

## Skeleton Metal Structures

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 the subject				Subject code		Semester
Skeleton Metal Structures <i>Szkieletowe konstrukcje metalowe</i>						Spring
Subject		Profile		Level of education		
Facultative		General academic		Full-time		
Type of classes						ECTS
Lecture	Practice	Laboratory	Project	Seminar	Exam	
30	-	-	30	-	NO	6
Faculty conducting subject:	<i>Faculty of Civil Engineering Tel: +48 (34) 325 09 04</i>					
Teachers conducting subject:	<i>PhD. Eng. Przemysław Kasza</i>					mail: przemyslaw.kasza@pcz.pl

<b>I. Card subject</b>	
<b>PURPOSE OF THE SUBJECT</b>	
<b>C01</b>	Understanding the principles of constructing steel halls, steel skeleton buildings and large-span roofs.
<b>C02</b>	Acquiring skills in designing and calculating structural elements of steel halls according to the Ultimate Limit States and Usage Limit States.
<b>PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES</b>	
<b>1</b>	Basic knowledge of theoretical mechanics and strength of materials.
<b>2</b>	Knowledge of metal structures I and metal structures II.
<b>3</b>	Ability to use structural loading standards.
<b>4</b>	Knowledge of the principles of preparing and reading technical drawings and the ability to apply them, including the preparation of workshop and assembly drawings in the field of steel structures.
<b>LEARNING OUTCOMES:</b>	
<b>Knowledge: the graduate knows and understands</b>	
<b>EK1</b>	Knows the general and specific knowledge necessary for shaping and designing steel-framed buildings and knows the principles of conducting scientific research in the subject area. Understands the need to optimize the structure, taking into account the economic factors related to its implementation
<b>Skills: the graduate can</b>	
<b>EK2</b>	Is able to obtain information from literature and other source materials, plan the general framework of design procedures and determine the output parameters for a given structural system based on the given assumptions. Is able to correctly select detailed calculation procedures, is also able to prepare construction opinions regarding the technical condition of the structure. Is able to correctly plan the structural system, is able to use software for modeling the structure, correctly select the sizes of sections and sheets, prepare a list of materials and also prepare workshop drawings and assembly-assembly drawings of the designed structure. Is able to recognize scientific problems related to the performed task and subject them to analysis.
<b>Social competence: the student is ready to</b>	
<b>EK3</b>	Is ready to work independently and cooperate in a team on assigned tasks, demonstrates reliability in the results of his work presented by him. Is ready to expand his knowledge by conducting research. Understands the need to convey knowledge about construction in a universally understandable manner, acts in accordance with the principles of professional ethics.

<b>PROGRAM CONTENT</b>		
<b>Type of classes - Lecture</b>		<b>Number of hours</b>
L1	Basic structural systems of steel halls with examples of applications.	2
L2	Characteristics of roof trusses and principles of their design.	2
L3		2
L4	Principles for constructing roof trusses, together with examples of construction solutions.	2
L5	Trusses made of square and rectangular pipes.	2
L6	Types and scope of use of steel roof purlins.	2
L7	Design solutions for roof skylights in steel halls.	2
L8	Wall and roof bracing of steel halls.	2
L9	Columns – construction principles and examples of solutions.	2
L10	Types of steel hall enclosures.	2
L11	Steel Skeleton Buildings – An Introduction.	2
L12	Static-structural systems of steel skeleton buildings.	2
L13		2
L14	Basic structural elements of steel skeleton buildings, large span roofs.	2
L15	Written test.	2
<b>TOTAL:</b>		<b>30</b>

<b>PROGRAM CONTENT</b>		
<b>Type of classes - Practice</b>		<b>Number of hours</b>
PT1	Introduction, issuing design assumptions, discussion of the form and scope of project implementation, planning of the structural layout of the hall.	2
PT2	Summary of loads.	2
PT3	Selection of roofing sheet metal and verification of ULS and SLS for the assumed roof purlin cross-section.	2
PT4 PT5 PT6	Performing structural calculations of the truss and verifying the obtained results. Checking the ULS and SLS of the steel roof truss.	6
PT7	Design of roof bracing.	2
PT8 PT9 PT10	Shaping workshop and assembly connections of designed structural elements. Designing welded and bolted connections of individual structural elements.	6
PT11	Checking the load-bearing capacity of truss nodes made of square or rectangular pipes.	2
PT12 PT13 PT14	Discussion of the form and scope of assembly and workshop drawings with BIM elements.	6
PT15	Passing the project.	2
<b>TOTAL:</b>		<b>30</b>

<b>BASIC AND ADDITIONAL LITERATURE</b>	
<b>Basic literature:</b>	
1.	Hanses K.: Basics Steel Construction, Birkhäuser, Berlin 2015
2.	Vayas I., Ermopoulos J., Ioannidis G.: Design of Steel Structures to Eurocodes. Springer International Publishing AG, 2018
3.	Eurocode: Basis of structural design
4.	Eurocode 1: Actions on structures – Part 1-1 General actions – Densities, self-weight, imposed loads for buildings
5.	Eurocode 1: Actions on structures – Part 1-3 Snow load and Part 1-4 Wind load.
6.	Eurocode 3: Design of steel structures Part 1-1: General rules and rules for buildings
7.	Eurocode 3: Design of steel structures Part 1-8: Design of joints
<b>Additional literature:</b>	

1. Allen E., Rand P.J.: Architectural Detailing – Function, Constructibility, Aesthetics. John Wiley & Sons Inc., 2016.