



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Concrete bridges

Course

Field of study

Year/Semester

Civil Engineering

1/2

Area of study (specialization)

Profile of study

Road, Bridge and Railway Engineering

general academic

Level of study

Course offered in

Second-cycle studies

Polish

Form of study

Requirements

full-time

compulsory

Number of hours

Lecture

Laboratory classes

Other (e.g. online)

30

Tutorials

Projects/seminars

30

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

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Wydział Inżynierii Lądowej i Transportu

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Prerequisites

Knowledge

Knowledge of strength of materials, structure mechanics, soil mechanics, concrete structures, foundations. Knowledge of the basics of bridge engineering in the field of the basics of shaping concrete bridges. Knowledge of the methods of determining internal forces including permanent and moving loads. Knowledge of the principles of dimensioning of reinforced concrete structures.

Skills

Skills related to performing static calculations and designing of reinforced concrete structures. Ability to perform basic static calculations of simple bridge structures. Self-education skills.



Social competencies

Ability to adapt of the type of any civil engineering structure to the communication requirements and social expectations, respect for the Polish language, understand the need for lifelong learning and group collaboration

Course objective

To acquaint students with the principles of shaping, designing and building bridge prestressed beam structures with various static schemes, concrete bridge structures with complex static systems and the composite concrete-concrete bridge structures

Course-related learning outcomes

Knowledge

1. Student knows the rules of shaping prestressed concrete bridges and bridges with complex static systems
2. Student has knowledge of dimensioning and shaping the reinforcement of reinforced concrete and prestressed concrete elements
3. Student has knowledge of dimensioning and shaping the reinforcement of concrete composite elements of the concrete-concrete type
4. Student has knowledge of calculating and shaping reinforcement in bridges with complex static systems (diagonal slabs, structures with a box cross section)
5. Student has knowledge of the technology of construction of concrete bridges, especially prestressed ones

Skills

1. Student is able to shape a prestressed bridge in longitudinal and transverse sections
2. Student is able to calculate a concrete prestressed bridge - calculate the required prestressing force, design the required prestressing reinforcement, calculate the prestressing losses and develop a prestressing program
3. Student is able to calculate a bridge made of composite elements type concrete-concrete
4. Student is able to shape a bridge with a complex static system (oblique plates, box sections) and to design and shape their reinforcement

Social competences

1. Student is responsible for the reliability of the obtained results of his / her work and the work of the team subordinate to him
2. Student is ready to independently complete and expand knowledge in the field of modern processes and technologies in construction



3. Student is aware of the need for sustainable development in construction
4. Student is aware of the need to improve professional and personal competences, is ready to critically assess his knowledge and received content

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written exam of the student's knowledge in the field of basics of bridges and material presented during the lectures.

Design exercise: assessment of the correctness of the exercise performed and demonstrating knowledge of the design exercise performed.

Programme content

Lectures (in the form of lectures with a multimedia presentation):

Idea of concrete structures and prestressed structures, purpose and methods of prestressing structures, shaping prestressed spans in various static systems, prestressed concrete and post-tensioned structures, design of prestressing reinforcement taking into account the ultimate and serviceability limit states, calculation of prestressing force losses, ability to program prestressing structures, calculation of anchorage zones, technologies for assembling prestressed structures, calculating composite concrete-concrete structures, calculating diagonal spans, calculating box-section spans, etc.

Project:

Design exercises (partly in the form of exercises with a multimedia presentation, using various sources of knowledge): a selected design task related to the static and strength analysis of a prestressed concrete beam bridge structure

Teaching methods

Lectures: problem lecture/lecture with presentations/ case study

Design exercises - exercise method, project method

Bibliography

Basic

Iwona Jankowiak „Podstawy budownictwa mostowego”, Wydawnictwo Politechniki Poznańskiej, Poznań 2019

Arkadiusz Madaj, Witold Wołowicki „Podstawy projektowania budowli mostowych”, WKiŁ Warszawa 2003/2007/...

Henryk Czudek, Wojciech Radomski „Podstawy mostownictwa”, PWN Warszawa 1983



Additional

Arkadiusz Madaj, Witold Wołowicki „Mosty betonowe“, WKŁ 1980/2002

Arkadiusz Madaj, Witold Wołowicki „Projektowanie mostów betonowych“, WKiŁ, Warszawa 2010

Arkadiusz Madaj, Witold Wołowicki „Mosty betonowe. Wymiarowanie i projektowanie“, WKiŁ Warszawa 1998/2002/2005/...

Jacek M. Skarżewski, Witold Wołowicki, Krzysztof Sturzbecher, „Mosty sprężone. Przewodnik do ćwiczeń projektowych“, Wydawnictwo PP, Poznań, 1989

Fritz Leonhardt, „Podstawy budowy mostów betonowych“, WKiŁ, Warszawa 1982

Juliusz Szczygieł, „Mosty z betonu zbrojonego i sprężonego“, WKiŁ, Warszawa 1972

Andrzej Ajdukiewicz, Jakub Mames, „Konstrukcje sprężone“, Państwowe Wydawnictwo Naukowe, Warszawa 1979

Andrzej Łapko, Bjarne Christian Jensen „Podstawy projektowania i algorytmy obliczeń konstrukcji żelbetowych“, Arkady , Warszawa 2005

Włodzimierz Starosolski „Konstrukcje żelbetowe wg PN-B-03264:2002 i Eurokodu 2“, Wydawnictwo Naukowe PWN, Warszawa 2009

Prasa techniczna / Katalog detali mostowych

Dz.U. 1994 nr 89 poz. 414 - Ustawa z dnia 7 lipca 1994 r. „Prawo budowlane”

Rozporządzenie Ministra Infrastruktury z dnia 24 czerwca 2022 r. w sprawie przepisów techniczno-budowlanych dotyczących dróg publicznych

PN-EN-1992-1-1: Eurocod 2: Projektowanie konstrukcji z betonu. Część 1-1: Reguły ogólne i reguły dla budynków

PN-EN 1992-2 Eurokod 2 – Projektowanie konstrukcji z betonu. Część 2: Mosty betonowe – Obliczanie i reguły konstrukcyjne

Breakdown of average student's workload

	Hours	ECTS
Total workload	120	4,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	60	2,0

¹ delete or add other activities as appropriate