



POLITECHNIKA CZĘSTOCHOWSKA
WYDZIAŁ BUDOWNICTWA
KIERUNEK: BUDOWNICTWO
KARTA OPISU PRZEDMIOTU



Nazwa przedmiotu						Kod przedmiotu	Rok / Semestr	
Konstrukcje zespolone stalowo-betonowe <i>Steel-concrete composite structures</i>						WB_BUD_D_II_KSB_02_KBI	I	2
Rodzaj zajęć						Poziom kwalifikacji		ECTS
Wykład	Ćwiczenia	Laboratorium	Projekt	Seminarium	Egzamin	stacjonarne II stopnia		
2	-	-	2	-	-	S2		6
Specjalność		KBI		Rodzaj przedmiotu:		obieralny		
Jednostka prowadząca przedmiot:				<i>Katedra Mechaniki Technicznej</i>				
				<i>Pokój 95</i>		<i>tel./fax: +48 (34) 325 09 65</i>		
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I. KARTA PRZEDMIOTU (SUBJECT CHARTER)

CEL PRZEDMIOTU (SUBJECT OBJECTIVE)

C01	Understanding of composite structures, as steel and concrete cooperation.
C02	Acquisition of skills to design and calculate load capacity for composite sections bended and compressed by ULS.
C03	Acquisition of skills to design and calculation of load capacity for composite sections by SLS.
C04	Widening of English technical vocabulary.

WYMAGANIA WSTĘPNE W ZAKRESIE WIEDZY, UMIEJĘTNOŚCI I INNYCH KOMPETENCJI (PRE-REQUISITE REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER POWERS)

1	Basic knowledge of concrete technology, physical, chemical, mechanical, properties of concrete and structural steel.
2	Basic knowledge of theoretical mechanics and strength of materials, and the ability of calculating the ratios of strength sections.
3	Knowledge of structural mechanics and the ability to solve static systems.
4	Skills to construct buildings bearing systems.
5	Skills to use standard construction loads.
6	Knowledge of the principles of preparing and reading technical drawings and skills of their application, including the preparation of drawings of components.

EFEKTY KSZTAŁCENIA (LEARNING OUTCOME)

EK1	the student has an orderly, general knowledge necessary to well understand how steel-concrete composite structures work
EK2	the student has a detailed knowledge useful to solve basic engineering tasks of steel-concrete composite structures
Umiejętności ogólne (General skills)	
EK3	the student is able to find information in the literature and other materials, including catalogues of manufacturers of components for the steel-concrete composite construction,
Podstawowe umiejętności inżynierskie (Basic engineering skills)	
EK4	the student is able to plan a general framework design procedures and specify the output parameters for the simple task of engineering on the basis of these assumptions
Umiejętności bezpośrednio związane z rozwiązywaniem zadań inżynierskich (Skills directly related to solving an engineering task)	
EK5	the student is able to choose the detailed calculation procedures
EK6	the student is able to properly determine the geometry of composite sections, with reinforcement plates and selection of connectors, can calculate the connection assembly

Kompetencje personalne i społeczne (Personal and social competences)	
EK7	the student is aware of the responsibility for the implementation of tasks and understand the non-technical aspects and consequences of engineer' work such as: social, economic and environmental impact

TREŚCI PROGRAMOWE (CONTENTS OF STUDY)		
Forma zajęć – Wykłady (Type of classes – Lecture)		Liczba godzin (Number of hours)
W01	Introduction to the design of steel-concrete composite structures (definitions, symbols, materials).	2
W02	Basis of design of composite structures.	2
W03	Outline of the development of composite structures.	2
W04	Connectors for composite structures.	2
W05	Composite plates - general principles for design and example solutions.	2
W06	Composite beams - general principles for design and example solutions.	2
W07	Composite columns - general principles for design and example solutions.	2
W08	Connection elements in composite structures.	2
W09	Calculation of free-ends composite beams. Rules for secondary beams.	2
W10	Calculation of continuous composite beams. Rules for main beams.	2
W11	Calculation of composite plates.	2
W12	Calculation of connectors. Integrated support buildings.	2
W13	General rules of preparing drawings.	2
W14	Design Solutions Part 1 - Examples of completed buildings.	2
W15	Design Solutions Part 2 - Examples of completed buildings.	2
RAZEM (TOTAL):		30
Forma zajęć – Projekt (Type of classes – Practice)		Liczba godzin (Number of hours)
P01	Introduction, design assumptions, review of form and scope of the project implementation.	2
P02	Preliminary planning of composite floor.	2
P03	Rules for the collection of loads on composite plate.	2
P04	Design rules for composite plates.	4
P05		
P06	Rules for collecting of loads on composite beam.	2
P07	Design rules for secondary composite beams and main composite beams of the implementation phase.	2
P08	Design rules for composite secondary beams and main beams of the exploitation phase ULS.	4
P09		
P10	Design rules for composite secondary beams and main beams of the exploitation phase SLS.	4
P11		
P12	Design rules for connection between composite beams and plate.	2
P13	Design rules for connection between secondary composite beams and main composite beams.	2
P14	Discuss the form and scope of a composite plate drawing.	2
P15	Discuss the form and scope of a composite beam drawing.	2
RAZEM (TOTAL):		30

NARZĘDZIA DYDAKTYCZNE (TEACHING TOOLS)	
1.	Lecture aided by multimedia methods.
2.	Practice aided by multimedia methods.
3.	Software.
4.	Author's teaching aids
5.	Literature.

SPOSOBY OCENY: (F - FORMUJĄCA; P - PODSUMOWUJĄCA) [METHODS OF ASSESSMENT (F – FORMATIVE, P – SUMMARY)]	
F01	Assessment of progress in developing a design task.
P01	Assessment of knowledge and skills to apply computational procedures by ULS.
P02	Assessment of knowledge and skills to apply computational procedures by SLS.
P03	Assessment of detailed knowledge and its theoretical foundations in the context of procedures computing

OBCIĄŻENIE PRACĄ STUDENTA (STUDENT'S WORKLOAD)			
L.p. (O.n.)	Forma aktywności (Activity)	[godz.] [hours]	[ECTS]
1.	Classes – lecture .	30	6
2.	Classes – practice .	30	
3.	Contact hours with the teacher.	10	
4.	To acquaint with indicated literature.	5	
5.	Carrying out of static calculations.	25	
6.	Perform of drawings, preparation of technical description.	15	
7.	Self-preparation for the lecture test.	15	
RAZEM (TOTAL):		150	

LITERATURA PODSTAWOWA I UZUPEŁNIAJĄCA (BASIC AND SUPPLEMENTARY LITERATURE)	
1.	American Society of Civil Engineers (ASCE), Construction Considerations for Composite Steel-and-Concrete Floor Systems, Journal of Structural Engineering, Vol. 128, No. 9, 1099-1110, 2002.
2.	Chung K.F., Lawson R.M.: Simplified design of composite beams with large web openings to Eurocode 4, Journal of Constructional Steel Research, Vol. 57, Issue 2, 135-164, 2001.
3.	Eurocode 4, Design of composite steel and concrete structures. Part 1: General rules and rules for buildings.
4.	Kucharczuk W., Labocha S.: <i>Konstrukcje zespolone stalowo-betonowe budynków</i> , Arkady, Warszawa 2007
5.	Łubiński M., Filipowicz A., Żółtowski W.: <i>Konstrukcje metalowe Część I</i> , Arkady, Warszawa 2000
6.	Łubiński M., Żółtowski W.: <i>Konstrukcje metalowe Część II</i> , Arkady, Warszawa 2004
7.	Bródka J., Broniewicz M.: <i>Projektowanie konstrukcji stalowych zgodnie z Eurokodem 3-1-1 wraz z przykładami obliczeń</i> , Wydawnictwo Politechniki Białostockiej, Białystok 2001
8.	Bródka J., Kozłowski A., Ligocki I., Łaguna J., Ślęczka L.: <i>Projektowanie i obliczanie połączeń i węzłów konstrukcji stalowych – tom 1</i> , Polskie Wydawnictwo Techniczne, Rzeszów 2009
9.	<i>Konstrukcje stalowe. Przykłady obliczeń według PN-EN 1993-1, Część pierwsza, Wybrane elementy i połączenia</i> , pod redakcją A. Kozłowskiego, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2010
10.	<i>Budownictwo ogólne, tom 5, stalowe konstrukcje budynków projektowanie według euro kodów z przykładami obliczeń</i> , Praca zbiorowa, Arkady, Warszawa 2010
11.	Kucharczuk W.: <i>Zasady sporządzania rysunków stalowych konstrukcji budowlanych</i> , Wydawnictwo Politechniki Częstochowskiej, Częstochowa 2004
12.	Bogucki W., Żybutowicz M.: <i>Tablice do projektowania konstrukcji metalowych</i> , Arkady, Warszawa 2008

13.	Normy PN-EN 1991, PN-EN 1992, PN-EN 1993, PN-EN 1994
14.	Materiały firm produkujących łączniki sworzniowe
15.	Bródka J., Broniewicz M.: <i>Projektowanie konstrukcji stalowych zgodnie z Eurokodem 3-1-1 wraz z przykładami obliczeń</i> , Wydawnictwo Politechniki Białostockiej, Białystok 2001

MACIERZ REALIZACJI EFEKTÓW KSZTAŁCENIA DLA SPECJALNOŚCI KBI (MATRIX OF LEARNING OUTCOME CARRYING OUT)					
Learning outcome for the course	Reference to the effect defined for the field of study	Objectives of the course	Contents of study	Teaching tools	Methods of assessment
EK1	KBI_W02	C01, C02, C03	W01÷W08, P01	1, 3, 4	F01, P03
EK2		C02, C03	W01, W02, W09÷W12, P02÷P11	1, 2, 3, 4	F01, P03
EK3		C01, C02, C03, C04	W01÷W15, P01÷P15	1, 2, 3, 4	F01, P01, P02, P03
EK4	KBI_U01	C01, C02, C03	W01, W02, W04÷W08, P02÷P07	1, 2, 3, 4	F01, P01, P02, P03
EK5		C02, C03	W09÷W12, P02÷P13	1, 2, 3, 4	F01, P01, P02
EK6		C02, C03	W09÷W12, P02÷P15	1, 2, 3, 4	F01, P01, P02
EK7	KBI_K02, KBI_K03	C01, C02, C03	W03, W13÷W15, P14, P15	1, 3, 4	P03

II.FORMY OCENY – SZCZEGÓŁY (METHODS OF ASSESSMENT – DETAILS)	
OCENY (MARKS)	EFEKTY KSZTAŁCENIA (LEARNING OUTCOME)
EK-01	
2,0	The student knows only the basic terms of the concrete and steel and their strength
3,0	The student completed the knowledge of new terminology and symbols on composite structures and a general understanding of the processes relevant to these structures.
3,5	The student can also determine the stress distribution in the composite section and demonstrate the differences compared to the corresponding non composite section.
4,0	The student can explain in further detail the behavior of steel and concrete composite element and define the role of connectors.
4,5	The student is able to explain the work of the composite element as a whole.
5,0	The student is able to identify environmental hazards, know methods to prevent their effects.
EK-02	
2,0	The student knows the rules cursory of modeling composite structures, cannot determine the factors affecting to the composite. Does not know the rules and terms of connection reinforcement steel bars.
3,0	The student knows the computational models, but has trouble with their interpretation, weakly knows the rules of forming composite structures.
3,5	The student is able to interpret correctly the results of calculations of the modeled structure
4,0	The student is able to perceive the computational models and to determine their application, knows the rules for shaping of composite structures.
4,5	The student knows in detail the principles and objectives of calculating the structure of the ULS and SLS, and understands their importance
5,0	Student is able to justify the adopted algorithm of dimensioning.
EK-03	
2,0	The student does not know the basic sources of literature necessary to design.
3,0	The student knows the applicable set of standards and can use them independently of each other.
3,5	The student is able to use appropriate standards but has trouble with their binding
4,0	The student is able to use all of the standards and link them throughout the design process
4,5	The student is able to justify the correctness of the calculation procedures

5,0	The student completed the messages given in the standards of knowledge given in other literature.
EK-04	
2,0	The student is not able to recognize the work section or structural element based on the static schema of the structure.
3,0	The student is able to recognize the work section or structural element based on the static schema of the structure.
3,5	The student is able to determine the load diagrams considered for a given structural system.
4,0	The student is able to determine the order of calculations.
4,5	The student is able to determine the output parameters for a given structural system
5,0	The student is able to assess the impact of changes in the adopted schema of work static structural system.
EK-05	
2,0	The student is not aware variants of calculation procedures.
3,0	The student is aware of the need to modify the calculation according to partial results, but cannot identify the right solution.
3,5	The student identifies the correct solution but has trouble with its interpretation.
4,0	The student modifies the calculation, depending on the partial results, but only in the context of basis cases.
4,5	The student can alone modify the calculation procedures in cases of atypical.
5,0	Student is able to justify the adopted computational procedures for atypical cases.
EK-06	
2,0	The student is not able to determine the position of the neutral axis in the cross-section.
3,0	The student is able to determine the position of the neutral axis in the cross-section and defined the conditions of load capacity of cross-section and connectors.
3,5	The student is able choose reinforcement of the plate.
4,0	The student is able to calculate of the mounting connection of primary and secondary elements.
4,5	The student is able to interpret the adopted solutions.
5,0	The student is able to hold a discussion of alternative solutions, justifying the validity of the selection.
EK-07	
2,0	The student performs tasks assigned to him carelessly.
3,0	The student performs tasks carefully, but their results are not subjected to discussion.
3,5	The student notes the need to discuss the result, but he cannot properly formulate the problem
4,0	The student formulates correctly the problem and is able to hold a discussion of results.
4,5	The student is able to discuss the result of applying the relevant criteria.
5,0	The student is able to assess the impact of changes in each of the criteria on the final result

III. INNE PRZYDATNE INFORMACJE O PRZEDMIOCIE (OTHER USEFUL INFORMATIONS ABOUT THE SUBJECT)	
1.	Information, where and how students may acquaint with literature, author's teaching aids and others: according to the type of materials: <i>According to the type of material – in the classroom, in the teacher's office and university or faculty library</i>
2.	Information about the place of classes: <i>Show-case in the Faculty of Civil Engineering and faculty www page.</i>
3.	Information about time of classes (day and hour): <i>Show-case in the Faculty of Civil Engineering and faculty www page.</i>
4.	Information about consultations (place and hours): <i>2 times a week in the teacher's office.</i>