

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Civil Engineering
1.3	Department	Structuri
1.4	Field of study	Civil Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Civil, Industrial and Agricultural Buildings /Engineer (English language)
1.7	Form of education	Full time
1.8	Subject code	55.0

2. Data about the subject

2.1	Subject name				Structuri metalice II						
2.2	Course responsible/lecturer				Prof.Dr.Ing. Nagy Zsolt-Zsolt.Nagy@dst.utcluj.ro						
2.3	Teachers in charge of seminars				Sl.Dr.Ing. Moga Catalin-Catalin.Moga@dst.utcluj.ro						
2.4	Year of study	4	2.5	Semester	1	2.6	Assessment	E	2.7	Subject category	DS/DI

3. Estimated total time

3.1	Number of hours per week	6	3.2 of which, course:	3	3.3 applications:	
3.4	Total hours in the curriculum	84	3.5 of which, course:	42	3.6 applications:	
Individual study						hours
Manual, lecture material and notes, bibliography						30
Supplementary study in the library, online and in the field						9
Preparation for seminars/laboratory works, homework, reports, portfolios, essays						28
Tutoring						2
Exams and tests						9
Other activities						0
3.7	Total hours of individual study	66				
3.8	Total hours per semester	150				
3.9	Number of credit points	6				

4. Pre-requisites (where appropriate)

4.1	Curriculum	Strength of Materials, Statics and dynamics of constructions
4.2	Competence	N/A

5. Requirements (where appropriate)

5.1	For the course	Cluj-Napoca, str. Barițiu, Nr. 25 – Room with video-projector
5.2	For the applications	Cluj-Napoca, str. Barițiu, Nr. 25 – Room 185

6. Specific competences

Professional competences	<ul style="list-style-type: none"> -- To apply structural modelling for structural systems – specifically for steel structures, mandatory standards; -- To select the adequate methods of analysis for steel structures; -- To know the overall stability principles governing the conceptual design against horizontal and vertical loads; -- To use data from engineering model – to perform stability and resistances checks; -- To determine sensibility of structures for second order effects; -- To be able to check structural joints for steel structures; -- To understand basic fire engineering requirements for steel structures.
Cross competences	<ul style="list-style-type: none"> -- Linking knowledge of design calculation and construction erection with the results of the structural stability analysis; -- Improving structural performance based on engineering data; -- Drafting and presentation of a technical report including design calculation for the ULS and SLS checks of a steel structure.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	To achieve skills in steel structural design and stability of building structures in the context of sustainable development
7.2	Specific objectives	Specific skills in the analysis and conceptual steel design: <ul style="list-style-type: none"> - Stability response of building structures - Structural joints for steel structures - Conception of adequate structural configurations

8. Contents

8.1. Lecture (syllabus)	Teaching methods	Notes
1. Introduction to the design of structural steelwork in accordance with the new Eurocodes (EC1, EC3)	-	-
2. Frame analysis and design		
3. Frame design approaches: Traditional vs Modern design approaches		
4. Member design - Local buckling and section classification		
5. Member design - Tension members - Restrained beams		
6. Member design - Unrestrained beams		
7. Member design – Columns and beam-columns		
8. Structural joints for steel structures / Generalities about structural joints for steel structures		
9. Practical procedures for the characterisation of the response of moment resisting joints: the component method		
10. Stability analysis in structural design of steel structures. Sway and non-sway frames		
11. Joint design for steel structures using FEM		
12. Introduction to EC3 Fire engineering design		
13. Practical demonstrations for structural analysis / workshop with students		
14. Case studies – built examples from industry		
Bibliography		

References: 1) EN1993-1-1 (2005) - Eurocode 3: Design of steel structures - Part 1-1: General rules and rules for buildings, CEN - European Committee for Standardization 2) EN 1993-1-8 (2005) (English): Eurocode 3: Design of steel structures - Part 1-8: Design of joints, CEN - European Committee for Standardization 3) Catalin Moga / Zsolt NAGY - Constructii Metalice – Structuri, UTPress, ISBN 978-606-737-599-2		
8.2. Applications/Seminars	Teaching methods	Notes
1. Design of a Single Bay Portal Frame. Geometry definition. Structural configuration of a single story structure for vertical and horizontal loads.	-	-
2. Design of a Single Bay Portal Frame. Geometry definition. Structural configuration of a single story structure for vertical and horizontal loads.		
3. Load evaluation. Dead loads. Snow loads. Wind loads. Load cases.Loads combination. ULS combination. SLS combination. Performing stability analysis. Sensibility analysis of the frame for horizontal and vertical loads. Frame classification (sway/non-sway)		
4. Load evaluation. Dead loads. Snow loads. Wind loads. Load cases.Loads combination. ULS combination. SLS combination. Performing stability analysis. Sensibility analysis of the frame for horizontal and vertical loads. Frame classification (sway/non-sway)		
5. Structural member checks for ULS / Beam checks / Columns checks		
6. Structural member checks for ULS / Beam checks / Columns checks		
7. Structural joint checks of a portal frame (Eave, Ridge and column base checks).		
8. Structural joint checks of a portal frame (Eave, Ridge and column base checks).		
9. BIM model for steel structures execution		
10. BIM model for steel structures execution		
11. Joint design for steel structures using FEM		
12. Execution drawings / shop and erection drawings for steel structures		
13. Execution drawings / shop and erection drawings for steel structures		
14. Project submission: presentation of the prepared project		
Bibliography References: 1. Design of portal frame using elastic analysis. Steel Alliance example. 2. Access Steel examples. 3. Zsolt Nagy - Îndrumător pentru proiectarea structurilor realizate din profile formate la rece. ISBN 978-973-0-33018-2		

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Accumulated skills will be necessary for those employees who will be involved in private or public institutions activities dealing with steel construction works, project management or quality assurance for residential or industrial constructions using steel as material.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Questionnaire with 30 questions	Min. 15 correct answers	60%
10.5 Applications	Project evaluation	Oral test – compulsory condition to the exam entrance	40%
10.6 Minimum standard of performance			
• $T=(30 \times 0.3)/2+1 \geq 5$; Applications: $L=(L1+L2+L3+L4)/4 \geq 5$; Final: $F=0,6 \times T+0,4 \times L \geq 5$			

Date of filling in:		Title Surname Name	Signature
	Lecturer	Prof.Dr.Ing. Nagy Zsolt	
	Teachers in charge of application	Sl.Dr.Ing. Moga Catalin	

Date of approval in the department	Head of department conf.dr.ing. Attila Puskas
18/06/2025	
Date of approval in the faculty	Dean prof.dr.ing Daniela MANEA
25/06/2025	