SYLLABUS

Course title: Urban, Industrial & Transportation Structures

Course title (in Polish): Budowlane Konstrukcje Miejskie, Przemysłowe i Komunikacyjne

The syllabus is valid since the summer semester of the academic year 2025/26 and its content is not subject to changes during the semester.

Course details:

Unit offering the course: Faculty of Civil Engineering

Course designated for the unit: The Silesian University of Technology

Specialization: Structural Engineering

Didactic cycle: Summer semester 2025/2026 - the first year of second degree studies

Coordinator of the course: Leszek Szojda

Delivery mode: in-person/~~hybrid~~

Number of ECTS credits: 7

Language:
English
Course homepage:
https://platforma.polsl.pl/rb/course/view.php?id=777
Prerequisites :
Passing semester 5 subjects: Structural Mechanics, Concrete Structures, Metal Structures, Masonry and Timber Structures, Special Structures, Foundations
Short description:
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.
Description :
TOTAL NUMBER OF TEACHING HOURS: 90h LECTURE: 90h PRACTICAL CLASSES: 0h PROJECT: 0h LABORATORY: 0h Course content:

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 modelling 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.

Bibliography:

• Starosolski W.: „"Konstrukcje żelbetowe wg Eurokodu 2 i norm związanych" tom 1, 2, 3". Wydawnictwo PWN 2011
• Kapela M., Sieczkowski J: „"Projektowanie konstrukcji budynków wielokondygnacyjnych"". Oficyna Pol. Warszawskiej 2003
• Mielczarek Z.: „"Nowoczesne konstrukcje w budownictwie ogólnym"". Arkady 2001
• Praca zbiorowa: „"Budownictwo Betonowe", tomy I do XVII". Arkady 1966
• Kobiak J., Stachurski W.: „ „Konstrukcje żelbetowe" tom IV". Arkady 1991
• Rykaluk K.: „„Konstrukcje stalowe. Kominy, wieże, maszty"". Politechnika Wrocławska 2004
• Mendera Z., Szojda L., Wandzik G.: „"Projektowanie stalowych słupów linii elekroenergetycznych"". PWN 2017
• Madej A., Wołowicki W.: „"Podstawy projektowania konstrukcji mostowych"". WKŁ 2007
• Madej A., Wołowicki W.: „"Mosty betonowe. Wymiarowanie i konstruowanie"". WKŁ 2008
• Ryżyński A.: „"Mosty stalowe"". PWN 1984
• Starosolski W.: „"Komputerowe modelowanie betonowych konstrukcji inżynierskich. Tom I i II"". Wydawnictwo Politechniki Śląskiej 2009
• Zybura A.: „"Konstrukcje żelbetowe wg Eurokodu 2"". PWN 2010
• Norma: „ „PN-EN 1992-1-1 Eurokod 2 – Projektowanie konstrukcji z betonu – Część 1-1: Reguły ogólne i reguły dla budynków."". PKN 2008
• Norma: „ „PN-EN 1992-3 Eurokod 2 – Projektowanie konstrukcji żelbetowych – Część 3: Konstrukcje zbiorników na ciecze i silosów."". PKN 2008
• Norma: „ „PN-EN 1991-4 Eurokod 1 – Oddziaływania na konstrukcje – Część 4: Silosy i zbiorniki"". PKN 2008
• Norma: „ „PN-EN 50341-1:2005 – Elektroenergetyczne linie napowietrzne prądu przemiennego powyżej 45kV. Część1:Wymagania ogólne – Specyfikacje wspólne"". PKN 2005

• Karlikowski J., Sturzbeher K.: „Mosty stalowe. Mosty belkowe i zespolone. Przewodnik do ćwiczeń projektowych". Wyd. Polit. Poznańskiej, Poznań 2003
• Czudek H., Piertaszek T.: „ „Salowe pomosty użebrowane. Obliczanie i konstruowanie."". Arkady 1978
• Furtak K.: „"Mosty zespolone"". PWN Warszawa – Kraków 1999

Learning outcomes :

• K1A_W05 – Student knows and understands principles of construction, dimensioning, strengthening and repair of construction elements: metal, RC, composite, timber and masonry as well as selected construction elements of bridges.
• K1A_W06 – Student knows and understands standard and guidelines for design of selected general and industrial buildings, as well as road and rail transport infrastructures facilities.
• K1A_U01 – Student can classify the construction work
• K1A_U02 – Student can perform the load combination and the standard load combination for the construction works in accordance with relevant design situation at the limits state.
• K1A_U04 – Student can size selected structural elements and design simple metal, RC composite, timber and masonry structures, as well as simple foundation and structural elements in bridges/communication structures.

Assessment methods and assessment criteria:

Course Passing Requirements:
The subject UI&TS consists of three parts: urban structures, industrial structures and transportation structures. It is conducted only in the form of a lecture with the total number of 90 lecture hours (IS and US - 30 hours each; TS divided into two groups - for IS and UB - 15 hours each).
The course ends with an exam for each part of the course separately. In order to obtain a positive mark, positive marks must be obtained for each part of the subject.

Active presents of the lecture. The course concludes with an exam. Knowledge is assessed in written, open-ended format. The course consists of three pats, and to receive a passing grade, a minimum score of 50% is required in each part. Whitening of grade for individual parts: US – 33%; IS – 34%; TS (UB part) – 15%; TS (IS part) – 15%.

Requirements for transferring a course grade:
Personal application for transferring the course must be submitted within the first two weeks of the semester.

Description of the ECTS calculation method:

Type of activity	Number of hours
Number of class hours, regardless of the delivery mode	90
Student's individual work 1* - *literature review*	30
Student's individual work 2* - *consultations*	9
Student's individual work 3* - *preparation to the exam*	50
Student's individual work 4* - *passing exam*	10
Other**	-
Total hours	**189**
Number of ECTS credits assigned to the course	**7**

Legend:
*- Student's individual work – specify the forms of activity, e.g. *preparation for classes, data interpretation, class report writing, preparation for an exam, literature review, preparation of a project, presentation development, written work, report, etc.*

** – other, e.g., *additional contact hours*