COURSE DESCRIPTION CARD - SYLLABUS

Course name
Selected industrial structures [S2Bud1E>WKP]

Course

Field of study
Civil Engineering

Year/Semester
2/3

Area of study (specialization)
Structural Engineering

Profile of study
general academic

Level of study
second-cycle

Course offered in
English

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Knowledge, skills and competences acquired during the education process in the field of structural design. The ability to formulate and solve technical problems in the field of civil engineering.

Course objective

To acquaint students with the current problems of designing and implementing the construction of industrial facilities.

Course-related learning outcomes

Knowledge:
1. The student has knowledge of detailed and advanced issues of material strength, modelling of materials and structures; have knowledge of the theoretical basis of the Finite Element Method as well as general principles of nonlinear analysis of engineering structures.
2. The student knows in detail the rules of design, construction and operation of selected building units.

Skills:
1. The student is able to correctly define a computational model and carry out an advanced linear

analysis of complex building units, their elements and connections; is able to apply basic nonlinear computational techniques together with a critical evaluation of numerical analysis results.
2. The student can dimension complex construction details in selected building objects.

Social competences:
1. The student is ready to autonomously complete and broaden (extend) knowledge in the field of modern processes and technologies of building engineering.
2. The student can realise that it is necessary to improve professional and personal competence; is ready to critically evaluate the knowledge and received content.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Assessment of the lectures: written test including 3-5 tasks checking the subject learning outcomes, the condition for passing is obtaining a minimum satisfactory mark.
Assessment of projects: Students are assessed on an ongoing basis according to the progress of work in modeling the structure and calculating tasks. The assessment concerns each of the given problems; the condition for passing is obtaining a minimum satisfactory mark.

Programme content

Design principles of large-area hall structures.
Modeling of basic structural elements.
Modeling of reinforced concrete structures: beams, columns, frames, slabs, foundations.
Supporting structures for machinery, tanks, installations, suspended transport.
Optimization of building structures.
Diagnosis of damage and strengthening of structural elements.

Course topics

Lectures:
1. Modeling of structural systems of large-area halls. Column grid, dimensions and arrangement of structural elements.
2. Creation of reinforced concrete structures of industrial buildings. Support structures for machines, tanks, silos.
3. Design of prefabricated elements with large spans. Selection of the cross-section of the roof girder, floor elements, etc.
4. Creating connections of prefabricated elements. Selection of the calculation model. Anchoring the column, supporting the roof girder, connecting the beam with the column.
5. Diagnostics of damages in buildings. Basic causes of damage, visible effects of poor work of the structure, asymptomatic emergency states. Structural health monitoring.
6. Principles of strengthening steel and reinforced concrete structures. Increasing the load-bearing capacity of structural elements. Repair or strengthening of structural connections.
Projects:
1. Designing a spatial steel structure. Computational models of main systems. Arrangement of expansion joints and braces.
2. Analysis of a portal frame with a steel, reinforced concrete and wooden girder.
3. Design of the foundation slab of a multi-storey building. Collection of loads and dimensioning.

Teaching methods

Lectures: informative and problem lecture, case study method
Projects: project method, solving project tasks given by the teacher

Bibliography

Basic
1. PN-EN 1990: Eurokod 0 - Basis of structural design
2. PN-EN 1991: Eurokod 1 - Actions on structures
3. PN-EN 1992: Eurokod 2 - Design of concrete structures

4. PN-EN 1993: Eurokod 3 - Design of steel structures
5. Alan Williams (2011), Steel structures design. The McGraw-Hill.
6. A.J. Bond et al. (2006), How to Design Concrete Structures using Eurocode 2. CCIP.
Additional
1. S. Trahair, M.A. Bradford, D.A. Nethercot, L. Gardner (2007): The Behaviour and Design of Steel Structures to EC3, Balkema.
2. . Sobon, R. Schroeder (1984), Timber frame construction: all about post and beam building. Garden Way Pub.

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	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)	30	1,00