COURSE DESCRIPTION CARD - SYLLABUS

Course name
Concrete Structures

Course

Field of study
Civil Engineering Second-cycle Studies

Year/Semester
I/2

Area of study (specialization)
Civil Engineering

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
english

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes

Other (e.g. online)

Tutorials
15

Projects/seminars
15

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
dr inż. Teresa Grabiec-Mizera

Responsible for the course/lecturer:

Prerequisites

Knowledge: A student has knowledge of: general mechanics and strength of materials, basis of theory of concrete structures, knows analysis principles of simple and complex RC elements design with taken RC two-way reinforced slabs into consideration.

Skills: A student can estimate and report loads acting on building structures. Student can classify building structures, design RC structure elements with taken two-way reinforced slabs into consideration and choose analytical or numerical solution of engineering problems.

Social competencies: A student understands the need for lifelong learning and knows how to interact in a group

Course objective

The gaining of knowledge and skills concerning design of thin- walled structures and prestressed structures. Preparing for numerical modeling of RC structures by the Autodesk Robot Structural Analysis Program.

Course-related learning outcomes

Knowledge

1. A student knows the basic type of loads acting on shell covers, he knows analysis principles rotational shells and spherodial shells whose performance is a complex state of stress. A student knows design and reinforcing principles concerning shell covers. - [K 2 W02, K 2 W14]

2. A student knows different type of loads in design situations concerning prestressed structures. - [K 2 W02, K 2 W14, K 2 W16]

3. A student knows principles of designing, dimensioning and reinforcing sections in prestressed structures. - [K 2 W02, K 2 W14, , K 2 W16]

4. A student knows principles of designing and dimensioning RC structures. He knows basic informations concerning numerical program Autodesk Robot Structural Analysis - [K 2 W01, K 2 W04]

Skills

1. A student is able to calculate loads acting on ground and underground shell structures. - [K 2 W01, K 2 W02]

2. A student is able to characterize different type of shell covers, liquid tanks, silos and he is able to calculate reinforcement. - [. K 2 W01, K 2 W02, K 2 W03]

3. A student is able to calculate losses of prestress and loads acting on sections in prestressed structures. - [K 2 W01, K 2 W02]

4. 5. A student is able to design RC structures by means the basic knowledge of Autodesk Robot Structural Analysis - [K 2 W01, K 2 W04, K 2 W06, K 2]

Social competences

1. A student understands the need of lifelong learning, is able to organize the learning process of others. - [K 2 W02, K 2 W03]

2. A student is able to cooperate and work in a group - [K 2 W01, K 2 W06]

3. He correctly identifies and resolves problems associated with his profession - [K 2 W07]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Credit of lectures and exercise classes

Credit in written form (1 per semester) - 1,5h

Credit of projects

Estimation of individual projects on the basis of calculation and structural drawings with a defence of submitted work

Number of evaluation

[%] (grade)

91-100 % (5)

81- 90% (4,5)

71- 80 % (4)

61- 70 % (3,5)

51- 60% (3)

poniżej 50% (2)

Programme content

Form of teaching: lectures

Selected issues of thin- walled structures: shall covers, liquid tanks, silos. Design issues of prestressed structures (pre-tensioned and post-tensioned structures)

Form of teaching: exercise classes

Principles of design selected thin- walled structures. Main principles of calculation losses of prestress and loads acting on sections in prestressed structures.

Form of teaching: projects

Calculation of two-way reinforced slabs supported on spatial frames by means the finite element method. Reinforced concrete structure numerical modeling in Autodesk Robot Structural Analysis.

Teaching methods

Lectures - multimedia presentations, examples- educationals materials

Classes and projects - multimedia presentations, calculations and examples- software presentation, tutorial

Bibliography

Basic

1.Nilson H.A., Darwin D., Dolan w. Ch. Design Concrete Structures, Mc Graw Hill Higher Education 2004

2.Mosley B., Bungey J., Hulse R. Reinforced Concrete Design, Palgrave macmillan 2007

3.Bhatt P. Prestressed concrete design to Eurocodes, Spon Press 2011

Additional

1.Halicka A., Frantczak D.: Projektowanie zbiorników żelbetowych, Wydawnictwo Naukowe PWN 2011,2013 t. 1,2.

2.Ajdukiewicz A., Mames J.: Konstrukcje z betonu sprężonego, Polski Cement Kraków 2004

3. Knauff M.: Obliczanie konstrukcji żelbetowych według Eurokodu, PWN Warszawa 2018

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	45	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	15	0,5

[1] delete or add other activities as appropriate