



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Design of bridges and tunnels

### Course

Field of study

Civil Engineering second-cycle studies

Area of study (specialization)

Civil Engineering

Level of study

Second-cycle studies

Form of study

part-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

26

Laboratory classes

Tutorials

10

Projects/seminars

18

Other (e.g. online)

### Number of credit points

### Lecturers

Responsible for the course/lecturer:

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Budownictwa i Inżynierii Środowiska

ul. Piotrowo 5, 61-138 Poznań

Responsible for the course/lecturer:

### Prerequisites

Knowledge

Knowledge of the strength of materials, structural mechanics, soil mechanics, concrete structures, steel structures, foundation design and fundamentals. Knowledge of Basics of Bridges in the range of the concrete and steel bridge structures and underground structures

Skills

Skills related to the static calculations and design of concrete and steel structures. Ability to perform basic static calculations of simple bridge structures. Self-learning 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

Understanding the terminology used to describe bridge structure.

Understanding the structural elements of selected types of spans and bridge supports and their functions.

Knowing selected loads used to calculate the bridge structures.

Understanding of selected issues in the field of static and strength calculations of bridge structures.

### Course-related learning outcomes

#### Knowledge

1. Student knows the definitions of parameters characterizing the position and dimensions of bridge structures, he knows the names of components of structure and equipment of bridges and knows their functions
2. Student knows the classifications of different types of bridge spans, their supports and equipment elements
3. Student knows the permanent and moving loads appearing on bridges according to European standard PN-EN

#### Skills

1. Student can name components of spans and supports of bridges and can describe every bridge using the correct terminology
2. Student can draw: cross-section and longitudinal view of different type of bridge structure, as well as a abutment and a bridge intermediate support
3. Student is able to determine permanent and moving loads of bridge structure or part thereof

#### Social competences

1. Student can adapt the type of structure to the communication requirements and social expectations
2. Student can collaborate and work together in a group, is aware of the need for self-education
3. Student complies with the principles of the Polish language and the rules of preparation of technical documentation

### 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



Written test of the student's knowledge in the field of material presented during the tutorials.

Preparation of some static-strength calculation of chosen bridge (project) and oral test of knowledge of the range of this project.

### Programme content

Lectures:

Basic definitions, main elements of bridge structure, types and elements of bridge spans, types and element of bridge supports, bridge span equipment, bridge structure dimensions, bridge classifications, issues related to the connection of bridge structures to the road and rail embankments, permanent and moving loads on bridges, basic methods of bridge span and support analysis, selected issues of structural design of bridges, issues related to the specifics of bridged constructions (among others fatigue and dynamic analysis of structures, joints in steel structures, layout of reinforcement bars in concrete elements, prefabricated bridges, etc.)

Tutorials and project:

static-strength analysis of spans and supports of bridge

### Teaching methods

Lectures: problem lecture/lecture with presentations/ case study

Tutorials: method based on usage of various source of knowlegde such us: film, photos, source files and presentations/ case study

Project method includes designing and performing simulation model and result testing

### Bibliography

Basic

1. Jankowiak I., Podstawy budownictwa mostowego, Wydawnictwo PP, Poznań 2019
2. Madaj A., Wołowicki W.: Podstawy projektowania budowli mostowych, WKiŁ, Warszawa 2007
3. Czudek H., Radomski R.: Podstawy mostownictwa, PWN Warszawa 1983

Additional

1. Madaj A., Wołowicki W.: Projektowanie mostów betonowych, WKiŁ, Warszawa 2010
2. Madaj A., Wołowicki W.: Mosty betonowe, WKiŁ 1980/2002
3. Ryżyński A., Wołowicki W.: Karlikowski J., Skarżewski J.: Mosty stalowe, PWN, Warszawa 1985
4. Karlikowski J., Sturzbecher K.: Mosty stalowe, Wydawnictwo PP 1993



5. Gałczyński S.: Podstawy budownictwa podziemnego, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2001
6. PN-EN 1991-2:2007 Eurokod 1: Oddziaływania na konstrukcje, Część 2: Obciążenia ruchome mostów
7. Furtak K., Kędracki M.: Podstawy budowy tuneli, Wydawnictwo Politechniki Krakowskiej, Kraków 2005
8. Leonhardt F.: Podstawy budowy mostów betonowych, WKiŁ, Warszawa 1982
9. Biliszczuk J.: Mosty podwieszane. Projektowanie i realizacja, Arkady 2005
10. Furtak K.: Mosty zespolone, PWN 1999

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,0
Classes requiring direct contact with the teacher	54	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	96	4,0

<sup>1</sup> delete or add other activities as appropriate