

Faculty of Civil and Environmental Engineering					
Study programme:	Civil Engineering	Degree level: full-time programme Bachelor's degree			
Specialization		Diploma path:			
Module name:	Special Concretes and Recycling of Concrete Structures				
Module type:	obligatory/elective	Semester: 6	ECTS 6	Module ID:	IS-FCEE-00160S
No. of hrs in semester:	L - 30	C -	LC- 15	P- 15	SW- S-
Prerequisites:	<i>Complete with prerequisites or "-"</i>	Concrete technology			
Aims and objectives:	The purpose of this module is to prepare students to: distinguish different applications of concrete and recognize respective requirements; select proper constituents, design mix composition and test selected performance features of concretes for special applications; recognize and select typical processes in recycled aggregate concrete production (including production of recycled aggregate).				
Forms of teaching activities:	<i>lecture, laboratory class, project</i>	Assessment:	<i>Evaluation must be relevant to the intended learning outcomes</i>		
		L - written evaluation; LC - completion of experimental tasks, evaluation of the student's reports and written evaluation; P – completion of a project, written evaluation, defense of a project			
Module content:	High Performance Concrete; Rheology of concrete; Self Compacting Concrete; Architectural Concrete; Underwater Concrete; Fiber Reinforced Concrete; Reactive Powder Concrete; Concrete for pavements (Roller Compacted Concrete vs. PCC pavements); Polymer Modified Cement Concrete; Lightweight concretes; Demolition and recycling of used concrete structures; Recycled aggregate; Recycled aggregate concrete.				
Teaching methods:	A series of lectures to provide students with an overview of the main issues relating to the constituents, requirements, properties, technology of production, uses and long-term performance of concretes for special applications. A series of lectures to provide students with an overview of methods and processes in recycling of used concrete structures; production, classification and properties of recycled aggregate and recycled aggregate concrete. A series of laboratory classes covering mix proportioning and the testing concrete properties in fresh and hardened state. Project of technology line for recycled aggregate production.				
Learning outcomes	<i>Write min. 4, max. 8 learning outcomes in the following order: knowledge - skills - competences. Each learning outcome must be verifiable.</i>			<i>Relevance to the programme learning outcomes</i>	
LO1	Student (graduate) identifies requirements and production processes of special concretes.			K_W18 SD, K_U07	
LO2	Student (graduate) qualitatively and quantitatively selects concrete constituent materials of selected special concretes			K_W18 SD, K_U07, K_U21 SD	
LO3	Student (graduate) evaluates technical parameters of selected special concretes			K_W08, K_W15, K_U08	
LO4	Student (graduate) estimates composition and properties of old/used concrete			K_W18 SD, K_W19 SD, K_U21 SD	
LO5	Student (graduate) describes technical processes of recycled aggregate concrete (RAC) production			K_W18 SD, K_U21 SD, K_U22 SD	
LO6	Student (graduate) identifies machines and dexices used for RAC production			K_W18 SD, K_U21 SD, K_U22 SD	

LO7	Student (graduate) uses Internet and other data bases	K_U23	
LO8	Student (graduate) works in taeam	K_K03	
student workload	lecture attendance	15x2h	30
	participation in classes, laboratory classes, etc.	15x1h+15x1h	30
	preparation for classes, laboratory classes, projects, seminars, etc.		30
	work on projects, reports, etc.		24
	participation in student-teacher sessions related to the class / seminar / project		4
	implementation of project tasks		
	preparation for and participation in exams/tests		20
			TOTAL:
quantitative indicators	Student workload - activities that require direct teacher participation 30+15+15+2+2+2 = 66h	66	ECTS 2,9
	Student workload - practical skills activities 45+30+24+4=103 h	103	4,5
basic references:	1. P.-C. Aitcin, <i>High Performance Concrete</i> , E&FN SPON, London 1998 2. Neville A.M., <i>Properties of concrete</i> , 5th edition, Pearson Education Ltd. 2011. 3. Neville A.M., Brooks J.J., <i>Concrete Technology</i> , 2nd edition, Trans-Atlantic Publications 2010. 4. Sika Concrete Handbook 2013 (pdf) 5. <i>The European Guidelines for Self-Compacting Concrete. Specification, Production and Use</i> , 2005, EFNARC, www.efnarc.org		
supplementary references:	1. Siddique R., Khan M.I., <i>Supplementary Cementitious Materials</i> , Springer 2011 2. <i>Specification and Guidelines for Self-Compacting Concrete</i> , 2002, EFNARC, www.efnarc.org		
learning outcomes	<i>methods of assessing learning outcomes</i>	type of class (if more than one) where the outcomes are assessed	
LO1	lecture attendance, written test, completion of experimental tasks, evaluation of the student's reports and written evaluation	L, LC	
LO2	participation in laboratory classes, completion of experimental tasks, evaluation of the student's reports and written evaluation	LC	
LO3	completion of experimental tasks, evaluation of the student's reports and written evaluation	LC	
LO4	completion of experimental tasks, evaluation of the student's reports, completion of the student's project and written evaluation	P, LC	
LO5	completion of the student's project and written evaluation	L, P	
LO6	completion of project and written evaluation	L, P	
LO7	completion of the student's project, the laboratory student's reports and written evaluation	L, P, LC	
LO8	participation in practical classes - task completion in team	LC, P	
Department:	Department of Construction Materials, Technology and Organization	Group instructors:	dr inż. Dorota Małaszkiwicz; dr inż.. Edyta Pawluczuk
Date:	11.12.2016	Coordinator:	dr inż. Dorota Małaszkiwicz

L - lecture C - class LC - laboratory class P-project
SW - specialization workshop S - seminar