SYLLABUS

Course title: Special Structures

Course title (in Polish): Konstrukcje Specjalne

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: 4

Language:
English
Course homepage:
https://platforma.polsl.pl/rb/course/view.php?id=778
Prerequisites :
Passing semester 5 subjects: Structural Mechanics, Concrete Structures, Metal Structures, Masonry and Timber Structures, Special Structures, Foundations
Short description:
The aim of the course is the ability to recognize the risks of the mining terrain deformation, shaping the building's body through which receipts are lowered impacts the ground, determination of internal forces resulting from these loads, the ability to introduce elements that protect objects from damage related to terrain deformation for various types of objects. An equivalent goal is to increase the ability to use advanced computational programs using the Finite Element Method by numerical modelling of the structure.
Description:
The subject consists of two main parts: Protection of buildings against mining subsidence (Protection) and Numerical modelling of structures (Modelling). The first part of the item (Protection...) consists of the following activities: lecture 8h; classes (introduction to the project) 2h; project 5h.

The second part of the subject (Numerical Modelling) includes:
classes (introduction to the laboratory) 4h;
laboratory 13h.

TOTAL NUMBER OF TEACHING HOURS: 32h
LECTURE: 8h
PRACTICAL CLASSES: 6h
PROJECT: 5h
LABORATORY: 13h

Subject content:
Lecture: The impact of vertical mining deformations – the curvature of the terrain. The influence of inclination of the ground. The influence of vertical terrain deformations on buildings. Stresses in wall shields. Cooperation of transverse walls. Protection of building structures against the curvature of the terrain. The soil pressure on the vertical walls of buildings caused by compressive strain of the ground is taken into account, as well as the methods of mitigating this influence. The effects of discontinuous ground deformation on building structures are described and their classification applied to this phenomenon is described.

Classes: The Protection part is presented the procedure for preparing a foundation grate design for a steel hall structure, and the second part the introduction to Finite Element Method is showed, principles of modelling of building structures.

Laboratory: Building of a numerical model of a selected building structure with specially attention of foundation loaded byground deformation (geometry, cross-sections, loads, combinations), running analysis and interpretation of results, preparing calculation report.

Project: The project includes protection the foundations layout of the building against the influence of horizontal deformation of the terrain. The result of the calculation is a drawing of the foundation tie-down system and their reinforcement.

Bibliography :

• Starosolski W.:: „Komputerowe modelowanie betonowych ustrojów inżynierskich, Tom 1 i 2". Wydawnictwo Politechniki Śląskiej, 2013
• Szojda L.: „Aspekty konstrukcyjne zabezpieczania budynków na terenach górniczych". Wydawnictwo Pol. Śl. 2019
• Kwiatek J.: „Obiekty budowlane na terenach górniczych". Wydawnictwo GIG 2002
• Praca zbiorowa: „Ochrona obiektów budowlanych na terenach górniczych". Wydawnictwo GIG 1996
• Popiołek E.: „Ochrona terenów górniczych". Wydawnictwo AGH 2009
• Ledwoń J.: „Budownictwo na terenach górniczych". Arkady 1983
• Autodesk: „Pomoc Autodesk Robot Structural Analysis Professional 2019". Autodesk Knowledge Network
• Instrukcja ITB 286: „Wytyczne projektowania budynków o ścianowym układzie nośnym podlegających wpływowi eksploatacji górniczej". ITB 1989
• Instrukcja ITB 332: „Projektowanie hal stalowych na terenach górniczych wraz z komentarzem i przykładami". ITB 1994
• Instrukcja ITB 364: „Wymagania techniczne dla obiektów budowlanych wznoszonych na terenach górniczych". ITB 2000
• Instrukcja ITB 416: „Projektowanie budynków na terenach górniczych". ITB 2006

Learning outcomes :

• K1A_W05 - Student knows and understands general principles of construction, dimensioning, strengthening and repair of construction elements
• 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_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:
Project: Preparation and submission of a paper project and laboratory report (or alternatively, uploading PDF files of the project and report to the submission task on the distance learning platform).
Course Passing Criteria: Submitting and presenting a project and laboratory report work that meets the specified requirements of the task.

The final grade consists of the project preparation and its defence (Protection...) and the preparation of a laboratory report in the form of a project along with its defence (Numerical modelling). The weighting of the marks from both parts is the same 50%.

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	32
Student's individual work 1* - *literature review*	10
Student's individual work 2* - *consultations and project*	10
Student's individual work 3* - *preparation of projects and laboratory report*	52
Student's individual work 4* - *preparation for a project defence*	2
Student's individual work 5* - *preparation for a laboratory report defence*	2
Other**	-
Total hours	**108**
Number of ECTS credits assigned to the course	**4**

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*