



1. Course number and name

RB-S1-19-S13-1B, **Special Structures II**

2. Credits and contact hours*

4 ECTS, lectures: 8 hours**, classes: 6 hours**, laboratory: 13 hours**, project: 5 hours**

3. Instructor's or course coordinator's name

Professor Leszek Szojda PhD, DSc

4. Text book, title, author, and year

- Hartman H.: Introductory Mining Engineering – John Wiley & Sons, 2002;
- Kratzsch H.: Mining Subsidence Engineering – Springer-Verlag, 1983;
- Peng S. S.: Surface Subsidence Engineering: Theory and Practice – CRC Press, 2020;
- Perelmuter A., Slivker V.: Numerical Structural Analysis – Springer Verlag, 2003;

a. other supplemental materials

- Autodesk: „User Guide Autodesk Robot Structural Analysis Professional 2019”. Autodesk Knowledge Network”

5. Specific course information

a. brief description of the content of the course (catalog 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 modeling of the structure.

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: Concrete structures (sem. 5), Structural mechanics (sem. 5), Foundation Engineering (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 principles of mechanics and analysis of bar structures in the field of statics, dynamics and stability, and knows selected computer programs supporting the calculation and design of structures.
- the standards and guidelines for the design of building objects and their elements.
- the rules of constructing and dimensioning elements of building structures: metal, reinforced concrete, composite, wooden and masonry.

The student can:

- assess and make a list of loads acting on building structures.
- correctly define computational models of computer structure analysis and to critically evaluate the results of this analysis.
- design selected elements and simple structures: metal, reinforced concrete, composite, wooden and masonry.

The student is able to:

- responsible for the reliability of the obtained results and their interpretation.
- formulate opinions on technical and technological processes in construction.
- formulates conclusions and describes the results of their own work. He is communicative in media presentations.

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_U02, K1A_U04

7. Brief list of topics to be covered

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 by ground 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.

*- Consultations were not included in the contact hours

** -per semester