

# Concrete Structures I

Kierunek:

## Budownictwo

### Karta Opisu Przedmiotu

Name of the subject				Subject code		Year / semester	
Concrete structures I <i>Konstrukcje betonowe I</i>						III	05
Subject		Profile		Level of education			
Obligatory		General academic		Full-time, first degree – S1			
Type of classes						ECTS	
Lecture	Exercises	Laboratory	Project	Seminar	Exam		
30	15	-	15	-	NO	6	
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<b>I. Card subject</b>	
<b>PURPOSE OF THE SUBJECT</b>	
<b>C01</b>	Understanding reinforced concrete as a construction material and the essence of reinforced concrete structures
<b>C02</b>	Acquisition of knowledge and skills in the design of reinforcement and calculation of load capacity for cross-sections of members working under bending, shear forces, according to ULS. Acquisition of knowledge and skills to calculate structural members according to SLS
<b>PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES</b>	
<b>1</b>	Basic knowledge in the field of construction chemistry, concrete technology, physical, chemical and mechanical properties of concrete and reinforcing steel
<b>2</b>	Basic knowledge of theoretical mechanics and the strength of materials
<b>3</b>	Knowledge of building mechanics and the ability to solve static systems
<b>4</b>	Knowledge of the principles of drawing up and reading technical drawings and the ability to apply them, in including drawing up drawings of simple reinforced concrete structural elements
<b>EDUCATIONAL EFFECTS:</b>	
<b>Knowledge: the graduate knows and understands</b>	
<b>EU1</b>	How the reinforced concrete structures work; has detailed knowledge useful for solving simple engineering tasks in the field of reinforced concrete structures.
<b>Skills: the graduate can</b>	
<b>EU2</b>	obtain information from literature and other materials, including manufacturers' catalogs; can identify actions on the basic structural members and its effects; can plan the overall framework of design procedures and determine the initial parameters for a simple engineering task based on the given assumptions; can correctly select detailed calculation procedures; can correctly determine the reinforcement for a cross-section, and draw a sketch of it.
<b>Social competence: the student is ready to</b>	
<b>EU3</b>	independently supply and expand the knowledge; take responsibility for the tasks performed; understands non-technical aspects and effects of the engineer's work such as: social, economic and environmental impact.

<b>PROGRAM CONTENT</b>		
<b>Type of classes - Lecture</b>		<b>Number of hours</b>
L1	Introduction to the subject. Getting to know standards: EC1, EC1, EC2.	1
L2	Introduction to Limit States.	1
L3	Mechanical properties of concrete.	1
L4	Mechanical properties of reinforcement.	1
L5	Durability.	1
L6	Beam phases of working.	1
L7	Dimensioning of a RC member section. One side reinforcement rectangular section with bending moment. Numerical calculations example.	1
L8	Two sides reinforcement rectangular section with bending moment. Numerical calculations example.	1
L9	T-flange section with bending moment. Numerical calculations example.	3
L10	Rules of shaping and distributing of reinforcement in the section.	
L11	Bond and anchorage. Mechanical methods of extending reinforcement. Numerical calculations example.	
L12	Shear in RC members. Numerical calculations example.	1
L13	Serviceability Limit States – deflection.	1
L14	Serviceability Limit States – cracks.	1
L15	Final colloquium.	1
<b>TOTAL:</b>		<b>15</b>

<b>PROGRAM CONTENT</b>		
<b>Type of classes - Practice</b>		<b>Number of hours</b>
PE1	Rules of competing. Introduction to the course. Getting to know standards.	1
PE2	Determination of the strength of concrete and steel. Determination of reinforcement cover	1
PE3 PE4	One side reinforcement rectangular section with bending moment. Reinforcement and resistant bending moment calculations.	2
PE5 PE6	Two sides reinforcement rectangular section with bending moment. Reinforcement and resistant bending moment calculations.	2
PE7 PE8	T-flange section with bending moment. Reinforcement and resistant bending moment calculations.	2
PE9 PE10	Calculations of shear reinforcement.	2
PE11 PE12	SLS - Deflection calculations.	2
PE13 PE14	SLS - Cracks calculations	2
PE15	Final colloquium.	1
<b>TOTAL:</b>		<b>30</b>

<b>PROGRAM CONTENT</b>		
<b>Type of classes - Project</b>		<b>Number of hours</b>
PT1	Introduction to the course and rules of completing. Overview of the project task	1
PT2	Determination of actions	1
PT3	Static system solution.	1
PT4 PT5	One side reinforcement rectangular section with bending moment. Reinforcement calculations.	2
PT6 PT7	Two sides reinforcement rectangular section with bending moment. Reinforcement calculations.	2

<b>PT8 PT9</b>	T-flange section with bending moment. Reinforcement calculations.	2
<b>PT10 PT11</b>	Calculations of shear reinforcement.	2
<b>PT12 PT13</b>	Calculations of SLS for cracks and deflection	2
<b>PT14</b>	Execution of drawings	1
<b>PT15</b>	Final assessment	1
<b>TOTAL:</b>		<b>15</b>

<b>BASIC AND ADDITIONAL LITERATURE</b>	
<b>Basic literature:</b>	
1.	Casandjian C., Challamel C., Lanos C., Hellesland J.: Reinforced concrete beams , Columns and frames, ISTE Ltd. 2013.
2.	Beeby A.W., Narayanan R.S.: Designer's guide to Eurocode 2: Design of concrete structures. Thomas Telford Publishing, Thomas Telford Ltd., London 2013
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 2: Design of concrete structures – Part 1-1: General rules and rules for buildings
<b>Additional literature:</b>	
1.	Mosley W.H., Hulse R., Bungey J.H.: Reinforced Concrete Design: To Eurocode 2