



POLITECHNIKA CZĘSTOCHOWSKA
WYDZIAŁ BUDOWNICTWA
KIERUNEK: BUDOWNICTWO
KARTA OPISU PRZEDMIOTU



Name of course						Code of course	Year / Semester	
Metal structures <i>Konstrukcje metalowe</i>						WB_BUD_D_I_KM1_05	III	5
Type of course						Level of qualification		ECTS
Lecture	Practice	Laboratory	Design	Seminar	Exam	stationary first cycle programme		
2	1	-	1	-	-	S1		6
Specialities		KBI / TOZB / AB		Type of course:		obligatory		
Unit administrating study:				<i>Department of Technical Mechanics</i>				
				<i>Room 95/97</i>		<i>phone/fax: +48 (34) 325 09 65</i>		
Person leading of course:				Ph.D. Anna DERLATKA		aderlatka@bud.pcz.czest.pl		

I. CARD OF COURSE

OBJECTIVE 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.

PREREQUISITES FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCE

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 construct the building dividing walls.
5	Ability to use the standards of the construction loads.
6	The knowledge of the preparing principles of the technical drawings and the ability to read and apply them.

LEARNING OUTCOMES

EK1	The student has got the ordered general knowledge which is necessary to understand the behaviour of steel structures.
EK2	The student has got the detailed knowledge which is useful for solving simple engineering tasks in the field of steel structures.

General skills

EK3	The student can obtain information from the literature and other sources, including the manufacturers catalogues of the steel construction elements.
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Fundamental engineering skills

EK4	The student can plan the general framework procedures for the design. The student can specify the output parameters for the simple engineering tasks on the basis of given assumptions.
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Skills directly related to solving an engineering tasks

EK5	The student can choose the specific computational procedures.
EK6	The student can choose the element cross-section and graphically interpret the result. The student can specify the output parameters for the simple engineering tasks on the basis of given sketch.

Competence of personal and social

EK7	The student is aware of the responsibility for the completed tasks and understands the non-technical aspects and effects of civil engineer work, such as the social, economic and environmental impacts.
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CONTENTS OF COURSE		
Form of teaching – Lectures		Number of hours
W01	The basic issues of the metal structures.	2
W02	The steel production process and the range of the steel products.	2
W03	The load capacity of the tensile elements.	2
W04	The classification of the cross-sections.	2
W05	The load capacity of the compression elements.	2
W06	The load capacity of the compression elements (buckling resistance).	2
W07	The load capacity of the bending elements.	2
W08	The load capacity of the bending elements (buckling resistance).	2
W09	The load capacity of the shear elements.	2
W10	The load capacity of the bolted connections.	2
W11	The load capacity of the bolted connections.	2
W12	The load capacity of the welded connections.	2
W13	The rules of the steel structures drawings.	2
W14	The rules of the steel structures drawings.	2
W15	Final test.	2
TOTAL:		30
Form of teaching – Practice		Number of hours
C01	The organizational classes and acquainted with the standards: PN-EN-1993-1 part 1, 5 and 8.	2
C02	The calculations of load capacity of the tensile elements.	2
C03	The calculations of load capacity of the tensile elements.	2
C04	The calculations of the cross-sections class.	2
C05	The calculations of load capacity of the compression elements.	2
C06	The calculations of load capacity of the compression elements.	2
C07	The calculations of load capacity of the bending elements.	2
C08	The calculations of load capacity of the bending elements.	2
C09	The calculations of load capacity of the shear elements.	2
C10	The calculations of load capacity of the bending and shear elements.	2
C11	The calculations of load capacity of the bolted connections.	2
C12	The calculations of load capacity of the bolted connections.	2
C13	The calculations of load capacity of the welded connections.	2
C14	The calculations of load capacity of the welded connections.	2
C15	Final test.	2
TOTAL:		30
TOOLS OF TEACHING		
1.	The lecture carried out with the using of audio-visual means.	
2.	The exercises carried out with the using of audio-visual means, board and chalk.	
3.	The materials prepared by the teachers.	
4.	Literature.	
METHODS OF ASSESSMENT: (F - FORMATIVE; P - SUMMARY)		
F01	The assessment of the individual preparation for the exercises.	
P01	The assessment of the knowledge and skills to apply computational procedures according to ULS.	
P02	The assessment of the knowledge and skills to apply computational procedures according to SLS.	
P03	The assessment of the familiarize with the knowledge in the context of the calculation procedures.	

WORKLOAD OF STUDENT			
O.n.	Activity	Average number of hours/ECTS to complete the activity	
		[hours]	[ECTS]
1.	Hours of classes organized by the universities - lectures.	30	5
2.	Contact hours with the teacher related with lectures.	10	
3.	Familiarization with the indicated literature.	20	
4.	Hours of classes organized by the universities - Practice.	30	
5.	Contact hours with the teacher related with practices.	10	
6.	Preparing for the practices.	20	
7.	Preparing for the final test.	20	
TOTAL:		140	

BASIC AND SUPPLEMENTARY LITERATURE	
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.
10.	Segui W., Steel Design. Cengage Learning, Stamford 2012.

MATRIX OF IMPLEMENTATION EFFECTS OF EDUCATION FOR DIRECTION					
The effect of learning for the realized subject	The reference to the effect of learning defined for the entire program	Objectives of the course	Program content	Tools of teaching	Method for assessing
EK1	K_W05	C01, C02, C03	W01÷W12, C01	1, 2, 3, 4	F01, P03
EK2	K_W08	C02, C03	W01÷W12, C02÷C14	1, 2, 3, 4	F01, P03
EK3	K_U22	C01, C02, C03	W01, W02, C02÷C04	1, 2, 3, 4	F01, P01, P02, P03
EK4	K_U02	C01, C02, C03	W03÷W05, W07, W09, W10, W12, C02÷C10	1, 2, 3, 4	F01, P01, P02, P03
EK5	K_U13	C02, C03	C02÷C14	1, 2, 3, 4	F01, P01, P02
EK6		C02, C03	W03÷W14, C01÷C14	1, 2, 3, 4	F01, P01, P02
EK7	K_K01, K_K02, K_K03	C01, C02, C03	W01, W14, C01÷C14	1, 2, 3, 4	P03

II. METHODS ASSESSMENT - DETAILS	
MARKS	LEARNING OUTCOME
EK-01	
2,0	The student knows only the basic terms relating to the steel.
3,0	The student completed the knowledge of new terminology and symbols of the steel and the

	general knowledge of the processes and phenomena relevant to the strength of steel.
3,5	The student can explain in further detail the behaviour of the steel under the load, as the building material.
4,0	Moreover, the student can explain in detail the behaviour of the steel under the load, as a building material, the issue of sustainability.
4,5	The student can explain in further detail the behaviour of some steel elements under the load.
5,0	Moreover, the student can explain the behaviour of the steel elements under the load and he can identify the environmental hazards. He knows methods to prevent their effects.
EK-02	
2,0	Student knows briefly the computational models of the steel structures. He cannot determine the factors influencing the loss of stability. He does not know the rules of the section selection.
3,0	Student knows the computational models, but he has problems with the interpretation them. He can determine the factors influencing the loss of stability. He knows briefly the rules of the section selection.
3,5	Student knows the computational models. He can determine the factors influencing the loss of stability.
4,0	Student can interpret the computational models and he can define their application. He knows the rules of the section selection.
4,5	In addition, the student knows briefly the principles and purposes of calculating the structure according to the ULS and SLS.
5,0	Moreover, the student knows in detail the principles and purposes of calculating the structure according to the ULS and SLS, and understands their importance.
EK-03	
2,0	The student does not know the primary literature, which is needed for design.
3,0	The student completed the basic information needed to design, he knows briefly set of standards (EC3 part 1, 5, 8)
3,5	The student knows the applicable set of standards and he can use them independently of each other (EC3 part 1, 5, 8).
4,0	The student is able to use all standards and connect them throughout the whole design process (EC3 cz.1, 5, 8).
4,5	Moreover, the student is able to analyse the results of calculations during the design process.
5,0	Moreover, the student completed the information given in the standards of knowledge given in the books.
EK-04	
2,0	The student cannot recognize the behaviour of the section or structural element on the basis of the static scheme of the structure.
3,0	The student can recognize the behaviour of the section or structural element on the basis of the static scheme of the structure.
3,5	Moreover, the student can choose the suitable scheme of calculation.
4,0	Students can also determine the sequence of calculations.
4,5	Student is able to interpret the results of calculations.
5,0	The student can specify the output parameters for solving the tasks on the basis of given sketch.
EK-05	
2,0	The student is not aware of the calculation procedures.
3,0	The student is aware of the need to modify the calculation according to the partial results, but he cannot identify the appropriate solution.
3,5	Moreover, the student is able to identify the right solution.
4,0	The student modifies the calculations based on the partial results, but only in the context of the bases cases.
4,5	Moreover, the student is able to modify the calculations for the complex cases.
5,0	The student can independently modify the calculation procedures in the unusual cases.
EK-06	
2,0	The student cannot do a section sketch of selected item.
3,0	The student is able to perform correctly a section sketch.
3,5	The student is able to interpret the made sketch.
4,0	The student is able to draw up the sections sketches with the connecting elements (bolts, welds).

4,5	The student is able to interpret the made sketch with the connecting elements.
5,0	Moreover, the student is able to interpret the given drawings of elements (sections) with connectors and on that basis he can determine the output parameters to given calculations.
EK-07	
2,0	The student performs the tasks assigned to him carelessly.
3,0	The student performs the tasks carefully, but he does not subject their results to discussion.
3,5	Moreover, the student notes the need to discuss the result, but he cannot formulate the problem properly.
4,0	The student formulates the problem correctly, but he cannot perform the discussions about the result.
4,5	The student can discuss the result using the appropriate criteria.
5,0	Moreover, the student is able to assess the impact of changes of particular criteria on the final result.

III. OTHER USEFUL INFORMATIONS ABOUT THE COURSE	
1.	Information where the student can see the presentations to classes, support materials and literature: <i>According to the type of materials - in the classes didactic, in the room of teacher, in the library of the university and faculty.</i>
2.	Information on the place of event classes: <i>Showcased at the Faculty of Civil Engineering, Faculty of Civil Engineering website.</i>
3.	Information on the date of the course (day of week / time): <i>Showcased at the Faculty of Civil Engineering, Faculty of Civil Engineering website.</i>
4.	Information on the consultation (hours + location): <i>The timetable posted on the door of Room 97 at the Faculty of Civil Engineering at. Academic 3 (third floor).</i>