COURSE DESCRIPTION CARD - SYLLABUS

Course name
Metal structures [S2Bud1E-KB>KM1]

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

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
30

Number of credit points

4,00

Coordinators

dr hab. inż. Robert Studziński prof. PP
robert.studzinski@put.poznan.pl

Lecturers

Prerequisites

KNOWLEDGE: Has knowledge of structural mechanics and strenght of materials in the Civil Engineering field of science. Knows the methods of designing metal structures according to Eurocodes subjected to compression, tension and bending. Is able to verivy the capacity of the cross-section subjected to variouse internal forces. Knows the design method of the wleded and bolteted connections (Eurocode rules). Knows the principles of designing trusses and roof bracings. SKILLS: Uses basic formulas in the field of structural mechanics and strength of materials. 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 (Eurocodes) for loads acting on building structures, as well as for static calculations and dimensioning of steel structure elements. SOCIAL COMPETENCE: 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, bracings, eccentrically compressed columns, frame joints, trusses, skeletal buildings, and spatial trusses. Acquiring knowledge of types of global analysis. 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 using finite element method as well as 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. 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
4. 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:

1. Design of Steel Structures, Luís Simões da Silva, Rui António Duarte Simões, Helena Gervasio, Publisher: ECCS Press and Ernst&Sohn, ISBN: 978-3-433-02973-2
2. Structural Stability of Steel: Concepts and Applications for Structural Engineers, Theodore V. Galambos, Andrea E. Surovek, John Wiley & Sons , 2008
3. Design of Steel Structures to Eurocodes, Vayas Ioannis, Ermopoulos John, Ioannidis George, ISBN 978-3-319-95474-5, DOI 10.1007/978-3-319-95474-5, Publisher: Springer International Publishing
4. Structural Design of Steelwork to EN 1993 and EN 1994, , Lawrence Martin, Elsevier, 2007
EN-1993-1-1 / EN-1993-1-3 / EN-1993-1-5 / EN-1993-1-8 / EN-1990 / EN-1991-1-1 / EN-1991-1-3 / EN-1991-1-4

Programme content

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.
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.

Course topics

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.
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Teaching methods

Lecture: informative lecture, problem lecture, demonstration
Projects: project and demonstration method

Bibliography

Basic
1. Design of Steel Structures, Luís Simões da Silva, Rui António Duarte Simões, Helena Gervasio, Publisher: ECCS Press and Ernst&Sohn, ISBN: 978-3-433-02973-2
2. Structural Stability of Steel: Concepts and Applications for Structural Engineers, Theodore V. Galambos, Andrea E. Surovek, John Wiley & Sons , 2008
3. Design of Steel Structures to Eurocodes, Vayas Ioannis, Ermopoulos John, Ioannidis George, ISBN 978-3-319-95474-5, DOI 10.1007/978-3-319-95474-5, Publisher: Springer International Publishing
4. Structural Design of Steelwork to EN 1993 and EN 1994, , Lawrence Martin, Elsevier, 2007
Additional
1. EN-1993-1-1 / EN-1993-1-3 / EN-1993-1-5 / EN-1993-1-8
3. EN-1990
4. EN-1991-1-1 / EN-1991-1-3 / EN-1991-1-4

Breakdown of average student's workload

	Hours	ECTS
Total workload	120	4,00
Classes requiring direct contact with the teacher	62	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	58	2,00