



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Transportation system management [S2Bud1E-ZBZ>ZST]

Course

Field of study

Civil Engineering

Year/Semester

1/2

Area of study (specialization)

Sustainable construction and management

Profile of study

general academic

Level of study

second-cycle

Course offered in

English

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

15

Number of credit points

2,00

Coordinators

dr inż. Szymon Fierek

szymon.fierek@put.poznan.pl

Lecturers

Prerequisites

The student should have basic knowledge of mathematics and statistics, enabling data analysis and understanding of quantitative relationships. They should be familiar with the fundamentals of civil engineering, particularly elements of transport and road infrastructure. The student should understand basic concepts related to traffic flow and the functioning of transport systems. The student should be familiar with basic IT tools supporting data analysis (e.g., spreadsheets) and have a general understanding of transport planning concepts.

Course objective

The main goal of the subject is to get students acquainted with theoretical and practical problems occurred in transportation systems, as well as methods to solve these problems

Course-related learning outcomes

Knowledge:

- have detailed knowledge in the field of operation algorithms of selected software supporting the analysis and design of building facilities, which are also useful to plan and manage construction projects, including Building Information Modelling (BIM);

- know in detail the principles of analysing, constructing and dimensioning elements and connections in selected building structures.

Skills:

- utilizing the obtained knowledge, they can select appropriate (analytical, numerical, simulation, experimental) methods and tools to solve technical problems;
- use advanced specialized tools in order to search for useful information, communication and in order to obtain software supporting the designer and organizer of building engineering works.

Social competences:

- can realize 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:

Written test

Assessment of assignments

Passing threshold - 50%

Programme content

The course introduces students to the principles of transport systems analysis, with a focus on transport modeling and traffic simulation. It covers the theoretical foundations and practical applications used in planning, managing, and evaluating transport systems.

The content includes an overview of key modeling approaches applied in transportation, including demand modeling and traffic flow analysis. Students are familiarized with the structure and logic of transport models, as well as with the fundamental relationships describing traffic behavior and system performance.

The course also presents methods for collecting and processing transport data, which form the basis for model development and validation. Elements of traffic simulation are introduced, including basic concepts of microscopic modeling using tools such as PTV Vissim.

Additionally, the course addresses the development and assessment of alternative transport scenarios, supporting decision-making processes in transport planning and management.

The programme combines conceptual understanding with introductory practical elements, preparing students for more advanced applications in transport modeling and simulation

Course topics

1. Introduction to Transportation Systems Management
2. Fundamentals of Transport Modeling
3. Transport Demand Modeling - Overview
4. Four-Stage Model - Trip Generation & Distribution
5. Modal split modeling and traffic assignment principles (including user equilibrium concepts).
6. Fundamentals of Traffic Flow Theory
7. Fundamental Diagram and Capacity Concepts
8. Data Collection in Transport Systems
9. Introduction to Traffic Simulation
10. Microscopic Simulation - Basics using PTV Vissim
11. Microscopic Simulation - Calibration and Validation
12. Scenario Development and Management
13. Evaluation of Simulation Results
14. Case Studies in Transport Modeling and Simulation
15. Project Presentations / Course Summary

Teaching methods

Lecturing, Classroom discussion, Project-Organized Problem-Based Learning, Case studies.

Bibliography

Basic:

1. Barcelo J.: Fundamentals of Traffic Simulation. Springer-Verlag, New York, 2010
2. Hall R.W. (ed.): Handbook of Transportation Science. Kluwer Academic Publishers, New York, 2003
3. Ortuzar J., Willumsen L.G.: Modelling Transport. John Wiley & Sons, New York, 2001

Additional:

1. Meyer M.D.: Transportation Planning Handbook. John Wiley & Sons, Hoboken, 2016

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00