COURSE DESCRIPTION CARD - SYLLABUS

Course name

Metal Structures

Course

Field of study

Civil Engineering

Year/Semester

1/2

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

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

15

Projects/seminars

15

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

dr hab. inż. Katarzyna Rzeszut

email: katzrzyna.rzeszut@put.poznan.pl

tel. 061 665 2097

Wydział Budownictwa i Inżynierii Środowiska

ul. Piotrowo 5 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Knowledge: student has knowledge of structural mechanics and strength of materials in the area of structural engineering. Knows the basic design method of industrial halls. Presents the design issues of spatial steel truss structures.

Skills: student uses the design standards for structural analysis and dimensioning of steel structural elements, design structural elements of trusses in industrial buildings and bracing systems, and joints.

Social competencies: student understand the need for lifelong learning and knows how to interact and work in a group, taking the different roles.

Course objective

Gaining of knowledge and skills in design methods of steel frame buildings, cranes construction suspended structures, masts, towers, chimneys and thin-walled cold-formed structures stiffened with the building envelope.

Course-related learning outcomes

Knowledge

Knowledge: Familiar with basic principles of structural design concerning the cable structures as a roof. Knows design issues of structural elemens susceptible dynamically: chimneys, towers and masts. Presents general principles and methods of structural analysis and design principles of thin-walled cold-rolled purlin cooperating with sheathing.

Skills

Skills: Uses the building standards for structural analysis and dimensioning of structures susceptible dynamically and thin walled. Able to design the components of towers, masts and suspension construction. Able to design thin-walled purlin restrained by sheeting. Is able to develop a project and prepare technical documentation in a CAD environment.

Social competences

Social competencies: Understand the need for lifelong learning; able to inspire and organize the learning process of others. Able to interact and work in a group, taking the different roles. Correctly identifies and resolves dilemmas associated to his profession.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:
Evaluation of:

Lectures - test in the . (1 per semester - 1.5 hours)

Project - individual student projects combined with an oral defense of the thesis, based on: - substantive assessment of the project documentation made, - regularity of work (entries in the consultation card and attendance at the classes), - project defense (written or oral form). assessment of individual student projects combined with oral defense of work

Exercises - test (1 per semester - 1.5 hours) or multimedia presentations of students.

Credit above 50%.

Programme content

Form of teaching: Lecture

Basic information on the structural design of structures susceptible dynamically: chimneys, towers and masts. Structural stability of steel portal frames. Principles of the location of the bracings in single-storey structures (single- or multi-bay). Design procedures of bracings according to EN1993-1-1: 2005+AC 2006. Rules for the production and design of cold-rolled construction. Issues of loss of stability of thin-walled

elements in compression, bending and eccentrically-compressed. Global and local stability of thin-walled components axial compression, bending, eccentric compression. Ultimate and serviceability limit state and design methods for beams partially restrained by sheeting. Cable structures. Characteristics of the selected cable structures. Principles of the cable structure response. Elementary cable mathematics: load extension relationship, radius of circular arc, centenary loaded vertically, pre-stressed cable, two-way cable net. Two-dimensional tension structures: suspension bridges, draped cables, cable-stayed beams, cable trusses. Three-dimensional tension structures and surface stressed structures: cable truss systems, pneumatically-stressed, pre-stressed. Examples of the erected cable structures. Space structures. Wide-span space structures. Trusses versus space deck systems. Structural load transmission at different grid density level. Design procedures and examples of the erected space structures.

Form of teaching: Exercise

Modeling and designing roofs, ceilings, towers and masts. Calculation algorithms thin-walled structures. Principles of design, construction and dimensioning thin-walled purlins and other elements of thin-walled structures. Structural solution of welded and bolted connections. Discussion and multimedia presentations of students.

Form of teaching: Project

The project of thin-walled purlins restrained by sheathing.

Teaching methods

Monographic lecture with multimedia presentation with elements of problem-conversational lecture.

Practical implementation of the engineering task. Initial discussion of the task, phased preparation of calculations and drawing documentation by students, consultation and approval of work stages, explanation by the teacher of all recurring doubts. The basis for getting credit is systematically (confirmed entries from consultations) correctly executed project and its defense (oral or written form).

Discussion and multimedia presentations of students.

Bibliography

Basic

1. Unified Design of Steel Structures, 1st Edition, Louis F. Geschwindner, John Wiley & Sons , 2008.

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

3. The Behaviour and Design of Steel Structures to EC3.S, Trahair, M.A. Bradford, D.A. Nethercot, L. Gardner , Balkema, 2007.

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

Additional

Steel Buildings: Analysis and Design, 4th Edition, Stanley W. Crawley, Robert M. Dillon, John Wiley & Sons , 2008.

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	45	1,5
Student's own work (literature studies, preparation for tutorials, preparation for tests, project preparation) [1]	15	0,5

[1] delete or add other activities as appropriate