

Nazwa w języku polskim: Konstrukcje Specjalne I
Nazwa w jęz. angielskim: Special Structures I

Dane dotyczące zajęć:
Information on course:

Jednostka oferująca: Wydział Budownictwa
Course offered by: Faculty of Civil Engineering

Język wykładowy:
angielski
Language: English
English
Strona WWW:
Course homepage: https://platforma2.polsl.pl/rb/course/view.php?id=572
Skrócony opis:
Short description:
The main aim of the subject is to prepare the student for individual work of the structural designer of complex engineering structures subjected to non-typical complex loads of different natures.
Opis:
Description:
<p>The main aim of the subject is to prepare a student for individual work as a structural designer of complex engineering structures subjected to non-typical complex loads of different natures. The course consists of three independent parts: Composites, Protection against mining subsidence, and Modelling.</p> <p>LECTURE: 25 hours</p> <p>Composite structures: Composite materials classification, composite materials in structural engineering, Fibre Reinforced Polymers, pre-cast composite elements in structures, structures made out of composites, novel and innovative technologies of creating composite structures. Dimensioning of FRP composites.</p> <p>Protection against mining subsidence: Geological structure of the Upper Silesian Industrial Area. Basic terms used in mining. Methods of deposit mining. Effects of underground coal mining on the surface. Parameters of formation of mining through. Division of types of deformations of the ground. Continuous deformations. Description and determination of parameters of the mining through the edge. Discontinuous deformations. Influence of subsoil deformation on structures. Categories of mining areas. Influence of mining deformations on buildings. The influence of horizontal mining deformations. The influence of deforming subsoil on buildings. Method of the Limit States in the context of mining interactions. Basic and unique load combination. The influence of horizontal ground deformations on building structures. Shear stresses under the surface of foundations. Influence of horizontal ground deformations on foundations. Axial forces in continuous footing. Bending moments in the continuous footing. Anchor and diagonal tie rods used for continuous footing systems. Principles of reinforcement distribution in foundations.</p> <p>Modelling: Introduction to Finite Element Method, finite element types, principles of modelling of building structures, plane strain/stress approach, software for engineering applications.</p> <p>EXERCISE: 5 hours</p> <p>Composites: Introduction to FRP composites design. Protection against mining subsidence: Introduction and explanation of the design exercise. Modelling: Presentation of selected examples of numerical models of structures</p> <p>PROJECT: 6 hours</p> <p>Composites: individual project of composite beam subjected to flexure. Protection against mining subsidence: Determination of mining impacts on reinforced concrete foundation structure. Calculation of the reinforcement in continuous footing. Structural drawing.</p> <p>LABORATORY: 4hours</p> <p>Modelling: Building a numerical model of a selected building structure (geometry, cross-sections, loads, combinations), running analysis and interpretation of results, preparing calculation report.</p>

Number of ECTS credits: 2
Literatura:
Bibliography:
<p>[1] fib: „Fib bulletin no. 14 ”. fib</p> <p>[2] J.L. Clarke: „Structural Design of Polymer Composites: Eurocomp Design Code and Background Document”. CRC Press</p> <p>[3] M. Górski, R. Krzywoń, Obliczanie wzmocnień z wykorzystaniem taśm i mat zbrojonych włóknami wysokiej wytrzymałości. XXIX Ogólnopolskie Warsztaty Pracy Projektanta Konstrukcji, Szczyrk, 26-29 marca 2014 roku. T. 1, Wykłady. PZITB</p> <p>[4] Kratzsch H.: „Mining subsidence engineering”. Springer</p> <p>[5] E. Onate : „Structural Analysis with the Finite Element Method ”. Springer 2009</p> <p>[6] Autodesk: „Autodesk Robot Structural Analysis - Training Manual ”. Autodesk</p> <p>[7] Autodesk: „Autodesk Robot Structural Analysis - Getting Started Guide”. Autodesk</p>
Efekty uczenia się:
Learning outcomes:
<p>KNOWLEDGE</p> <p>(1) Student knows the rules of structural mechanics and analysis of structures including statics and dynamics. Knows the standards and design guidelines for structures and their elements - [directional effect K1A_W05]</p> <p>(2) Student knows basic software supporting the structural design process and the rules of dimensioning and detailing concrete and composite structures - [directional effect K1A_W06]</p> <p>SKILLS</p> <p>(1) Student is able to define and schedule the loads applied to structural elements - [directional effect K1A_U02]</p> <p>(2) Student is able to build correct design models for numerical analysis and critically evaluate its results - [directional effect K1A_U02]</p> <p>(3) Student is able to design chosen structural elements of concrete and composite structures - [directional effect K1A_U04]</p>
Metody i kryteria oceniania:
Assessment methods and assessment criteria:
<p>CONDITIONS FOR PASSING THE COURSE:</p> <p>1) active and registered attendance at classes,</p> <p>2) passing the colloquium including lectures,</p> <p>3) preparation, delivery and defense of the projects,</p> <p>Composites: Final grade is given based on the written test results (50%) and the quality and correctness of the design exercise (50%). Mining: Final grade is given based on the written test results (50%) and the quality and correctness of the design exercise (50%). Modelling: Final grade is given based on the quality and correctness of the project report.</p> <p>Final note is calculated as weighted average value out of 3 marks: Composites (40%), Mining (40%), Modelling (20%).</p>

**Przynależność do grup przedmiotów w cyklach:
Element of course groups in various terms:**

Opis grupy przedmiotów Course group description	Cykl pocz. First term	Cykl kon. Last term