

Metal structures I

Field of study (Kierunek):

Civil Engineering (Budownictwo)

Subject Description Card (Karta Opisu Przedmiotu)

ISCED 2013-F Field of study: Building and civil engineering (code: 0732)

Name of course				Subject code		Semester	
Metal structures I <i>Konstrukcje metalowe I</i>						Autumn/ Spring	
Subject		Profile		Level of education			
Facultative		General academic		Full-time			
Rodzaj zajęć						ECTS	
Lecture	Practice	Laboratory	Design	Seminar	Exam		
15	30	-	15	-	NO	6	
Faculty conducting subject:	<i>Faculty of Civil Engineering Tel: +48 (34) 325 09 04</i>						
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I. Card subject	
PURPOSE OF THE SUBJECT	
C01	The understanding of the metal (steel) as a construction material and the understanding of the essence of metal structures.
C02	The skill acquisition of the design and calculation of the load capacity of the bending, compression, tension and shear cross-sections of the steel elements according to ULS rules. The skills acquisition of the design and calculation of the welded and bolted connections.
C03	The skill acquisition of the steel elements calculations according to SLS rules.
PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES	
1	The basic knowledge of the civil engineering.
2	The basic knowledge of the theoretical mechanics and the strength of materials and the skill to calculate the sections strength parameters.
3	The knowledge of the structural mechanics and the ability to solve the static equilibrium systems.
4	Ability to use the standards of the construction loads.
5	Ability to use of CAD program.
6	The knowledge of the preparing principles of the technical drawings and the ability to read and apply them.
EDUCATIONAL EFFECTS:	
Knowledge: the graduate knows and understands	
EK1	The graduate knows the behaviour of steel structures. The graduate knows how to solve simple engineering tasks in the field of steel structures.
Skills: the graduate can	
EK2	The graduate can obtain information from the literature and other sources, including the manufacturers catalogues of the steel construction elements. The graduate can choose the specific computational procedures. The graduate can choose the element cross-section and graphically interpret the result. The graduate can specify the output parameters for the simple engineering tasks on the basis of given sketch.
Social competence: The student is ready to	

EK3	The student is ready to work in a group and make his/her own decisions related with design metal structures.
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PROGRAM CONTENT		
Type of classes - Lecture		Number of hours
L1	The basic issues of the metal structures.	1
L2	The steel production process and the range of the steel products.	1
L3	The load capacity of the tensile elements with aspects of building information modelling.	1
L4	The classification of the cross-sections.	1
L5	The load capacity of the compression elements with aspects of building information modelling.	1
L6	The load capacity of the compression elements (buckling resistance).	1
L7	The load capacity of the bending elements with aspects of building information modelling.	1
L8	The load capacity of the bending elements (buckling resistance).	1
L9	The load capacity of the shear elements.	1
L10	The load capacity of the bolted connections.	1
L11	The load capacity of the bolted connections.	1
L12	The load capacity of the welded connections.	1
L13	The rules of the steel structures drawings.	1
L14	The rules of the steel structures drawings.	1
L15	Final test.	1
TOTAL:		15
Form of teaching – Practice		Number of hours
PT1	The organizational classes and acquainted with the standards: PN-EN-1993-1 part 1, 5 and 8.	2
PT2	The calculations of load capacity of the tensile elements.	2
PT3	The calculations of load capacity of the tensile elements.	2
PT4	The calculations of the cross-sections class.	2
PT5	The calculations of load capacity of the compression elements.	2
PT6	The calculations of load capacity of the compression elements.	2
PT7	The calculations of load capacity of the bending elements.	2
PT8	The calculations of load capacity of the bending elements.	2
PT9	The calculations of load capacity of the shear elements.	2
PT10	The calculations of load capacity of the bending and shear elements.	2
PT11	The calculations of load capacity of the bolted connections.	2
PT12	The calculations of load capacity of the bolted connections.	2
PT13	The calculations of load capacity of the welded connections.	2
PT14	The calculations of load capacity of the welded connections.	2
PT15	Final test.	2
TOTAL:		30
Form of teaching – Design		Number of hours
P1	The assumptions of projects.	1
P2	Loads.	3
P3	The design of the web (shear element).	1
P4	The design of the flanges (bending elements).	3
P5	The design of connection of the secondary beam with the main beam.	1
P6	The design of assembly connections of the main beams.	2
P7	The design of the welded connections.	1
P8	The steel structures drawings.	3

BASIC AND ADDITIONAL LITERATURE
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Basic literature:

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| 1. | Bogucki W.: Tablice do projektowania konstrukcji metalowych. Arkady. Warszawa 1996. |
| 2. | ECCS - European Convention for Constructional Steelwork, Design of Steel Structures: Eurocode 3 - Design of Steel Structures. Part 1-1 - General Rules and Rules for Buildings. John Wiley & Sons, Berlin 2014. |
| 3. | Ghosh K. M.: Practical Design of Steel Structures. Whittles Publishing, Dunbeath, Caithness KW6 6EY, Scotland, UK 2010. |
| 4. | Hancock G., Wilkinson T.J., Zhao X.L., Cold-formed Tubular Members and Connections: Structural Behaviour and Design. Elsevier B.V., Great Britain 2005. |
| 5. | Knowles P.R., Design of Structural Steelwork. CRC Press, London 2005. |
| 6. | Negi L.S., Design of Steel Structures 2 Edition. Tata McGraw-Hill Publishing Company Limited, New Delhi 1997. |
| 7. | PN-EN 1993-1-1 Eurocode 3: Design of steel structures. Part 1-1: General rules and rules for buildings. |
| 8. | PN-EN 1993-1-5 Eurocode 3 : Design of steel structures. Part 1-5 : Plated structural elements. |
| 9. | PN-EN 1993-1-8 Eurocode 3 : Design of steel structures. Part 1.8 : Design of joints. |

Additional literature:

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| 1. | Segui W., Steel Design. Cengage Learning, Stamford 2012 |
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