



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Traffic engineering and road junctions [N2Bud1-BDMiK>IRiWD]

### Course

Field of study

Civil Engineering

Year/Semester

1/2

Area of study (specialization)

Road, Bridge and Railway Engineering

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

### Number of hours

Lecture

20

Laboratory classes

10

Other

0

Tutorials

0

Projects/seminars

18

### Number of credit points

4,00

### Coordinators

dr inż. Jarosław Wilanowicz

jaroslaw.wilanowicz@put.poznan.pl

### Lecturers

### Prerequisites

KNOWLEDGE: Student has knowledge of road design guidelines and related technical conditions. Student knows the rules of the design and construction of road earthworks. Student has a basic knowledge of the design of road infrastructure. SKILLS: Student is able to classify the elements of road. Student knows how to dimension the basic elements of the road. Student can execute a road project documentation at the preliminary design. SOCIAL COMPETENCIES: Student can work independently. Student is aware of the need to improve his professional skills. Student follows the rules of ethics.

### Course objective

1) Transfer of knowledge in the scope of analysis, design and operation of road intersections and grade separated junctions and in the analysis and assessment of road safety. 2) Development of skills concerning to identify and solve important problems in the design of the grade junctions and the grade separated interchanges and in the field of organization and traffic safety. 3) Acquiring the ability of self-study of new issues and development trends in the design and operation of road facilities as above.

### Course-related learning outcomes

Knowledge:

Know in detail the rules of design, construction and operation of selected road building units.  
Have advanced and detailed knowledge of the theoretical principles of design of selected road building units.  
Know in detail the technical conditions of constructing selected road building units.

#### Skills:

Can dimension complex construction details in selected road building units.  
Utilizing the obtained knowledge, they can select appropriate analytical and numerical methods and tools to solve technical problems.  
Are able to obtain information from literature, databases and other properly selected information sources; can integrate the obtained information, interpret and evaluate it as well as draw conclusions, formulate and justify opinions.

#### Social competences:

Take responsibility for the reliability of working results and their interpretation.  
Can realise that it is necessary to improve professional and personal competence; are ready to critically evaluate the knowledge and received content.  
Understand the need to transfer to the society the knowledge about building engineering, transfer the knowledge in a clear and easily comprehensible manner.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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The student's knowledge is assessed by means of a written test, which takes place in the last class before the end of the semester.

The test consists of 3 questions and a duration of 45 minutes.

Information about the form and time of test and its duration is given to students at the first lecture in the semester.

Student's skills are evaluated on the basis of performed project, and its qualitative assessment is based on essential and aesthetic performing of drawing and computational exercises (the subject and content of the project is given on the theme card).

Completion date of the project is the last design tutorial in the semester.

### Programme content

The subject of the course is the basic conditions and principles of designing intersections on rural roads and streets, both with and without traffic lights, as well as road and motorway interchanges.

Program content includes:

- a) general arrangements and terms used,
- b) general characteristics and requirements in the design of road intersections and interchanges,
- c) conditions and criteria for the use of particular types of intersections with and without traffic lights and road interchanges,
- d) matters related to road traffic management, in particular regarding the preparation of traffic organization projects and technical requirements (and methods) for placing signs on roads.

### Course topics

Detailed description and functionality of various geometric shapes of the junctions and the road interchanges (one-, two- and multi-level crossing).

Principles of spatial geometric formation of details of the road intersections and the grade separated junctions (safety, traffic flow, visibility, esthetics solutions). Methods for calculating the traffic capacity of intersections.

Measurements, research and analysis of road traffic. Road traffic forecasting methods. Traffic control systems. Goals, systems, measures and methods of traffic management. Advanced ITS technical and organizational solutions. Traffic lights.

Road safety (BRD) in law. The state of road safety in Poland and other countries. Accident rates used in individual types of road safety analysis. Impact of some factors on road safety.

### Teaching methods

1. Lecture with multimedia presentation.
2. Design exercises - discussion of technical details regarding the subject and content of the project. Consultation of the project with the student.
3. Laboratory exercises - designing a traffic light program at an intersection using a computer program.

## Bibliography

### Basic

1. Rozporządzenie Ministra Infrastruktury z dn. 24 czerwca 2022 r. w sprawie przepisów techniczno-budowlanych dotyczących dróg publicznych (Dz.U. 2022, poz. 1518).
2. Rozporządzenie Ministra Infrastruktury z dnia 16 stycznia 2002r. w sprawie przepisów techniczno-budowlanych dotyczących autostrad płatnych, Dz. U. Nr 12 (poz. 116), Warszawa, 15 lutego 2002r.
3. Wytyczne projektowania skrzyżowań drogowych. Generalna Dyrekcja Dróg Publicznych, Warszawa 2001.
4. Krystek Ryszard (praca zbiorowa). Węzły drogowe i autostradowe. Wydawnictwo Komunikacji i Łączności, Warszawa 1998.
5. Gaca St., Suchorzewski W., Tracz M. Inżynieria ruchu drogowego - Teoria i praktyka. WKiŁ. 2011.
6. Praca zbiorowa. Badanie zagrożeń w ruchu drogowym. Wydawnictwo PAN. 2005.
7. Metoda obliczania przepustowości skrzyżowań z i bez sygnalizacji. Instrukcje obliczania (2 egz.), GDDKiA, Warszawa 2004.

### Additional

1. Bartoszewski J. Węzły drogowe i uliczne, PWK, Warszawa 1970.
2. Chrostowski H., Rolla ST., Wrześniowski ST. Autostrady ? projektowanie, budowa, ekonomika. WKiŁ, Warszawa 1975.
3. Szczuraszek T. Bezpieczeństwo ruchu miejskiego. WKiŁ, Warszawa 2006.
4. Tracz M., Allsop R.E. Skrzyżowania z sygnalizacją świetlną. WKiŁ, Warszawa 1990.
5. Podoski. Transport w miastach. WKiŁ. Warszawa 1988.
6. Rozporządzenie Ministra Infrastruktury z dn. 3 lipca 2003r. w sprawie szczegółowych warunków technicznych dla znaków i sygnałów drogowych oraz urządzeń bezpieczeństwa ruchu drogowego i warunków ich umieszczania na drogach (Dz.U. nr 220, poz. 2181 z dn. 23 grudnia 2003r. z późn. zmian., załączniki nr 1 do 4).

## Breakdown of average student's workload

	Hours	ECTS
Total workload	105	4,00
Classes requiring direct contact with the teacher	48	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	57	2,00