COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">Faculty of Civil Engineering and Environmental Sciences</td></tr>
<tr><td>Field of study</td><td colspan="6">Civil engineering</td><td colspan="2">Degree level and programme type</td><td>Bachelor's degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6"></td><td colspan="2">Study profile</td><td>academic</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Special concretes and recycling of concrete structures</td><td colspan="2">Course code</td><td>IS-FCEE 00160S</td></tr>
<tr><td colspan="2">Course type</td><td></td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td>Semester</td><td>summer</td></tr>
<tr><td>30</td><td></td><td>15</td><td>15</td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>6</td></tr>
<tr><td>Entry requirements</td><td colspan="9">Concrete technology</td></tr>
<tr><td>Course objectives</td><td colspan="9">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).</td></tr>
<tr><td>Course content</td><td colspan="9">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.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">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, 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.</td></tr>
<tr><td>Assessment method</td><td colspan="9">Written exam</td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="7">Learning outcomes</td><td colspan="2">Reference to the learning outcomes for the field of study</td></tr>
<tr><td>LO1</td><td colspan="7">Student (graduate) identifies requirements and production processes of special concretes.</td><td colspan="2">K_W18 SD, K_U07</td></tr>
<tr><td>LO2</td><td colspan="7">Student (graduate) qualitatively and quantitatively selects</td><td colspan="2">K_W18 SD, K_U07,</td></tr>
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	concrete constituent materials of selected special concretes	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 devices 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 a team	K_K03
Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
LO1	written test, completion of experimental tasks, evaluation of the student's reports	L, LC
LO2	completion of experimental tasks, evaluation of the student's reports	LC
LO3	completion of experimental tasks, evaluation of the student's reports	LC
LO4	evaluation of the student's reports, completion of the student's project	P, LC
LO5	written test, completion of the student's project	L, P
LO6	written test, completion of the student's project	L,P
LO7	written test, completion of the student's project, the laboratory student's reports	L, P, LC
LO8	participation in practical classes - task completion in a team	LC, P
Student workload (in hours)		No. of hours
Calculation	lecture attendance	30
	participation in laboratory classes, project	30
	preparation for laboratory classes and project	30
	work on reports and projects	30
	participation in student-teacher sessions related to the class	2
	preparation for and participation in exams/tests	30
	TOTAL:	152
Quantitative indicators		HOURS / No. of ECTS credits
Student workload – activities that require direct teacher participation		62 / 2,5
Student workload – practical activities		92 / 3,7
Basic references	1. P.-C. Aïtcin, High Performance Concrete, E&FN SPON, London 1998 2. Neville A.M., Properties of concete, 5th edition, Pearson Education Ltd. 2011. 3. Neville A.M., Brooks J.J., Concrete Technology, 2nd edition, Trans-Atlantic Publications 2010.	

	4. Sika Concrete Handbook 2013 (pdf) 5. The European Guidelines for Self-Compacting Concrete. Specification, Production and Use, 2005, EFNARC, www.efnarc.org	
Supplementary references	1. Siddique R., Khan M.I., Supplementary Cementitious Materials, Springer 2011	
Organisational unit conducting the course	Department of Construction and Road Engineering	Date of issuing the programme
Author of the programme	Dorota Małaszkiewicz, PhD., CivEng Edyta Pawluczuk, PhD.,CivEng	10.03.2021

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work, S – seminar