COURSE DESCRIPTION CARD - SYLLABUS

Course name
Prestressed structures [S2Bud1-KB>KS]

Course

Field of study
Civil Engineering

Year/Semester
1/2

Area of study (specialization)
Structural Engineering

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
30

Number of credit points

3,00

Coordinators

dr inż. Adam Uryzaj
adam.uryzaj@put.poznan.pl

Lecturers

Prerequisites

The student has knowledge of: general mechanics and strength of materials, basis of theory of concrete structures, analysis principles of simple and complex RC elements design with taken RC two-way reinforced slabs into consideration. The student can estimate and report loads acting on building structures. He 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. The student understands the need for lifelong learning and knows how to interact in a group.

Course objective

Acquiring knowledge and skills in the construction and dimensioning of prestressed structures in the ultimate and serviceability limit state.

Course-related learning outcomes

Knowledge:
The student knows different type of loads in design situations concerning prestressed structures.
The student knows principles of designing, dimensioning and reinforcing sections in prestressed structures.

The student knows the loads acting on the cross-sections and losses of prestressing forces.

Skills:
The student is able to use the standards for the dimensioning of reinforced concrete structures.
The student is able to determine the loads acting on the sections and losses of prestressing forces.
The student is able to design simple bent prestressed concrete sections.

Social competences:
The student understands the need of lifelong learning, is able to organize the learning process of others.
The student is able to cooperate and work in a group .
The student correctly identifies and resolves problems associated with his profession.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Passing the lectures in the form of a written exam. The duration of the exam is about 1.5 hours.
Deadline for completing the lectures - the last lecture in a given semester. The second pass date - by the end of the exam session.
Completion of design exercises: obligatory individual execution of a design exercise. Project completion time - the entire semester. Final completion of design exercises in the oral form. Pass date - the last exercises in a given semester. The second credit date - by the end of the examination session - oral defense of the project.
Number of evaluation
100% - excellent
91 - 99% - very good (A)
81 - 90% - good + (B)
71 - 80% - good (C)
61 - 70% - sufficient +(D)
50 - 60% - sufficient (E)
< 50 % F failed

Programme content

1. Introduction to the design of prestressed concrete structures.
2. Basic material properties and methods of production of prestressed structures.
3. Basic principles of designing prestressed structures.
4. Rules for selecting the shape of the cross-section.
5. Compressive forces.
6. Immediate losses of prestress for pre- and post-tensioning and time dependent lossess of prestress for pre- and post-tensioning and their determination.
7. Ultimate Limit State in basic computational situations.
8. Anchorage zones in prestressed concrete structures.
9. Serviceability Limit State

Course topics

1. Introduction to the design of prestressed concrete structures.
2. Basic material properties and methods of production of prestressed structures.
3. Basic principles of designing prestressed structures.
4. Rules for selecting the shape of the cross-section.
5. Compressive forces.
6. Immediate losses of prestress for pre- and post-tensioning and time dependent lossess of prestress for pre- and post-tensioning and their determination.
7. Ultimate Limit State in basic computational situations.
8. Anchorage zones in prestressed concrete structures.
9. Serviceability Limit State

Teaching methods

1. Lecture with multimedia presentation.

2. Design exercises - solving individual design tasks.

Bibliography

Basic
1. Konstrukcje z betonu sprężonego Andrzej Ajdukiewicz, Jakub Mames, Polski Cement, Kraków 2004.
Michał Knauff – Obliczanie konstrukcji żelbetowych według Eurokodu 2.
Wydanie 3. PWN, Warszawa 2018 (rozdział 19).
3. Michał Knauff, Marcin Niedośpiał – Betonowe konstrukcje sprężone w
budownictwie ogólnym. PWN, Warszawa 2021.
4. Rafał Szydłowski – Stropy płytowe sprężone cięgnami bez przyczepności.
Teoria, projektowanie Badania. Wydawnictwo Politechniki Krakowskiej,
Kraków 2019.
5. PN-EN 1992-1-1: wrzesień 2008 Eurokod 2. Projektowanie konstrukcji z betonu. Część 1-1: Reguły ogólne i reguły dla budynków.
6. PN-B-03264:2002 Konstrukcje betonowe żelbetowe i sprężone. Obliczenia statyczne i projektowanie.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00