

COURSE SYLLABUS	
Course code	1080-BU400-ISA-0503
Course name	Metal Structures I
Course version	2027L
Level of education	first cycle programme
Form and mode of study	full-time study
Study profile	general academic profile
Field of study	Civil Engineering
Specialisation	-
Organizational unit	The Faculty of Civil Engineering
Implementing unit	The Faculty of Civil Engineering
Course unit	n/a
Course groups	-
Course status	Obligatory
Language of the course	English
Study stage code	BU000-S4-ISA-1080
Number of ECTS credits	4

Part I

01. Learning outcomes and the method of conducting classes

Learning outcomes	see table "Learning outcomes"
Forms of classes and the number of hours in the semester	
project	30,00 h
lectures	20,00 h

02. ECTS balance

Number of ECTS credits	4	
Course workload	Hours	ECTS
Total number of hours and ECTS credits for the course:		
Hours and ECTS credits for courses involving direct participation of academic teachers	54	2,16
Hours and ECTS credits involving student's independent work	46	1,84
Total	100	4,00
Number of hours involving direct participation of academic teachers:		
Hours connected with class participation	50	
Other synchronous hours	4	
Total	54	
Number of hours involving student's independent work:		
Hours for student's independent work	46	

03. Course content

Course content	1. Subject textbooks and standards. Basic concepts and definitions used in steel construction. 2. Types and kinds of steel structures in construction - general division, examples. Use of steel as a construction material. 3. ULS method in the design of steel structures. 4. Connections in steel structures, classification of welded connections and mechanical fasteners. 5. Forming and designing welded connections, construction requirements. 6. Categories of lap bolted connections, forming and designing of pressure and friction connections, construction requirements. 7. Local instability of cross-section walls under the influence of compressive normal stresses, classification system of walls and cross-sections. 8. Calculation of cross-section load-bearing capacity in simple load states (axial tension, axial compression and bending). 9. Classification of webs, shear capacity of stocky webs. 10. Axially tensioned elements - forming cross-sections and design. Axially compressed elements – shaping cross-sections and designing with respect to various forms of buckling (flexural, torsional and flexural-torsional). 11. Axially compressed solid-wall columns. Column heads and column bases and methods of anchoring in the foundation. 12. Simply supported rolled steel beams, cross-section load-bearing capacity in bending and shear conditions. Lateral buckling of beams not stiffened transversely between supports or discrete bracings, structural procedures eliminating the effect of buckling. 13. Steel plate girders – manufactured in an automated manner and individually designed. Principles of shaping the cross-section of plate girders. 14. Local instability of cross-section webs under the influence of tangential stresses, load-bearing capacity of slender webs, interactive instability. 15. Instability of webs under the influence of concentrated load, flange instability with a slender web. 16. Selection of transverse stiffeners, rigid and flexible stiffeners, design requirements. 17. Supports for rolled beams, plate girders bearings. 18. Design drawings of steel structure elements, principles of preparation. 19. Semester design exercise. Design of a steel structure ceiling and an axially compressed column.
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Table: Learning outcomes

Knowledge	
Outcomes code	W1
Description	Knows and understands the basics of checking strength and designing simple steel structural elements - beams, axially compressed columns, tension elements. Knows the basic principles of calculating welded and bolted lap joints.
Related field-of-study learning outcomes	K1_W15, K1_W17
Outcomes code	W2
Description	Knows and understands the basics of the steel production process. Knows the basic types of steel used in building structures. Knows and understands the principles of selecting steel sections for simple structural elements (beams, axially compressed columns).
Related field-of-study learning outcomes	K1_W06
Outcomes code	W3
Description	Knows and understands standard provisions relating to steel structures, as they relate to the design of simple structural elements and typical welded and bolted lap joints.
Related field-of-study learning outcomes	K1_W23
Skills	
Outcomes code	U1
Description	Can design simple beam elements and axially compressed columns. Can design typical welded and bolted lap joints.

Part I	
Related field-of-study learning outcomes	K1_U15, K1_U18
Outcomes code	U2
Description	Can make construction drawings of simple steel structure elements: beams and axially compressed columns.
Related field-of-study learning outcomes	K1_U11
Social competence	
Outcomes code	K1
Description	Is ready to supplement knowledge with information from the literature
Related field-of-study learning outcomes	K1_K01, K1_K02
Outcomes code	K2
Description	Is ready to search for correct solutions (selected cross-sections, calculation results).
Related field-of-study learning outcomes	K1_K03

Part II	
04. Year and semester of studies	
Year	2027L
Semester	4
05. Course leader and course teachers	
Course leader	Mirosław Siennicki
project	Mirosław Siennicki
lectures	Mirosław Siennicki
06. Course objective	
Course objective	The aim of the course is to acquire knowledge and practical skills related to the principles of analysis and design of simple steel structural elements and connections.
07. Teaching methods and techniques	
project	multimedia presentation, individual work, design and drawing work
lectures	multimedia presentation, lecture with blackboard
08. Methods of verifying learning outcomes	
Knowledge	
Outcomes code	W1
Description	Knows and understands the basics of checking strength and designing simple steel structural elements - beams, axially compressed columns, tension elements. Knows the basic principles of calculating welded and bolted lap joints.
Verification methods	lectures: written test project : project
Outcomes code	W2
Description	Knows and understands the basics of the steel production process. Knows the basic types of steel used in building structures. Knows and understands the principles of selecting steel sections for simple structural elements (beams, axially compressed columns).
Verification methods	lectures: written test project : project
Outcomes code	W3
Description	Knows and understands standard provisions relating to steel structures, as they relate to the design of simple structural elements and typical welded and bolted lap joints.
Verification methods	lectures: written test project : project

Part II	
Skills	
Outcomes code	U1
Description	Can design simple beam elements and axially compressed columns. Can design typical welded and bolted lap joints.
Verification methods	lectures: written test project : project
Outcomes code	U2
Description	Can make construction drawings of simple steel structure elements: beams and axially compressed columns.
Verification methods	lectures: written test project : project
Social competence	
Outcomes code	K1
Description	Is ready to supplement knowledge with information from the literature
Verification methods	lectures: written test project : project
Outcomes code	K2
Description	Is ready to search for correct solutions (selected cross-sections, calculation results).
Verification methods	lectures: written test project : project
09. Required and recommended reading list	
Required reading	Martin L., Purkiss J.: Structural Design of Steelwork to EN 1993 and EN 1994, 3rd edition, Elsevier, 2017.
Recommended reading	Da Silva L. S., Simoes R., Gervasio H., Couchman G.: Design of steel structures.: Eurocode 3: Design of steel structures, Part 1-1 – General rules and rules for buildings, ECCS, 2014.
10. Other information	
Other information	In accordance with the Course Regulations