

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	Low energy buildings and rational use of energy in buildings							Course code	IS-FCEE-00069-1W	
								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	Physics II - basics of building physics, Building physics, Basics of thermal diagnostics of buildings									
Course objectives	To familiarize students with the basics of low-energy buildings and with the methods of designing passive buildings. Presentation of the principles of the rational use of energy heating, hot water, lighting. To familiarize students with the assessment of a building in its "life cycle". Teaching the preparation of studies on the planning and implementation of projects relating to the rationalization of energy use in a building. Presentation of modern methods of assessing passive buildings.									
Course content	<p><u>Lecture:</u> An idea of the low-energy buildings, definitions depending on energy consumption, design principles. Detailed solution low energy buildings (passive). Installations and heat source and their role in buildings with low energy demand. The building and its operation and the energy consumption on the background of the heat balance. Possibilities of individual components of heat balance of the building. The role of energy certificates in the rationalization of the use of energy. Energy certification in EU directives and Polish regulations. Investments in improving the quality of buildings and the protection of the environment. Thermal modernization as part of the rationalization of the use of energy in buildings. Ecological aspects of energy consumption in buildings.</p> <p><u>Classes:</u> Assessment of the building's energy condition. Selection of measures rationalizing energy consumption in the building. Development of assumptions for the concept of a passive building. Analysis of the calculations from the previously presented examples and drawing conclusions.</p>									
Teaching methods	Informative and problem lecture, project classes									
Assessment method	Lecture: multiple-choice written test, classes - preparation of the project, test									
Symbol of learning outcome	Learning outcomes							Reference to the learning outcomes for the field of study		

L01	Student knows the principles of designing low-energy and passive buildings and the selection of an effective heat source for them, including renewable energy sources	K_B1_W07, K_B1_W06	
L02	Student knows the principles of reducing the heat demand of the building and can correctly choose the measures to improve energy efficiency	K_B1_W06, K_B1_U05, K_B1_U08	
L03	Student can collect data and evaluate the building in terms of energy and analyze its existing condition.	K_B1_W09, K_B1_U02	
L04	Student knows the impact of the energy quality of buildings on the state of the environment and can see non-technical aspects (health).	K_B1_W09, K_B1_U11	
L05	Student understands the need to implement the principles of sustainable development in construction.	K_B1_W09	
L06	Student understands the interaction between the activities of the designer and contractor and the energy quality of the building.	K_B1_W07	
Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed	
L01	final tests, preparation of project tasks	L, C	
L02	final tests, preparation of project tasks	L, C	
L03	final tests, preparation of project tasks	L, C	
L04	final tests, preparation of project tasks, defence and discussion of the project	L, C	
L05	final (multiple-choice) tests	L	
L06	final (multiple-choice) tests	L	
Student workload (in hours)		No. of hours	
Calculation	lecture attendance	10	
	participation in classes	10	
	performing design tasks at home	15	
	participation in student-teacher sessions related to the classes/project	5	
	preparation for the evaluation / tests	25	
	preparation to the classes	10	
	TOTAL:	75	
Quantitative indicators		HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation		25	1
Student workload – practical activities		50	2
Basic references	<p>1. Grudzińska M. Ostańska A., Życzyńska A. "Low Energy and Passive Buildings". Medium. Warsaw, 2017</p> <p>2. Buildings 2020+ Construction, materials and installations, Editor Krawczyk D.A., Białystok – Cordoba – Vilnius 2019 (https://pb.edu.pl/oficyna-wydawnicza/wp-content/uploads/sites/4/2018/12/Buildings-2020-part1-20.12.pdf)</p>		

	<p>3. <i>Buildings 2020+ Energy sources</i>, Editor Krawczyk D.A., Białystok – Cordoba – Vilnius 2019, (http://www.vipskills.pb.edu.pl/images/download/Buildings-2020-part2-04-02-2019.pdf)</p> <p>4. <i>Directive 2010/31/EU of the European Parliament and of the Council Of 19 may 2010 On the energy performance of buildings (recast)</i></p>	
Supplementary references	<p>1. Markiewicz-Zahorski Przemysław, “<i>Building construction, solution & details for professionals</i>”, Polygraphy Department of the Cracow University of Technology, 2019</p> <p>2. Albert Thumann, William J. Younger: <i>Handbook of energy audits</i>. Fairmont Press, 2003.</p> <p>3. <i>National standards: EN ISO 10456; EN ISO 6946; EN ISO 13788; EN-ISO 10077</i></p> <p>4. <i>Concerted action "Energy performance of buildings - Implementing od Energy Performance of Buildings Directive (EPBD)", Lisbon, September 2015</i></p>	
Organisational unit conducting the course	Department of Energy-Efficient Construction and Geodesy	Date of issuing the programme
Author of the programme	Beata Sadowska, PhD, Eng.	11.02.2022

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