

## 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	Structures
1.4	Field of study	Civil Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	CCIA English/Engineer
1.7	Form of education	Full time
1.8	Subject code	46

### 2. Data about the subject

2.1	Subject name				Steel Structures I						
2.2	Subject area				Structural Engineering						
2.3	Course responsible/lecturer				Professor Ioan Petran						
2.4	Teachers in charge of seminars				Lecturer Paul Pernes						
2.5	Year of study	III	2.6	Semester	VI	2.7	Assessment	Exam	2.8	Subject category	

### 3. Estimated total time

3.1 Number of hours per week	5	3.2 of which, course:	3	3.3 applications:	2
3.4 Total hours in the curriculum	70	3.5 of which, course:	42	3.6 applications:	28
Individual study					hours
Manual, lecture material and notes, bibliography					20
Supplementary study in the library, online and in the field					5
Preparation for seminars/laboratory works, homework, reports, portfolios, essays					18
Tutoring					2
Exams and tests					3
Other activities					
3.7	Total hours of individual study	48			
3.8	Total hours per semester	118			
3.9	Number of credit points	4			

### 4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	Loads evaluation and structural analysis

### 5. Requirements (where appropriate)

5.1	For the course	N/A
5.2	For the applications	N/A

## 6. Specific competences

Professional competences	Advantages and disadvantages of steel structures Standard tests on steel material Bolted connection types, characteristics, position Welded connections types and technology of welding Cross section types for steel elements Steel elements subjected to axial loads
Cross competences	Number and position of bolts in case of a bolted connection Type and characteristics of welded seams in case of a welded connections Sizing and checking for a steel element subjected to tension and centric compression force

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

7.1	General objective	Developing ability to design steel connections
7.2	Specific objectives	Sizing and checking steel joints

## 8. Contents

8.1. Lecture (syllabus)	Teaching methods	Notes
1.Steel fabrication and steel products; Structure of carbon steel and alloy steels	Presentation	Video-projector
2.The influence of alloying on the mechanical characteristics of steel; Heat treatments		
3.Structural steel for buildings		
4.Corrosion behaviour of steel elements		
5.Calculation procedure for steel structures; Romanian standards (STAS) and Eurocode 3(EC 3)		
6.Mean of joinings and gripings; Romanian standards and EC 3		
7.Riveted connections; Details and calculation of riveted connections		
8.Regular bolted connections; Details and calculation of them		
9.High-strength bolted connections; Details and calculation of them		
10.Welded connections; Fillet welds; Butt welds		
11.Technology of welds; welding procedures; welding defects and control		
12.Design resistance of fillet welds; design resistance of butt welds		
13.Centric tensioned bars; centric compressed bars		
14.Centric compressed bars; buckling phenomena		

<b>Bibliography</b> 1.Ioan Petran, Roland Mihai Senila – Design of pitched roof steel portal frame structure, Ed. Mediamira, Cluj-Napoca, 2017 2.SR EN 1993-1-8 Eurocode 3:Design of steel structures, 2013 3.ECCS No 126, TC 10 Structural Connections, European Recommendations for de design of Structural connections according to Eurocode 3, 2003 4.Arcelor profiles-Beams, channels and merchant bars, Arcelor Group, 2005		
<b>8.2. Applications/Seminars</b>	<b>Teaching methods</b>	<b>Notes</b>
1.Steel qualities.Choice of steel for building elements.Range of laminates	Presentation, workshop, applications	Eurocode 3 part 1-8 Tables of laminates Arcelor profiles
2.Steel behaviour subjected to different stresses – Traction testing		
3.Regular bolted connections.Constructive prescriptions, bolts presentation, calculation of bolted joints		
4.Paper 1:Calculation of articulated connection between a main and a secondary beam		
5. Paper 1:Calculation of articulated connection between a main and a secondary beam		
6.Paper 2:Design of a beam-column connection (extended rigid end-plate)		
7. Paper 2:Design of a beam-column connection (extended rigid end-plate)		
8. HSFG bolts connections.Constructive prescriptions, calculation of joints		
9.Paper 3:HSFG bolts continuous connection (splice plates joint)		
10. Paper 3:HSFG bolts continuous connection (splice plates joint)		
11.Welded connections		
12.Paper 4:Beam-column welded connection		
13. Paper 4:Beam-column welded connection		
14.Recapitulation, applications		

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

Skills for the future engineers in a frame of design companies and building companies

**10. Evaluation onsite/online**

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	5 question theory problems	Written exam – 2 hours	60%
10.5 Applications	Design problem solving	Written testing – 45 minutes	40%
10.6 Minimum standard of performance			
Every position must be $\geq 5$ mark, including course, application and papers no. 1-4			

Date of filling in: 30.06.2025		Title Surname Name	Signature
	Lecturer	Professor Ioan Petran, Phd	
	Teachers in charge of application	Lecturer Paul Pernes, Phd	

Date of approval in the department ..... 30.06.2025 _____	Head of department Conf.dr.ing Attila Puskas
Date of approval in the faculty ..... __30.06.2025_____	Dean Prof.dr.ing Daniela Manea