# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Thin-walled structures [N2Bud1-KB>KC]

## Course

Field of study
Civil Engineering

Year/Semester
2/3

Area of study (specialization)
Structural Engineering

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

## Number of hours

Lecture
10

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
10

## Number of credit points

2,00

## Coordinators

prof. dr hab. inż. Katarzyna Rzeszut
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## Lecturers

## 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 stee thin-walled cold-formed structures stiffened with the building envelope.

## Course-related learning outcomes

Knowledge:
methods of structural analysis and design principles of thin-walled cold-rolled purlin cooperating with sheathing.

Skills:
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:

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
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.

## Course topics

none

## 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).

## Bibliography

Basic

1. Z. Kurzawa, K. Rzeszut, M. Szumigała, Stalowe Konstrukcje Prętowe cz III wyd. PP 2015.
2. Garncarek R.: Obliczanie płatwi ceowych i zetowych stabilizowanych przeponą z blach fałdowych wg normy europejskiej ENV1993-1-3; 1996. Konstrukcje Stalowe nr 5/1999, str. 39-41.
3. Bródka Jan, Broniewicz Mirosław, Giżejowski Marian: „Kształtowniki gięte. Poradnik projektanta”; Wydanie I, Polskie Wydawnictwo techniczne Rzeszów 2006.
4. Biegus Antoni: „Stalowe budynki halowe”; Wydawnictwo ARKADY Sp. z o.o., Warszawa 2008.
5. PN-EN 1993-1-3:2008 Eurokod 3. Projektowanie konstrukcji stalowych. Część 1-3: Reguły ogólne. Reguły uzupełniające dla konstrukcji z kształtowników i blach profilowanych na zimno.
6. - PN-EN-1993-1-3:2008/NA2010/AC:2009/Ap1:2010 - poprawki do normy.
Additional
1. K. Rzeszut, Stataczność cienkościennych konstrukcji metalowych z luzami i poczatkowymi imperfekcjami, wyd. PP 2015.
2. Łubiński, Filipowicz.: Konstrukcje metalowe cz.1 i 2, Żółtowski, Arkady, Warszawa, 2000.
3. Bródka J., Garcarek R., Miłaczewski K.: Blachy fałdowe w budownictwie stalowym. Arkady. Warszawa 1999.

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 50 | 2,00 |
| Classes requiring direct contact with the teacher | 20 | 1,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 30 | 1,00 |