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
Concrete structures *Konstrukcje betonowe*							**Autumn**
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:	***Faculty of Civil Engineering*** ***Tel: +48 (34) 325 09 04***						
Teachers conducting subject:	***PhD. Eng. Beata Ordon-Beska*** mail: b.ordon-beska@pcz.pl						

I. Card subject	
PURPOSE OF THE SUBJECT	
C01	Understanding reinforced concrete as a construction material; understanding the essence of reinforced concrete structures
C02	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
PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES	
1	Basic knowledge in the field of construction chemistry, concrete technology, physical, chemical and mechanical properties of concrete and reinforcing steel
2	Basic knowledge of theoretical mechanics and the strength of materials
3	Knowledge of building mechanics and the ability to solve static systems
4	Knowledge of the principles of drawing up and reading technical drawings and the ability to apply them, including drawing up drawings of simple reinforced concrete structural elements.
LEARNING OUTCOMES:	
Knowledge: the graduate knows and understands	
EK1	How the reinforced concrete structures work; has detailed knowledge useful for solving simple engineering tasks in the field of reinforced concrete structures.
Skills: the graduate can	
EK2	obtain information from literature, normatives and other databases; 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.
Social competence: the student is ready to	
EK3	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.

PROGRAM CONTENT		
Type of classes - Lecture		**Number of hours**
L1	Introduction to the classes and rules of completing. Introduction to the Limit Sates method Getting to know standards: EC0, EC2.	2
L2	Durability of RC structures, cover calculations.	2
L3	Mechanical properties of concrete, classes, rheology, design models.	2
L4	Mechanical properties of reinforcement, classes, grades welding, design models. Reinforced concrete: properties, design models.	2
L5 L6	Dimensioning of a RC member section: bending, rectangular and T-flange section. Numerical calculations example.	4
L7	Dimensioning of a RC member section: bending with axial force.	2
L8	Shear in RC members.	2
L9	Torsion in RC members. Numerical calculations example.	2
L10 L11	Serviceability Limit States – deflection.	4
L12 L13	Serviceability Limit States – cracks.	4
L14	Bond and anchorage. Mechanical methods of extending reinforcement.	2
L15	Written test.	2
	TOTAL:	**30**

PROGRAM CONTENT		
Type of classes - Project		**Number of hours**
PT1	Introduction to the course and rules of completing. Overview of the project task. Creating a numerical model of a simple structure.	2
PT2	Creating a numerical model of a simple structure continued. Determination of actions. Static system solution.	2
PT3	Discussion of the model calculation results, selection of sections for dimensioning	2
PT4 PT5 PT6	Dimensioning of bending sections.	6
PT7 PT8	Dimensioning of sections under bending with axial force.	4
PT9 PT10	Dimensioning of shear zones.	4
PT11 PT12	SLS - Deflection calculations.	4
PT13 PT14	SLS - Cracks calculations	4
PT15	Written test, final assessment.	2
	TOTAL:	**30**

BASIC AND ADDITIONAL LITERATURE	
Basic literature:	
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 Tellford Publishing, Thomas Tellford Ltd., London 2013
3.	Eurocode: Basis of structural design
4.	Eurocode 1: Actions on structures – Part 1-1General actions – Densities, self-weight, imposed loads for buildings
5.	Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings
Additional literature:	
1.	Mosley W.H., Hulse R., Bungey J.H.: Reinforced Concrete Design: To Eurocode 2