziaływania na konstrukcje. Część 1-3 Oddziaływania ogólne. Obciążenie śniegiem.

Additional

1. Seria wydawnicza: Słabe miejsca w budynkach tomy 1-6 Arkady,Warszawa 1982-197.

Recommended for classes in the english language:

1. Littleield D. "Metric Handbook: Planning and Design Data", 4th Edition, Routledge 2012
3. Allen E. & Joseph Iano J., Fundamentals of Building Construction - Materials and Methods, 5th Edition, Wiley
3. Deplazes A. (ed.), Constructing Architecture: Materials, Processes, Structures. A Handbook, Birkhäuser Basel 2021
4. Markiewicz P., Building Construction For Architects, Archiplus 2014
5. Watts A., Modern Construction Handbook, 6th edition, Birkhäuser 2022

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00