



**1. Course number and name**

RB-S1-19-S6E-50, **Urban, Industrial and Transportation Structures II**

**2. Credits and contact hours\***

7 ECTS, lectures: 90 hours\*\*

**3. Instructor's or course coordinator's name**

Professor Leszek Szojda PhD, DSc

**4. Text book, title, author, and year**

- Varyani U. H.: Structural Design of Multi Storeyed Building – Standard Publication-Dehli; 2014
- Zalka K.: Structural Analysis of Multi-Storey Buildings – CRC Press; 2020
- Jürgen A., Hausmann K., Jüttner F.: Industrial Buildings (Design Manual) – Birkhäuser Architecture; 2004
- El-Reedy M. A.: Construction Management and Design of Industrial Concrete and Steel Structures – CRC Press; 2010
- Weyer J., Baragaño S.: Industrial building Planning and Design – Design Media Publishing (UK) Limited; 2014
- Unsworth J. F.: Design and Construction of Modern Steel Railway Bridges – CRC Press; 2014
- Mann C.: Prestressed Concrete Bridges – Springer, Basel; 2011

**a. other supplemental materials**

- Standards: EN 1992-1-1:2005 „Eurocode 2. Part 1-1, EN 1992-3:2006 „Eurocode 2. Part 3, EN 1993-3-1:2006 „Eurocode 3. Part 3-1, EN 50341-1:2012. Part 1, EN 1992-2:2005 „Eurocode 2, EN 1993-2:2006 Eurocode 3. Part 2.

**5. Specific course information**

**a. brief description of the content of the course (catalog description)**

Lectures:

*Urban Structures* - mastering the problems of design (calculation and design) objects of urban structures, especially the structure of multi-storey longwall buildings, frame and support tower structures.

*Industrial Structures* - General acquainting students with basic types of industrial structures, their role in the technological process of industrial plant, to determine the specific construction loads.

*Transportation Structures* - to acquaint students with the specifics of bridge construction.

**b. prerequisites or co-requisites**

Candidates should have knowledge of building mechanics and building structures, which corresponds to the subjects of the Faculty of Civil Engineering course: Structures of Building (sem. 5), Structural Mechanics (sem. 5)

**c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**

Required.

**6. Specific goals for the course**

**a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic**

The student knows:

- the standards and guidelines for urban and industrial building design as well as bridges. He knows the rules determining the loads for specific types of urban, industrial and bridge structures



- the rules of analysis, design and dimensioning of structural elements of urban and industrial buildings as well as bridges
- about the projected impact of buildings on the environment

The student can:

- make a classification of industrial buildings due to their structures
- evaluate and assemble basic load on complex structures

The student is able to:

- aware of the necessity and can individually deepen the provided knowledge in the technical literature
- present complex issues of construction and formulate opinions and provide them in an understandable way

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

K1A\_W05, K1A\_W06, K1A\_U01, K1A\_U02, K1A\_U04,

#### 7. Brief list of topics to be covered

- Urban Structures - Requirements for buildings. Longwall structure systems, bar frame and mixed. The principles and calculation methods of bar frame and longwalls structure systems. Load capacity of concrete walls, structure of walls, openings, lintels and rims. General rules for calculation of the longwall-bar frame supporting system, bracing elements, torsion the buildings. Influence of foundation work on the strengthen elements, protection against progressive catastrophe. Expansion joints. Prefabricated longwall systems, exterior and interior walls, floors, roofs. Principles of forming, calculation and structure connections in the longwall systems. Staircases, balconies, loggias, basement storey, foundations. Longwall monolithic structures – calculation and structure, the influence of support tower structures and creep work buildings. Overview connection rod elements: column-beam, column-beam-column, column-plate, column-plate-column, column - column, column –foundation.
- Industrial Structures - general overview of industrial facilities principles, technological loads, operational risks and basic dimensioning of the main elements of the structure. Descriptions of the individual modeling of the structure. Types of discussed industrial plants: conventional power plants, nuclear power plants, coal mines. Individual structures: tanks -general information, rectangular and circular tanks for liquids, tanks for loose material, industrial chimneys, tower structures, masts, power support structures.
- Transportation structures - bridges classifications. The design of bridge supports and methods of their foundation. Principles of designing and calculating superstructures single-span bridges. The calculation methods static-strength RC main girders and steel, including the action moving loads. Principles of dimensioning for bending, shear and torsion RC main girders and check the ULS (including issues of stability) girder beams and SLS. Determining the raise executive arrows.

\*- Consultations were not included in the contact hours

\*\* -per semester