



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Road construction I [S1Bud1>BD1]

### Course

Field of study

Civil Engineering

Year/Semester

3/5

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

30

Laboratory classes

0

Other

0

Tutorials

15

Projects/seminars

30

### Number of credit points

4,00

### Coordinators

dr inż. Mikołaj Bartkowiak

dr inż. Jarosław Wilanowicz

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### Lecturers

### Prerequisites

**KNOWLEDGE:** • general knowledge of mathematics and physics, • knowledge of descriptive geometry, technical drawing, and the preparation of drawings using CAD software, • knowledge of cartographic projections and basic surveying works in construction, • knowledge of the fundamentals of geology, • knowledge in the field of soil mechanics and foundation engineering of structures, • knowledge of construction materials and their properties. **SKILLS:** • ability to read architectural, structural, installation, and surveying drawings, as well as to prepare graphic documentation both traditionally and in selected CAD environments, • ability to use information technologies, online resources, and other sources for information retrieval. **SOCIAL COMPETENCES:** • ability to adapt to new and changing circumstances, as well as to set priorities in carrying out own and assigned tasks, • responsibility for the reliability of obtained results and their interpretation, • acting in accordance with ethical principles.

## Course objective

- To provide basic engineering knowledge in the field of road engineering and the design of road infrastructure facilities (roads, intersections, and road interchanges).
- To develop skills in presenting design solutions for a road, intersection, and road interchange at the stage of design and operation.
- To prepare graduates to participate in the process of designing and constructing roads, intersections, and road interchanges.

## Course-related learning outcomes

### KNOWLEDGE:

1. Student has detailed knowledge of guidelines for the design of roads, intersections, and road interchanges, as well as the related technical requirements and standards;
2. Student has basic general knowledge of the design of road transport infrastructure facilities;
3. Student knows the principles of designing road infrastructure facilities.

### SKILLS:

1. Student is able to classify elements of roads, intersections, and road interchanges;
2. Student is able to dimension the basic elements of a road, an intersection, and a road interchange;
3. Student is able to prepare selected elements of the design documentation for a road, an intersection, and a road interchange at the level of a preliminary design (programme concept) using basic CAD software;
4. Student is able to apply the provisions of construction law and legal acts concerning road design.

### SOCIAL COMPETENCES:

1. Student is responsible for the reliability of the obtained results and their interpretation;
2. Student is ready to critically assess their knowledge and the content received, as well as to critically evaluate the results of their own work.

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: the condition for passing is attendance at classes and obtaining a positive result in a test conducted during the last lecture of the semester, covering the material presented in the lectures.

Tutorial classes: the condition for passing is attendance at classes (monitored by the instructor) and obtaining a positive result in a test conducted during the last lecture of the semester, covering the material presented in the tutorial classes.

Project exercises: the condition for passing is attendance at classes (monitored by the instructor) and systematic work confirmed by entries in the consultation card. The assessment covers the substantive and aesthetic quality of the design documentation prepared as part of two projects, the subject matter and scope of which are specified in the project briefs.

## Programme content

The course is divided into 2 parts:

- 1) Design of public roads;
- 2) Design of intersections and road interchanges.

The course covers issues related to the design of roads, intersections, and road interchanges, including classification of roads and basic concepts in road engineering.

## Course topics

Lectures:

The first half of the semester covers issues related to the design of a section of a public road:

1. Introduction to road engineering.
2. Classification and categorisation of roads.
3. General characteristics of road alignment elements.
4. Horizontal alignment of a road – design principles, circular curves and transition curves.
5. Vertical alignment of a road – elements and design principles of the vertical profile.
6. Road cross-section – elements of the cross-section, road clearance.
7. Road pavements – classification, traffic loading, and subgrade.
8. Elements of surface drainage of a road.

The second half of the semester covers issues related to the design of intersections and road interchanges:

1. Classification and characteristics of intersections and road interchanges.
2. Basic criteria and data for the design of intersections and road interchanges.
3. Design and dimensioning of geometric elements of road interchanges, including ramps as well as acceleration and deceleration lanes.
4. Design and dimensioning of geometric elements of intersections, including approaches, exits, and turning movements.
5. Road safety and conflicts at intersections and interchanges.
6. Traffic organisation and measures for improving safety and traffic calming.

Tutorial classes:

Discussion of issues supporting the implementation of project exercises together with an analysis of sample solutions.

Project exercises:

Project exercise 1: Preparation of elements of the design documentation for a section of a two-way public road.

Project exercise 2: Preparation of elements of the design documentation for a WB-type road interchange.

## Teaching methods

Lecture – informational lecture / problem-based lecture / lecture with multimedia presentation.

Tutorial exercises – multimedia presentation.

Project exercises – case study.

## Bibliography

Basic literature:

### 1. Legal acts

- Ustawa z dnia 21 marca 1985 r. o drogach publicznych (Dz.U. 1985 nr 14 poz. 60), z późn. zm.
- Rozporządzenie Ministra Infrastruktury z dnia 24 czerwca 2022 r. w sprawie przepisów techniczno-budowlanych dotyczących dróg publicznych (Dz.U. 2022 poz. 1518)
- Rozporządzenie Ministra Infrastruktury z dnia 3 lipca 2019 r. w sprawie szczegółowych warunków technicznych dla znaków drogowych oraz warunków ich umieszczania na drogach (Dz.U. 2019 poz. 2311)

### 2. Polish Standards (PN)

- PN-S-02205:1998 – Drogi samochodowe. Roboty ziemne. Wymagania i badania
- PN-S-02204:1997 – Drogi samochodowe. Odwodnienie dróg

### 3. Road design guidelines (WR-D)

#### 3.1. Rural roads

- WR-D-22-1 – Wytyczne projektowania odcinków dróg zamiejskich. Część 1: Wymagania podstawowe. Warszawa 2022
- WR-D-22-2 – Wytyczne projektowania odcinków dróg zamiejskich. Część 2: Kształtowanie geometryczne. Warszawa 2022
- WR-D-22-4 – Wytyczne projektowania odcinków dróg zamiejskich. Część 4: Katalog typowych przekrojów poprzecznych. Warszawa 2023

#### 3.2. Road intersections

- WR-D-31-1 – Wytyczne projektowania skrzyżowań drogowych. Część 1: Wymagania podstawowe. Warszawa 2022
- WR-D-31-2 – Wytyczne projektowania skrzyżowań drogowych. Część 2: Skrzyżowania zwykłe i skanalizowane. Warszawa 2022
- WR-D-31-3 – Wytyczne projektowania skrzyżowań drogowych. Część 3: Ronda. Warszawa 2022

#### 3.3. Road interchanges

- WR-D-32-1 – Wytyczne projektowania węzłów drogowych. Część 1: Wymagania podstawowe. Warszawa 2022
- WR-D-32-2 – Wytyczne projektowania węzłów drogowych. Część 2: Elementy węzłów i wyposażenie techniczne. Warszawa 2022

### 4. Other

- WR-D-61 – Katalog typowych konstrukcji nawierzchni podatnych i półsztywnych. Warszawa 2025
- WR-M-11 – Wytyczne projektowania elementów powiązania drogowych obiektów inżynierskich z terenem

i drogą. Warszawa 2021

Supplementary literature:

- Edel R., Odwodnienie dróg. Wyd. 4 zmienione i uaktualnione, Wydawnictwa Komunikacji i Łączności, 412 s., Warszawa, 2017
- Krystek R. (red.), Węzły drogowe i autostradowe. Wyd. II (rozszerzone), Wydawnictwo Komunikacji i Łączności, 486 s., Warszawa, 2008

### Breakdown of average student's workload

	Hours	ECTS
Total workload	120	4,00
Classes requiring direct contact with the teacher	75	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	45	1,50