COURSE DESCRIPTION CARD - SYLLABUS

Course name

Metal Structures

Course

Field of study

Civil engineering

Year/Semester

1/1

Area of study (specialization)

Structural Engineering

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

english

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

30

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Wydział Inżynierii Lądowej i Transportu

ul. Piotrowo 5, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Has knowledge of structural mechanics and material strength in the field of content of the Civil Engineering field of study. Knows the methods of designing metal structures in the field of compressed, stretched and bent elements together with construction nodes as well as the principles of designing truss trusses and roof bracing.

Uses basic formulas in the field of structural mechanics and material strength. Is able to adopt appropriate construction and technological solutions in the field of corrosion and fire protection. Is able to propose a construction solution using an appropriate calculation procedure, uses building standards for loads acting on building structures, as well as for static calculations and dimensioning of steel structure elements.

Understands the need for lifelong learning and is able to interact and work in a group, taking on different roles in it. Is aware of the responsibility of the profession he is learning.

Course objective

Acquiring knowledge and skills in the construction and dimensioning of frame systems and bracing in hall buildings, design of eccentrically compressed columns and frame bolts, trusses, skeletal buildings, and spatial trusses. Acquiring knowledge of types of global analysis. Design principles of crane beams. Understanding the essence of second order analysis and imperfections in steel structure design.

Course-related learning outcomes

Knowledge

1. Know in detail the principles of analysing, constructing and dimensioning elements and connections in selected building structures.

2. Have extended and detailed knowledge of material strength, modelling and constructing; have knowledge of theoretical principles of the finite element method as well as general rules of non-linear calculations of engineering structures.

3. Have advanced and detailed knowledge of the theoretical principles of structure analysis and optimization as well as design of selected building units.

Skills

1. Can prepare an evaluation and statement of strengths influencing both simple and complex building units.

2. Can design elements and connections in complex building units, working both individually and in a team.

3. Can perform a classical static and dynamic analysis and stability analysis of statically determinate and non-determinate bar structures (trusses, frames and strands); as well as surface construction (discs, plates, membranes and shells).

4. Are able to correctly define a computational model and carry out an advanced linear analysis of complex building units, their elements and connections; are able to apply basic nonlinear computational techniques together with a critical evaluation of numerical analysis results.

5. Utilizing the obtained knowledge, they can select appropriate (analytical, numerical, simulation, experimental) methods and tools to solve technical problems.

Social competences

1. Take responsibility for the reliability of working results and their interpretation.

2. Can realise that it is necessary to improve professional and personal competence; are ready to critically evaluate the knowledge and received content.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Completing the lecture - colloquium in the last class. Design exercises - the project and its oral defense.

Grading scale:

5.0 - the student has obtained over 90% of points from the test or project defense,

4,5 - the student obtained from 80% to 90% of points from the test or project defense,

4.0 - student obtained from 70% to 80% of points from the test or project defense,

3.5 - the student has obtained from 60% to 70% of points from the test or project defense,

3.0 - the student has obtained from 50% to 60% of points from the test or project defense,

2.0 - the student has obtained less than 50% of the points from the test or project defense

Programme content

Lecture

Methods for constructing and dimensioning frame systems (static diagrams, loads, dimensioning of eccentrically compressed columns and frame transoms, connection details). Principles of construction and dimensioning of concentrations in hall buildings. Types of global analyzes in the dimensioning of steel structures. Imperfections. Basic information on the design of spatial steel structures.

Teaching method:

lecture: information lecture, problem lecture, demonstration

Project

Implementation of the portal hall design. 3D static analysis of the hall. Collecting surface loads. Dimensioning of hall elements. Designing connections. Preparation of drawing documentation.

Teaching method:

- projects: design and demonstration method

Teaching methods

Form of classes: Lectures - problem lecture / seminar lecture / lecture with multimedia presentation. Test.

Form of classes: projects - oral defense of the project. Steel hall design.

Bibliography

Basic

1. Z. Kurzawa, K. Rzeszut, M. Szumigała, Stalowe Konstrukcje Prętowe cz III wyd. PP 2015.

2. Bródka Jan, Broniewicz Mirosław, Giżejowski Marian: Kształtowniki gięte. Poradnik projektanta; Wydanie I, Polskie Wydawnictwo techniczne Rzeszów 2006

3. Biegus Antoni: Stalowe budynki halowe; Wydawnictwo ARKADY Sp. z o.o., Warszawa 2008

4. Structural Stability of Steel: Concepts and Applications for Structural Engineers, Theodore V. Galambos, Andrea E. Surovek, John Wiley & Sons , 2008

5. Structural Design of Steelwork to EN 1993 and EN 1994, , Lawrence Martin, Elsevier, 2007

Additional

1. EN-1993-1-1

2. EN-1993-1-8

3. EN-1990

4. EN-1991-1-1

5. EN-1991-1-3

6. EN-1991-1-4

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	30	1

[1] delete or add other activities as appropriate