

FACULTY OF CIVIL ENGINEERING**SUBJECT CARD**

Name in English: Sustainable housing
Name in Polish: Budownictwo zrównoważone
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: CEB008263
Group of courses: ~~YES~~ / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			15	
Number of hours of total student workload (CNPS)	30			60	
Form of crediting	Examination / 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	1			2	
including number of ECTS points for practical (P) classes				2,0	
including number of ECTS points for direct teacher-student contact (BK) classes	0,6			0,6	

* delete as appropriate

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Graduation of civil engineering, environmental engineering architecture or city planning studies.
2. Has knowledge of building construction, technical drawings and general building design.
3. Knows standards, guidelines and regulations about construction and their detail design.
4. Has theoretical basis of detached house design and construction detail solutions.

SUBJECT OBJECTIVES

- C1. Gain knowledge about design rules of modern, low energy demand, ecological residential and commercial buildings and their details.
- C2. Getting acquainted with renewable energy usage possibilities.
- C3. Getting acquainted with regulations of rational energy preservation with taking thermal, visual and acoustic comfort of different rooms into consideration.
- C4. Getting basis of design team cooperation to connect form and function with rational energy usage in buildings.

SUBJECT EDUCATIONAL EFFECTS	
Relating to knowledge:	
PEK_W01	knows the standards, guidelines and regulations referring to the design of buildings and their components
PEK_W02	possesses knowledge about the influence of building investments on the environment
PEK_W03	has extensive knowledge in the area of selected elements, constructions and building structures
Relating to skills:	
PEK_U01	is able to use advanced specialized tools when searching Internet databases and other sources which can be used to find both general information and other information related to civil engineering; is able to use information technology to communicate and know how to obtain software which is used to aid the work of a designer and the person organizing and managing building processes
PEK_U02	is able to choose a tool (analytical or numerical) in order to solve engineering issues; is able to use selected software which aid modeling and design processes in construction
PEK_U03	has skills to solve tasks referring to selected theoretical issues and also design elements, constructions and building structures
Relating to social competences:	
PEK_K01	is aware of the need to constantly upgrade professional and personal competence in the form of formal or informal education and also improves and develops knowledge in the area of modern processes and technology, related to civil engineering
PEK_K02	is aware of the importance and also understands non-technical aspects and consequences of engineering activity, including influence on the environment and responsibility for implemented decisions
PEK_K03	is able to work independently and cooperate in a team on a specific task; is responsible for both the safety of his work and his subjected team's work

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours
Lec1	Course subjects and passing regulations talk through. Sustainable building design basic information. LCA – building life cycle, total building costs. Environmental influence of buildings.	2
Lec2	Building environmental impact methods. Social, economical and environmental aspects of sustainable building design. Law regulations	2
Lec3	Global and local greenhouse gas emission. Carbon dioxide reduction strategies. Energy production from different fuels. Emission factors. Fuel equity. The primal energy conversion coefficients.	2
Lec4	Classification of low-energy buildings. Building shape coefficient. Basic and advanced building design methods. Heat flow through windows and glazed facades.	2
Lec5	Building thermal mass. Ventilation system, heat recovery, ground-coupled heat exchanger	2
Lec6	Renewable energy resources in global and local scale. Usage in low-energy and passive buildings.	2
Lec7	Examples of low-energy and passive buildings. Applied solutions. Possible solutions to carry in buildings in polish climate.	2
Lec8	Final test	1
Total hours		15

Form of classes - class		Number of hours
Cl1		
...		
	Total hours	

Form of classes - laboratory		Number of hours
Lab1		
...		
	Total hours	

Form of classes - project		Number of hours
Proj1	Project subjects and passing regulations talk through. Handing over design cases. Familiarize with work safety regulations.	1
Proj2	U-value calculations for building partition. Untypical cases	2
Proj3	Correct arrangement for rooms with different functions in horizontal and vertical plane. Daylight access.	2
Proj4	Building shape coefficient. Building thermal mass.	2
Proj5	Optimisation of heat gains and losses in buildings with different purpose.	2
Proj6	HVAC (heating, ventilation, air conditioning) and DHW (domestic hot water) systems	2
Proj7	Renewable energy sources. Usage possibilities in Poland and all over the world.	2
Proj8	Infrared thermography. Thermogram interpretation.	2
	Total hours	15

Form of classes - seminar		Number of hours
Sem1		
...		
	Total hours	

TEACHING TOOLS USED	
N1.	Lecture: multimedia presentation of lecture material.
N2.	Project: multimedia presentation of project material. Solving problem with use of MS Office software

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
P1 (project)	PEK_U01 PEK_U02 PEK_U03 PEK_K01 PEK_K02 PEK_K03	Design case accomplishment
P2 (lecture)	PEK_W01 PEK_W02 PEK_W03	Colloquium - test

PRIMARY AND SECONDARY LITERATURE
<u>PRIMARY LITERATURE:</u> [1] Beggs C., Energy Management, Supply and Conservation. Elsevier, 2002. [2] Clark J., Energy Simulation in Building Design. Wiley Company, 2001. [3] Gratia E., DeHerde A.: Passive Solar Architecture. BRE, 2006. [4] Hens H., Buildings Physics – Heat, Air and Moisture. Ernst & Sohn, 2007. [5] Moss K., Heat and Mass Transfer in Buildings. Elsevier, 2007. [6] Twidell J., Weir T., Renewable Energy Resources. Taylor & Francis, 2006. <u>SECONDARY LITERATURE:</u>

SUBJECT SUPERVISOR (NAME AND SURNAME, DIVISION, E-MAIL ADDRESS)
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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Sustainable housing
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 ***
Knowledge				
PEK_W01	K2_W06	C1, C2	Lec1 do Lec7	N1
PEK_W02	K2_W13	C2, C3, C4	Lec1 do Lec7	N1
PEK_W02	K2S_CEB_W22	C1, C2, C3, C4	Lec1 do Lec7	N1
Skills				
PEK_U01	K2_U01	C1, C3	Proj1 do Proj7	N2
PEK_U02	K2_U08	C2, C4	Proj1 do Proj7	N2
PEK_U03	K2_U04, K2S_CEB_U23	C1, C2, C3, C4	Proj1 do Proj7	N2
Social competences				
PEK_K01	K2_K01	C3, C4	Proj1 do Proj7	N2
PEK_K02	K2_K02	C1, C2	Proj1 do Proj7	N2
PEK_K03	K2_K03	C4	Proj1 do Proj7	N2

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

*** - from table above