

**FACULTY OF CIVIL ENGINEERING****SUBJECT CARD**

**Name in English:** Conservation and strengthening of monumental heritage structures  
**Name in Polish:** Konserwacja i wzmacnianie konstrukcji zabytkowych  
**Main field of study (if applicable):** Civil Engineering  
**Specialization (if applicable):** Civil Engineering  
**Level and form of studies:** ~~1st~~ 2nd level\*, full-time / ~~part-time~~\*  
**Kind of subject:** ~~obligatory~~ / optional / ~~university-wide~~\*  
**Subject code:** CEB006763  
**Group of courses:** YES / ~~NO~~\*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	<b>15</b>			<b>15</b>	
Number of hours of total student workload (CNPS)	<b>30</b>			<b>60</b>	
Form of crediting	<del>Examination</del> / crediting with grade *	Examination / crediting with grade *	Examination=/ crediting with grade *	Examination / crediting with grade *	Examination / crediting with grade *
For group of courses mark (X) final course					
Number of ECTS points	<b>1</b>			<b>2</b>	
including number of ECTS points for practical (P) classes				<b>2,0</b>	
including number of ECTS points for direct teacher-student contact (BK) classes	<b>0,6</b>			<b>0,6</b>	

\* delete as appropriate

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. The student has knowledge of general mechanics, strength of materials, and general principles of shaping structures.
2. Possesses the knowledge concerning traditional building construction including historical objects.
3. The student knows the rules and the guidelines and codes for the design of buildings and their components.
4. The student has a theoretical basis. He has the ability to calculating and construction elements and basic building structures of concrete, steel, timber and masonry structures.
5. Possesses the knowledge concerning building materials.

**SUBJECT OBJECTIVES**

- C1. The knowledge concerning technology of strengthening of the elements of the traditional building.
- C2. Understanding of the specific calculations of structures after strengthening.
- C3. The knowledge concerning characteristic of contemporary strengthening materials, including composites.
- C4. The knowledge concerning moisture protections of existing building.
- C5. The knowledge concerning doctrine in the conservation of historical constructions.

<b>SUBJECT EDUCATIONAL EFFECTS</b>	
<b>Relating to knowledge:</b>	
PEK_W01	Pssesses the knowledge concerning methods and technology of strengthening of existing buildings, especially historical objects.
PEK_W02	Possesses the knowledge concerning building materials using in strengthening of historical structures.
<b>Relating to skills:</b>	
PEK_U01	Knows how to choose the appropriate technology of strengthening taking into account the technical state of the building.
PEK_U02	Knows how to prepare the documentation of conservation and strengthening works.
<b>Relating to social competences:</b>	
PEK_K01	Student is aware of the need to improve professional and personal skills.
PEK_K02	Student knows and understands the consequences of non-technical aspects and engineering activities, including the specification of intervention on the historical objects.

<b>PROGRAMME CONTENT</b>		
<b>Form of classes - lecture</b>		<b>Number of hours</b>
Lec1	Presentation of the range of lecture. Specification and classification of building destruction causes.	2
Lec2	Methods of diagnosis of building destruction causes	2
Lec3	Repair and strengthening of foundations.	2
Lec4	Repair and strengthening of masonry structures.	2
Lec5	Repair and strengthening of timber and glulam structures	2
Lec6	Repair and strengthening of floor structures.	2
Lec7	Technology of drainage and protection of the existing objects against moisture. Specification of conservation and strengthening of historical building. Crediting colloquy.	3
<b>Total hours</b>		<b>15</b>

<b>Form of classes - class</b>		<b>Number of hours</b>
Cl1		
...		
<b>Total hours</b>		

<b>Form of classes - laboratory</b>		<b>Number of hours</b>
La1		
...		
<b>Total hours</b>		

<b>Form of classes - project</b>		<b>Number of hours</b>
Proj1	Conditions of course crediting. Subject area scope. Plan of the course. Distribution of projects themes.	2
Proj2	The examples of strengthening of foundation and masonry structures strenghtening.	2
Proj3	The examples of strengthening of timber structures.	2
Proj4	The examples of strengthening of floor structures.	2
Proj5	The examples of strengthening of vault structures.	2
Proj6	Individual project consultations. The rules of the final documentation.	2
Proj7	Pass classes on the basis of completed projects.	3
<b>Total hours</b>		<b>15</b>

Form of classes - seminar		Number of hours
Se1		
...		
<b>Total hours</b>		

TEACHING TOOLS USED
N1. Lecture: multimedia presentations N2. Project: presentation of examples

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end))	Educational effect number	Way of evaluating educational effect achievement
F1 (project)	PEK_W01 PEK_U01 PEK_U02 PEK_K01	Analysis of the projects.
F2 (project)	PEK_W01 PEK_U01 PEK_U02 PEK_K01	Presence
P = 0,85 x F1 + 0,15 x F2 (project)		
P (lecture)	PEK_W02 PEK_U02 PEK_K02	Test

PRIMARY AND SECONDARY LITERATURE
<b>PRIMARY LITERATURE:</b> [1] Masłowski E., Spizewska D.,: „Wzmacnianie konstrukcji budowlanych”, Arkady, Warszawa 2000 [2] Mitzel A., Stachurski W., Suwalski J.,: „Awarie konstrukcji betonowych i murowych”, Arkady Warszawa 1973 [3] Proceedings of the conference „Structural Analysis of Historical Constructions”
<b>SECONDARY LITERATURE:</b> [1] Proceedings of the conference “PROHITECH” [2] Proceedings of the conference “MURICO”

SUBJECT SUPERVISOR (NAME AND SURNAME, DIVISION, E-MAIL ADDRESS)
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**MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT  
Conservation and strengthening of monumental heritage structures  
AND EDUCATIONAAL EFFECTS FOR MAIN FIELD OF STUDY *Civil Engineering*  
AND SPECIALIZATION *Civil Engineering***

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives ***	Programme content ***	Teaching tool number ***
<b>Knowledge</b>				
<b>PEK_W01</b>	K2_W02, K2_W06, K2_W09, K2S_CEB_W22	C1 – C5	Lec1 - Lec7 Proj1 – Proj6	N1, N2
<b>PEK_W02</b>	K2_W10	C1,C3	Lec1 - Lec7 Proj1 – Proj6	N1, N2
<b>Skills</b>				
<b>PEK_U01</b>	K2_U04, K2_U05, K2S_CEB_U21, K2S_CEB_U23	C1,C3,C4,C5	Lec1 - Lec7 Proj1 – Proj6	N1, N2
<b>PEK_U02</b>	K2_U12	C2,C5	Lec1 - Lec7 Proj1 – Proj6	N1, N2
<b>Social competences</b>				
<b>PEK_K01</b>	K2_K01, K2_K06	C1-C4	Lec1, Lec7	N1, N2
<b>PEK_K02</b>	K2_K02	C5	Lec1, Lec7	N1, N2

\*\* - enter symbols for main-field-of-study/specialization educational effects

\*\*\* - from table above