COURSE DESCRIPTION CARD - SYLLABUS

Course name

Concrete Structures with BIM

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 studies

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

30

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

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Faculty of Civil and Transport Engineering

Institute of Building Engineering

ul. Piotrowo 5, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

KNOWLEDGE: The student has knowledge of mathematics, physics and chemistry, knows the rules of analysis, construction and dimensioning of reinforced concrete elements of any building objects and knows the standards and guidelines for designing building objects and their elements.

SKILLS: The student is able to evaluate and compile loads acting on building objects, can classify building objects, can design elements in complex reinforced concrete structures, and can choose tools (analytical or numerical) to solve engineering problems.

SOCIAL COMPETENCE: Student is a responssible person willing to broaden her/his knowledge and to communicate and work in a team environment with her/his colleagues.

Course objective

Understanding the principles of analysis and design of shell reinforced concrete structures.

Course-related learning outcomes

Knowledge

The student knows the rules for determining the combination of permanent and variable loads.

The student knows the rules of dimensioning reinforced concrete sections in a complex load condition.

The student knows the rules of constructing complex reinforced concrete structures.

Skills

The student is able to determine the loads acting on structural systems and determine their most unfavorable cases in combination.

The student is able to design shell structures in the membrane and bending states.

The student is able to construct the reinforcement of selected elements and thin-walled structures.

Social competences

Student is aware of the need for acting in the public interest and with regard to the purposes of sustainable building engineering and of her/his respossiblity for the results of performed calculations and design of structural elements.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture – Final exam at the last lecture (2h)

Projects – Completion of a project of a reinforced concrete silo or tank and defence of it in the form of test (1 h) at the last meeting.

Programme content

Analysis of reinforced concrete structures according to Eurocode 2. Types of silos and tanks. Loads acting on silos and tanks and their calculation in combination. Differential equilibrium equations of shells. Surface structures as spherical and conical shells. Cylindrical shells. Liquid tanks. Silos for loose materials. Application of the finite element method and computer programs in the calculation of shell structures.

Teaching methods

Lecture – Traditional lectures ("chalk-and-talk"), with computer-assisted presentations at times.

Projects – Project of a reinforced concrete silo or tank.

Bibliography

Basic

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.

Additional

1. P. Lewiński, Zasady projektowania zbiorników żelbetowych na ciecze z uwzględnieniem wymagań Eurokodu 2: przykłady obliczeń. Wyd. ITB, Warszawa 2011.

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	75	3,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	50	2,0

[1] delete or add other activities as appropriate