COURSE DESCRIPTION CARD - SYLLABUS

Course name
Concrete structures with BIM [N2Bud1-KB>KBzeBIM]

Course

Field of study
Civil Engineering

Year/Semester
1/1

Area of study (specialization)
Structural Engineering

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
18

Laboratory classes
10

Other (e.g. online)
0

Tutorials
0

Projects/seminars
18

Number of credit points

5,00

Coordinators

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Lecturers

Prerequisites

KNOWLEDGE: The student has knowledge of mathematics, physics and chemistry, strength of materials, building mechanics, knows the basics of reinforced concrete theory, knows the principles of analysis, construction and dimensioning of reinforced concrete elements, simple and complex building objects, knows the standards and guidelines for the design of building structures and their elements SKILLS: The student is able to assess and compare the loads acting on building objects, is able to classify building objects, is able to design elements in complex reinforced concrete structures, and is able to choose tools (analytical or numerical) to solve engineering problems. SOCIAL COMPETENCES: The student is a responsible person who wants to expand his knowledge, contact with others and work in a team. The student is aware of the need to constantly update and supplement knowledge and skills..

Course objective

The student knows the rules for determining combinations of permanent and variable loads. The student knows the principles of dimensioning reinforced concrete sections under complex load conditions. The student knows the principles of constructing complex reinforced concrete structures. The student is able to determine the loads acting on structural systems and determine the most unfavorable cases. The student is able to design shell structures in the film and bending state. The student is able to construct reinforcement of selected elements and thin-walled structures. The student is aware of the need to act in the public interest, taking into account the goals of sustainable construction and responsibility for the results of calculations and designs of structural elements. He understands the need for lifelong learning and can co-organize the learning process. Able to work in a group. Properly recognizes and solves problems related to the profession.

Course-related learning outcomes

The student knows the rules for determining combinations of permanent and variable loads. The student knows the principles of dimensioning reinforced concrete sections under complex load conditions. The student knows the principles of constructing complex reinforced concrete structures
Skills
The student is able to determine the loads acting on structural systems and determine the most unfavorable cases. The student is able to design shell structures in the film and bending state. The student is able to construct reinforcement of selected elements and thin-walled structures.
Social competences
The student is aware of the need to act in the public interest, taking into account the goals of sustainable construction and responsibility for the results of calculations and designs of structural elements. He understands the need for lifelong learning and can co-organize the learning process. Able to work in a group. Properly recognizes and solves problems related to the profession.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Completion of lectures in the form of a written exam. Exam duration approx. 1.5 hours. Deadline for passing lectures - examination session in a given semester. Completion of laboratory exercises - assessment in the form of a written final test. Passing date - last exercises in a given semester. Passing the design exercises: mandatory individual performance of the design exercise. Project completion time - the entire semester. Final assessment of design exercises in oral form. Passing date - last exercises in a given semester. The second passing date - until the end of the examination session - oral defense of the project.
Grading scale :
100%. - perfect
91-99 points - very good (A)
81-90% - good plus (B)
71- 80% - good (C)
61-70% - sufficient plus (D)
50-60% - satisfactory (E)
< 50%. - insufficient (F)

Programme content

Analysis of reinforced concrete structures according to Eurocode 2. Types of silos and tanks. Loads acting on silos and tanks and their design combinations. Differential shell equilibrium equations. Coating coverings as spherical and conical coatings. Cylindrical coatings. Liquid tanks. Silos for bulk materials. The use of various computational methods (traditional and computer) in calculating shell structures. Shaping reinforcement and construction details

Course topics

1 . Calculation and construction of unidirectionally and multidirectionally reinforced rectangular slabs, based on two, three and four edges, single and multi-span.
2. Calculation and construction of round and triangular cross-reinforced slabs.
3. Determination of fluid and soil pressure loads and their standard combinations.

4. Calculation and construction of direct foundations. Strip foundations for continuous and concentrated loads, footings and foundation slabs.
5. Calculation and construction of retaining walls.
6. Calculation and construction of tanks for liquids with a rectangular cross-section, aboveground, aboveground and underground.
7. Calculation and construction of cylindrical tanks for liquids, aboveground, aboveground and underground.
8. Calculation of spherical shells and thin-walled coverings.
9. Calculation and construction of silos for bulk materials depending on the cross-sectional dimensions and their height.

Teaching methods

1. Lecture with multimedia presentation.
2. Design exercises - solving individual design tasks.
3. Laboratory exercises - traditional classes with chalk at the blackboard supported by multimedia presentations and computer work using BIM.

Bibliography

1. K. Grabiec, Żelbetowe konstrukcje cienkościenne. PWN, Warszawa-Poznań 1999.
2. A. Halicka, D. Franczak, Projektowanie zbiorników żelbetowych. Tom 1: Zbiorniki na materiały sypkie. PWN, Warszawa 2011.
3. A. Halicka, D. Franczak, Projektowanie zbiorników żelbetowych. Tom 2: Zbiorniki na ciecze. Wyd. 2. PWN, Warszawa 2014.
4. M. Knauff i in., Podstawy projektowania konstrukcji żelbetowych i sprężonych według Eurokodu 2. Dolnośląskie Wydawnictwo Edukacyjne, 2006.
5. J. Kobiak, W. Stachurski, Konstrukcje żelbetowe. Arkady, Tom 2 i Tom 4, Warszawa 1987 i 1991.
6. A. Seruga, Sprężone betonowe zbiorniki na ciecze o ścianie z prefabrykowanych elementów. Wyd. Politechniki Krakowskiej, Kraków 2015.

Breakdown of average student's workload

	Hours	ECTS
Total workload	130	5,00
Classes requiring direct contact with the teacher	48	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	82	3,00