



COURSE DESCRIPTION CARD - SYLLABUS

Course name

SELECTED ASPECTS OF MECHANICS AND STABILITY OF COLD-FORMED STEEL STRUCTURES

Course

Proposed by Discipline

Civil engineering, geodesy and transport

Type of studies

Doctoral School

Form of study

full-time

Year/Semester

II/3

Course offered in

English

Requirements

elective

Number of hours

Lecture

8

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

Knowledge: basic knowledge on structural mechanics and strength of materials.

Skills: basic skills in static calculations and dimensioning of structural elements.

Social competencies: understanding of the need for lifelong learning and interest in broadening knowledge in field of thin-walled steel structures.



Course objective

Introduction to the issues of statics and stability of cold-formed thin-walled steel structures taking into account their sensitivity to initial imperfections. Presentation of knowledge covering linear and nonlinear analysis of thin-walled structures considering interactive buckling, initial geometric imperfections and clearances. Presentation of issues related to the design of thin-walled cold-formed elements cooperating with the cladding systems.

Course-related learning outcomes

Knowledge

A PhD student who graduated from doctoral school knows and understands:

- 1) theoretical background in field of stability of cold-formed thin-walled steel structures, [P8S_WG/SzD_W01]
- 2) main trends in the design development related to interactive buckling, geometric imperfections and clearances, [P8S_WG/SzD_W02]

Skills

A PhD student who graduated from doctoral school can:

- 1) solve complex problems related to cold-formed thin-walled steel structures, [P8S_UW/SzD_U01]
- 2) make a critical evaluation of results obtained from numerical calculations, [P8S_UW/SzD_U02]

Social competencies

A PhD student who graduated from doctoral school is ready to:

- 1) discuss the problems related to stability of cold-formed thin-walled structures, [P8S_KK/SzD_K01]
- 2) critically evaluate own contribution to the development of cold-formed thin-walled structures, [P8S_KK/SzD_K02]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

PQF code	Methods for verification of learning outcomes	Assessment criteria
W01, W02	Written elaboration of a CF TWS design problem.	Evaluation of knowledge on the basis of originality and integrity of the written work.
U01, U02	Written elaboration of a CF TWS design problem	Evaluation of and skills on the basis of originality and integrity of the written work.
K01, K02	Written elaboration of a CF TWS design problem	Evaluation of social competencies on the basis of originality and integrity of the written work.



Programme content

- 1) Introduction to the issues of statics and stability of cold-formed thin-walled structures (CF TWS).
- 2) Interactive buckling and sensitivity analysis of CF TWS to initial imperfections.
- 3) Linear and nonlinear analysis of CF TWS taking into account initial geometric imperfections and clearances.
- 4) Design method of CF TWS beams restrained by sheeting.

Course topics

Stability of cold-formed thin-walled steel structures taking into account their sensitivity to initial imperfections and clearances. Design methods of thin-walled cold-formed elements cooperating with the cladding systems.

Teaching methods

Lecture: multimedia presentation including illustrations and examples.

Bibliography

Basic

- 1) Rzeszut K., Stateczność cienkościennych konstrukcji metalowych z luzami i początkowymi imperfekcjami, Wyd. Politechniki Poznańskiej, ISBN 978-83-7775-371-2, 2015, s. 137.
- 2) Rzeszut K. Wybrane zagadnienia mechaniki i projektowania lekkich konstrukcji stalowych, w: Współczesna mechanika konstrukcji w projektowaniu inżynierskim, KILiW PAN, Warszawa, 2015, s. 327-348.
- 3) Kurzawa Z., Rzeszut K., Szumigała M. Stalowe konstrukcje prętowe. Cz. 3, Konstrukcje z łukami, elementy cienkościenne, pokrycia membranowe, elementy zespolone, dachy pierścieniowe i belki podsuwnicowe. Poznań, Polska: Wyd. Politechniki Poznańskiej, 2017, 353 s.

Additional

- 1) Rzeszut K., Post-Buckling Behaviour of Steel Structures with Different Types of Imperfections, Applied Sciences, 2022, vol. 12, iss. 18, s. 9018-1-9018-21.
- 2) Rzeszut, K., Garstecki, A., Modeling of initial geometrical imperfections in stability analysis of thin-walled structures, 2009, Journal of Theoretical and Applied Mechanics 47 (3), s. 667, 2009.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	8	0
Doctoral student's own work (literature studies, preparation for tutorials, project preparation) ¹	42	2,0

¹ delete or add other activities as appropriate