

# Tadeusz Kosciuszko Cracow University of Technology

## Course Card

Faculty of Civil Engineering

Field of study: Civil Engineering

Study profile: general academic

Study form: full-time

Field of study code: BUD

Study cycle: 1st

Specialty: no specialty

### 1 COURSE INFORMATION

Course name	Podstawy konstrukcji mostowych
Course name in English	Introduction to Bridge Constructions
Course code	WIL BUD oIS D55 24/25
Course category	Przedmioty profilowe
No. of ECTS points	5.00
Semester	6

### 2 CLASS TYPE, NUMBER OF HOURS ACCORDING TO THE STUDY PLAN

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
6	30	0	0	0	30	0

### 3 COURSE OBJECTIVES

**Objective 1** Basic knowledge of design of bridge structures, materials used in bridge construction, communication layout on the bridge and architectural design of bridge structures.

**Objective 2** Basic knowledge of design and construction of concrete bridges, steel bridges, composite bridges and laminated timber bridges and also basic knowledge on bridge equipment. Knowledge preparing students to solve engineering tasks as well as to participate in scientific research in the field of bridge design and construction.

**Objective 3** Basic knowledge of actions and load combinations to EC (development of the static road traffic load models, combination of multi-component actions, development of fatigue load models, actions on footbridges, actions on railway bridges, accidental actions on bridges)

**Objective 4** Basic knowledge of the structural analysis used for static and dynamic calculations during bridge design. Knowledge preparing students to solve engineering tasks as well as to participate in scientific research in the field of bridge design and construction.

## 4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

- 1 Concrete structures
- 2 Steel structures
- 3 Structural mechanics
- 4 Soil mechanics
- 5 Strength of materials

## 5 LEARNING OUTCOMES

**LO1 Knowledge** of basic concepts and modern trends in design and construction (material selection) of road and rail bridges.

**LO2 Knowledge** on design and construction of reinforced concrete bridges and basic information on design and construction of prestressed concrete bridges, steel bridges, composite bridges, arch bridges, cable stayed bridges, suspension bridges and movable bridges.

**LO3 Knowledge** Ability to select a proper design and construction technique for a given situation (span length selection, material selection, communication layout on the bridge).

**LO4 Skills** Ability to design a slab deck / beam deck reinforced concrete bridge to EC (set of conceptual drawings of the bridge, combinations of actions, structural analysis, calculations for ultimate limit states and serviceability limit states, detailing of reinforcement).

**LO5 Knowledge** Ability to work in a design team either as a leader or a regular member.

## 6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
<b>P1</b>	Conceptual design of a single span reinforced concrete road bridge. Setting up the structural form, communication layout on the bridge, location of the bridge and selecting the main accessories of the bridge.	4
<b>P2</b>	Setting up the basic parameters of the bridge: set of conceptual drawings of the superstructure - cross sections, longitudinal sections and top view drawings.	6
<b>P3</b>	Actions and combination of actions (non-traffic actions for persistent design situations, traffic loads on road bridges and others when applicable). Calculations carried out for the bridge main girders.	6

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
<b>P4</b>	Detailed structural calculations for the main components of the bridge - RC main beams.	4
<b>P5</b>	Analysis of one of the main beams for ultimate limit states (bending, shear) and serviceability limit states (stress limitation, crack control, deflection control).	6
<b>P6</b>	Execution of selected detailed drawings and detailing of reinforcement steel	4

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
<b>L1</b>	Organizational topics for Bridge Structures classes. Types and classification of the bridge structures, basic terminology and elements of the bridge structures. The historical development of the bridge structures.	4
<b>L2</b>	Design of communication layout on the bridge. Bridge accessories, bridge bearings, protection and bridge management. Basics of hydraulic and hydrologic calculations.	4
<b>L3</b>	Actions and load combinations to EC (actions on road bridges, actions on railway bridges, the combination of multi-component actions, actions on footbridges, accidental actions on bridges).	6
<b>L4</b>	Design and construction of concrete bridges (reinforced concrete and prestressed concrete bridges).	4
<b>L5</b>	Design and construction of steel bridges and composite bridges.	4
<b>L7</b>	Bridges construction methods.	4
<b>L9</b>	Long span bridges - cable stayed, suspension and arch bridge structures.	4

## 7 TEACHING TOOLS

**N1** Lecture

**N2** Discussion

**N3** Multimedia presentation

**N4** Consultations

**N5** Work in groups

## 8 Student workload

Activity form	Number of hours of activity
<b>Hours realized in contact with the teacher</b>	
Hours resulting from the study plan	60
Consultation hours	2
Exams and tests during session	2
Passing the project	1
<b>Hours of autonomous student work</b>	
Preparing for classes, studying literature	35
Developing results	20
Preparing of reports, projects presentations, discussion	30
<b>Total number of hours devoted to the subject</b>	<b>150</b>
Total number of ECTS points	5.00

## 9 Methods of grading

### Partial grades

F1 Team project

F2 Oral answer

F3 Writing exam

### Summary grade

P1 Average of forming grades

### Conditions for passing the course

L1 The positive result of the exam, correctly made project, the oral answer to questions about design issues.

### Assessment of activity without teacher participation

B1 Team project