

## COURSE DESCRIPTION CARD

Faculty of Civil Engineering and Environmental Sciences									
Field of study								Degree level and programme type	
Specialization/ diploma path								Study profile	Academic profile
Course name	Strengthening of building structures							Course code	IS-FCEE-00228S
								Course type	Erasmus
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	Semester	Winter
	15			15				No. of ECTS credits	3
Entry requirements	General construction, Mechanics of structures, Basics of concrete structure design, Basics of bridge engineering, Masonry and wooden structures, Basics of metal structure design, Steel hall structures								
Course objectives	To acquaint students with the mechanisms of damage, diagnostics and methods of strengthening the structure. Design and dimensioning of building structure reinforcements. Developing the ability to efficiently use the standards and guidelines necessary for designing reinforcements. The subject prepares for the implementation of scientific research in the field of strengthening structures								
Course content	Lecture: Damage mechanisms and diagnostic methods for reinforced concrete / steel / masonry / wooden / bridge structures. Damage assessment. Methods of repair and strengthening. Design of the selected reinforcement of the damaged structure. Verification of the bearing capacity and serviceability of the reinforced structure element. Change in the conditions of use of the steel structure. Modification of the static scheme of the structure. Increasing the cross-sections of elements and nodes. Regulating the state of stress. Scientific research in the field of structure reinforcement - review. Methods of preparation and implementation of scientific research in the field of strengthening selected structures. Project: Introduction and verification of knowledge in introductory subjects. Damage mechanisms and methods of diagnostics of a selected structure. Damage assessment. The choice of repair and strengthening methods for the selected structure. Design of the selected reinforcement of the damaged structure. Verification of the bearing capacity and serviceability of the reinforced structure element. Preparation of the necessary construction drawings								
Teaching methods	Information lecture, problem lecture, projects								
Assessment method	Lecture - exam, project - implementation of the design task of the elected structure, corrections, defense								
Symbol of learning outcome	Learning outcomes							Reference to the learning outcomes for the field of study	
LO1	Students know and is able to determine the type of damage and the cause of its occurrence in the structure							K_B1_W02 K_B1_W03 K_B1_W04 K_B1_W06	

		K_B1_W09 K_B1_U02 K_B1_U04
L02	Students know and is able to correctly select the method of strengthening (repair) the structure	K_B1_W05 K_B1_W06 K_B1_U02 K_B1_U06 K_B1_U07 K_B1_U08
L03	Students know the methods of repair / strengthening and is able to dimension the reinforced (repaired) structure	K_B1_W03 K_B1_W05 K_B1_U06
L04	Students know the rules of making construction drawings and is able to make construction drawings of the designed reinforced / repaired structure elements	K_B1_W06 K_B1_U06
L05	Students know the standards and is able to use them and other sources of information	K_B1_W11 K_B1_U06
<b>Symbol of learning outcome</b>	<b>Methods of assessing the learning outcomes</b>	<b>Type of tuition during which the outcome is assessed</b>
L01	written exam, calculation part of the project, presentation and defense of the project	L, P
L02	written exam, computational part of the project, graphic part and project defense	L, P
L03	graphic part of the project, project correction	P
L04	design part of the project, project correction	P
L05	corrections and defense of the project	P
<b>Student workload (in hours)</b>		<b>No. of hours</b>
<b>Calculation</b>	participation in lectures	15
	participation in the project	15
	preparation for the project and corrections	15
	implementation of design tasks	15
	preparation to pass the lecture	15
	participation in consultations	5
	<b>TOTAL:</b>	<b>80</b>
<b>Quantitative indicators</b>		<b>HOURS</b>
<b>Student workload – activities that require direct teacher participation</b>		35
<b>Student workload – practical activities</b>		65
<b>Basic references</b>	<ol style="list-style-type: none"> <li>1. Eurocode 0: Basis of structural design</li> <li>2. Eurocode 1: Actions on structures</li> <li>3. Eurocode 2: Design of concretes structures</li> <li>4. Eurocode 3: Design of steel structures</li> <li>5. Eurocode 4: Design of composite steel and concretes structures</li> <li>6. Eurocode 5: Design of timber structures</li> <li>7. Eurocode 6: Design of masonry structures</li> </ol>	

<b>Supplementary references</b>	1. Fiona Cobb. : Structural Engineer's Pocket Book: Eurocodes	
<b>Organisational unit conducting the course</b>	<b>Department of Building Structures</b>	<b>Date of issuing the programme</b>
<b>Author of the programme</b>	<b>Dr Eng. Barbara Sadowska-Buraczewska</b>	<b>13.02.2022</b>

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

S – seminar