COURSE DESCRIPTION CARD - SYLLABUS

Course name
Engineering Structures

Course

Field of study
Sustainable Building Engineering

Year/Semester
4/7

Area of study (specialization)
-

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
English

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars
15

Number of credit points

5

Lecturers

Responsible for the course/lecturer:
dr inż. Robert Studziński

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Wydział Inżynierii Lądowej i Transportu

ul. Piotrowo 5, 60-965 Poznań

Responsible for the course/lecturer:
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Prerequisites

Knowledge:

- basic knowledge of mathematics, strength of materials, building mechanics, computer methods,

- basic knowledge of Metal and Concrete Structures I and II.

Skills:

- use of available information sources,

- uses construction standards (Eurocode) in the field of load collection, determination of load combinations, design of steel elements and connections,

- can model structural systems (2D) in any program for static calculations.

Course objective

Skills in designing engineering structures in terms of Eurocodes. Ability to apply various global analyzes to steel and concrete structures. Ability to apply imperfections in the design of steel and concrete structures. The ability to ensure spatial geometric invariability and rigidity to reinforced concrete, steel and reinforced concrete-steel structures.

Course-related learning outcomes

Knowledge

1. Know building legislation, Polish standards (PN) and European standards (EN), technical conditions of constructing building facilities and energy-saving buildings.

2. Know the principles of constructing and dimensioning metal and concrete elements as well as connections of building units.

3. Have basic knowledge of operation algorithms of selected software (including the usage of BIM technology), supporting the calculation and design of constructions.

Skills

1. Can set up the strengths influencing building units and perform static analysis of statically determinate and non-determinate bar structures.

2. Are able to design selected elements and simple metal and concrete structures.

3. Are able to perform the analysis of linear stability and ultimate limit capacity of simple bar structures, in the aspect of evaluating critical and ultimate limit states of constructions.

Social competences

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

2. Are able to critically evaluate the results of their own work.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures:

Colloquium on the lecture content including closed questions and tasks to be solved.

Passing is obtained from obtaining a minimum of 50% of the maximum number of points in the test in the lectures.

Grading scale:

91% -100% very good (A)

81% -90% good plus (B)

71% -80% good (C)

61% -70% sufficient plus (D)

51% -60% sufficient (E)

less than 50% insufficient (F)

Projects:

Colloquium on the content of projects in the form of closed questions

Assessment of individual projects

Passing is obtained from obtaining a minimum of 50% of the maximum number of points in the colloquium on the content of the projects and the correct development of an individual project.

Grading scale:

91% -100% very good (A)

81% -90% good plus (B)

71% -80% good (C)

61% -70% sufficient plus (D)

51% -60% sufficient (E)

less than 50% insufficient (F)

Programme content

Lecture:

Global analysis of frame systems; Second order effects in the analysis of engineering structures; Imperfections; Principles of shaping the transverse arrangements of halls, Principles of shaping spatial arrangements of industrial halls; Local and global instability; Shaping nodes and connections.

Design:

Structural design of the frame system with a steel and reinforced concrete structure (steel skeleton structure, reinforced concrete floor slabs, reinforced concrete foundations).

Teaching methods

Lecture: information lecture, problem lecture, demonstration

Design exercises: method of design and demonstration

Bibliography

Basic

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

[2] Mosley B., Bungey J., Hulse R.: Reinforced concrete design to Eurocode 2, 6th Ed., Palgrave Macmillan 2007

[3] Toniolo G., di Prisco M.: Reinforced Concrete Design to Eurocode 2. Springer 2017

[4] Design of a Steel Structures 2nd Edition, L. da Silva, R. Simones and H. Gervasio, Willey Ernst&Sohn 2016

[5] EN 1990 - Basis of structural design

[6] EN 1991-1-1 - Densities, self-weight, imposed loads for buildings

[7] EN 1991-1-3 - Snow loads

[8] EN 1991-1-4 - Wind loads

[9] EN 1993-1-1 - Design of steel structures - Part 1-1

[10] EN 1993-1-3 - Design of steel structures - Part 1-3

[11] EN 1993-1-5 - Design of steel structures - Part 1-5

[12] EN 1993-1-8 - Design of steel structures - Part 1-8

[13] EN 1992-1-1 - Design of concrete structures - Part 1-1

Additional

1] Structural Design of Steelwork to EN 1993 and EN 1994, Lawrence Martin, Elsevier, 2007

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

[3] R Studziński, P Ordziniak, Wymiarowanie słupów stalowych dwugałęziowych, Builder, 21, s. 74-77, 2017

[4] R Studziński, P Ordziniak, Wybrane aspekty modelowania prętowych konstrukcji stalowych, Materiały Budowalne, 12, s. 70-72, 2016

[5] R Studziński, P Ordziniak, Wyznaczenie sprężystego momentu krytycznego dla dowolnych przekrojów otwartych i zamkniętych, Materiały Budowlane, 9, s. 125-127, 2015

[6] Starosolski W.: Konstrukcje żelbetowe według Eurokodu 2 i norm związanych. PWN 2015

[7] Knauff M., Golubińska A.: Tablice i wzory do projektowania konstrukcji żelbetowych z przykładami obliczeń. PWN 2013

Breakdown of average student's workload

	Hours	ECTS
Total workload	95	5,0
Classes requiring direct contact with the teacher	50	3,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	45	2,0

[1] delete or add other activities as appropriate