

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

**Name in Polish:** Budownictwo Mieszkaniowe  
**Name in English:** Apartment Building  
**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:** CEB004462  
**Group of courses:** YES / NO\*

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

\* delete as appropriate

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

1. The student has knowledge of the building engineering of the first degree of engineering studies, especially in building structures and concrete structures.
2. The student has knowledge of basic mechanics and strength of materials to the extent necessary for the design of buildings.
3. The student knows the standards requirements relating to loads for buildings and design of the building structures.

**SUBJECT OBJECTIVES**

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|-----|--|
| C1. | Learning the principles of architectural and structural requirements for designing multi-storey apartment buildings.   |
| C2. | Introduction of structural characteristic of concrete large slab systems with particular attention paid on the possibilities of their modernization and renovation.  |
| C3. | Introduction of technological and structural solutions used in modern apartment building systems based on the monolithic technology.   |
| C4. | Developing personal skills for determining loading regimes and internal forces in multi-storey stiffening walls weakened by internal openings.   |
| C5. | Developing personal skills for assessment of spatial rigidity of multi-storey structures.  |
| C6. | Strengthening the ability to work in a team task and making students aware of the need to constantly expand knowledge of modern technology concerning erection of apartment buildings and their modernization. |

<b>SUBJECT EDUCATIONAL EFFECTS</b>	
<b>Relating to knowledge:</b>	
PEK_W01	The student knows and understands the specific structural and functional requirements of modern apartment building engineering.
PEK_W02	The student knows and understands the principles of design and calculation concerning multi-storey buildings which structures are basing on prefabricated and monolithic concrete technology.
<b>Relating to skills:</b>	
PEK_U01	The student is able to identify loading regimes acting on the high multi-storey stiffening walls and define resulting internal forces with particular emphasis on the walls weakened by internal openings.
PEK_U02	The student can do structural calculation of load-bearing and stiffening walls in multi-storey apartment buildings and make an assessment of their spatial rigidity.
<b>Relating to social competences:</b>	
PEK_K01	The student can work independently or in a team task (making relevant report of project).
PEK_K02	The student is aware of the need to constantly expand knowledge of traditional and modern structural solutions for multi-storey apartment buildings. He is also interesting in expanding knowledge concerning modern systems for modernization such structures and testing their technical conditions.

<b>PROGRAMME CONTENT</b>		
<b>Form of classes - lecture</b>		<b>Number of hours</b>
Lec1	Introduction, aims, scope and plan of the subject. Brief history review of the development of industrialized building engineering in Poland and Europe.	2
Lec2	General structural and functional requirements specific to modern apartment building engineering.	2
Lec3	Principles of loading regimes acting on the high multi-storey buildings with particular emphasis on wind load conditions.	2
Lec4	Principles of determining internal forces in multi-storey concrete structures with particular attention paid on the walls weakened by internal openings.	4
Lec5	Overview of concrete large slab systems existing in Polish apartment building engineering. For example, description of W-70, WK-70 and WWP systems. Information concerning possibilities of technical and technological transformations of this type structures.	4
Lec6	Verification of multi-spatial rigidity of high concrete buildings including calculation of foundation plate rotation.	2
Lec7	Overview of modern concrete monolithic technology designed for multi-storey apartment buildings. For example, description of PERI and DOCA technology.	4
Lec8	Overview of potential risks and conditions to ensure the safety of residential high-rise buildings.	2
Lec9	Modern system solutions for windows and doors	2
Lec10	Modern material systems and solutions for finishing works.	2
Lec11	Modern systems and solutions for renovation and modernization of multi-family residential buildings.	2
Lec12	Final examination test.	2
	<b>Total hours</b>	<b>30</b>

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

Form of classes - laboratory		Number of hours
Lab1		
...		
	<b>Total hours</b>	

Form of classes - project		Number of hours
Proj1	Introduction. Characteristic of the project. Schedule and organization of the project work. Issue of individual student subjects and discussion of their scope.	2
Proj2	Principles of design and dimensioning of the typical floor drawings.	2
Proj3	Identification of typical rigid systems and calculation of geometrical characteristics of individual structural walls.	2
Proj4	Principles of determining wind load regimes for high-rise buildings. Identification of the other loads occurring in multi-storey apartment buildings. Consultation of student projects.	2
Proj5	Description of procedures for determining internal forces in multi-storey, concrete walls weakened by internal openings. Consultation of student projects.	2
Proj6	Principles of spatial rigidity assessment in multi-storey apartment buildings. Consultation of student projects.	2
Proj7	Consultation of student projects.	2
Proj8	Assessment of student projects and final recognition.	1
	<b>Total hours</b>	<b>15</b>

Form of classes - seminar		Number of hours
Sem1		
...		
	<b>Total hours</b>	

TEACHING TOOLS USED	
N1.	LECTURE: classic lecture, multimedia presentations, educational films.
N2.	PROJECT: discussion of selected aspects related to designing multi-storey apartment buildings, discussion of proposed design solutions, project realization as a team work
N3.	Consultation of student projects.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
<b>Evaluation</b> (F – forming (during semester), P – concluding (at semester end))	Educational effect number	Way of evaluating educational effect achievement
P (project)	PEK_U01 PEK_U02 PEK_K01	The final evaluation of the project

P (lecture)	PEK_W01 PEK_W02 PEK_U01 PEK_U02 PEK_K02	Crediting with grade basing on the final examination test.
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#### **PRIMARY AND SECONDARY LITERATURE**

##### **PRIMARY LITERATURE:**

- [1] Petersson H., Analysis of Loadbearing Walls in Multi-storey Buildings, Chalmers University of Technology, Goeteborg, 1974.

##### **SUBJECT SUPERVISOR (NAME AND SURNAME, DIVISION, E-MAIL ADDRESS)**

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##### **MEMBERS OF THE EDUCATIONAL TEAM (NAME AND SURNAME, E-MAIL ADDRESS)**

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT  
**Apartment building**  
AND EDUCATIONAL 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_W06, K2_W14, K2S_CEB_W18	C1÷C3	Lec1÷Lec8	N1, N3
<b>PEK_W02</b>	K2_W04, K2_W06, K2_W07, K2S_CEB_W16, K2S_CEB_W18	C1÷C6	Lec1÷Lec8	N1, N3
<b>Skills</b>				
<b>PEK_U01</b>	K2_U02, K2_U04, K2_U05, K2S_CEB_U18,	C4÷C5	Proj2÷Proj7 Lec9÷Lec11	N1, N2
<b>PEK_U02</b>	K2_U02, K2_U06, K2_U11, K2S_CEB_U18	C4÷C5	Proj2÷Proj7 Lec9÷Lec11	N1, N2
<b>Social competences</b>				
<b>PEK_K01</b>	K2_K03, K2_K05, K2_K06	C6	Lec9÷Lec11 Proj2÷Proj7	N1, N2
<b>PEK_K02</b>	K2_K01, K2_K05, K2_K06	C6	Lec4÷Lec8 Proj2÷Proj7	N1, N2

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

\*\*\* - from table above