

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Energy technology in construction		Code 1010112111010105652
Field of study Civil Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 1 / 1
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 15 Classes: - Laboratory: 15 Project/seminars: 15		No. of credits 3
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art		ECTS distribution (number and %)
Responsible for subject / lecturer: dr inż. MARLENA KUCZ email: marlena.kucz@put.poznan.pl tel. +48 61 6652864 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań		Responsible for subject / lecturer: dr inż. KATARZYNA RATAJCZAK email: KATARZYNA.M.RATAJCZAK@PUT.POZNAN.PL tel. +48 61 6652864 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Methods to minimise energy use in buildings. Basic ways to estimate life cycle of building elements and energy calculations, knowledge of generation methods, accumulation and sustainable use of energy.
2	Skills	Ways to acquire and analyse information from various sources. Ability to assess heat flows, ability to differentiate heat sources used in buildings and calculate effects of their operation. Ability to use computer software based on BIM principles.
3	Social competencies	Professional responsibility of engineers as the ?environment stewards? and representatives of the society in regard to environmental changes. The need for life-long learning, ability to work in teams and accepting various societal roles and responsibilities.
Assumptions and objectives of the course: Recognition of the issues related to minimisation of energy use in buildings and by the building industry, differentiation of various energy sources, with the focus on the renewable ones; implementation of the acquired knowledge in buildings.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Student knows the basic European norms of energy demand in apartment buildings/dwellings - [W06]		
2. Student knows principles of building basic structural elements in buildings - [W05, W07]		
3. Student knows standards and regulations regarding design of buildings and their elements - [W06, W07]		
4. Student knows software and calculation procedures used in design - [W08]		
5. Student knows basic relationships between decisions regarding choice of materials , technologies and construction methods and their energy outcomes - [W13, W19]		
Skills:		
1. Utilising computer software to model building engineering objects - [U05]		
2. Ability to perform basic energy calculations for a building - [U08, U17]		
3. Ability to design building structures utilising passive methods of providing energy - [U05, U17]		
Social competencies:		
1. Student can identify and solve problems related to variety of engineering solutions - [K04]		
2. Student can cooperate in a team and provide leadership to the group - [K01]		
3. Student is conscious of the need for sustained development of his personal abilities - [K03, K06]		
4. Student can think and act creatively - [K03]		
5. Student understands the need for sustainable building - [K04, K07]		

Assessment methods of study outcomes													
<p>The final test checking command of knowledge taken from lectures. Scale of marks (given as a percentage points)</p> <table> <tr> <td>91-100</td> <td>very good (A)</td> </tr> <tr> <td>81 - 90</td> <td>good + (B)</td> </tr> <tr> <td>71 - 80</td> <td>good (C)</td> </tr> <tr> <td>61 - 70</td> <td>pass + (D)</td> </tr> <tr> <td>51 - 60</td> <td>pass (E)</td> </tr> <tr> <td>below 50</td> <td>fail (F)</td> </tr> </table>		91-100	very good (A)	81 - 90	good + (B)	71 - 80	good (C)	61 - 70	pass + (D)	51 - 60	pass (E)	below 50	fail (F)
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81 - 90	good + (B)												
71 - 80	good (C)												
61 - 70	pass + (D)												
51 - 60	pass (E)												
below 50	fail (F)												
Course description													
<ol style="list-style-type: none"> Sustainable building How to design an energy efficient building Energy Calculation - methodology, LCC, life cycle of the building, BEMS - Building Management System (control and monitoring of energy consumption), Energy management in the building Intelligent systems, Energy efficiency in buildings - practical examples, Case study: Improving energy efficiency <p>Project and laboratory: - Energy-efficient building design based on BIM and analysis of ecological aspect and cost - LCC, Optimum solution for set boundary conditions in term of cost end energy- heating, insulation, heat recovery</p> <p>Lecturer: dr inż. M.KUCZ, d inż. K.Ratajczak, mgr inż. R.Milwicz</p>													
Basic bibliography:													
<ol style="list-style-type: none"> Brown GZ and DeKay M Sun, wind & light, architectural design strategies 2nd ed. John Wiley & Sons 2001 Givoni B Man, climate & architecture 2nd ed. Van Nostrand Reinhold 1981 Givoni B Climate considerations in building and urban design Van Nostrand Reinhold 1998 Douglas Harris: Guide to Energy Management in Buildings., Routledge; 1 edition (November 30, 2011) Haines, Roger W., Myers, Michael E., HVAC systems design handbook , McGraw-Hill, cop. 2010. 2008, 2014: METHODOLOGY ROZPORZADZENIE MINISTRA INFRASTRUKTURY w sprawie metodologii obliczania charakterystyki energetycznej budynku Włodarczyk J., Podosek Z, Systemy teletechniczne budynków inteligentnych : okablowanie strukturalne, instalacje elektryczne, systemy alarmowe, systemy kontroli dostępu, sieci domowe, systemy HVAC, systemy przeciwpożarowe, Przedsiębiorstwo Badawczo-Projektowo-Wdrożeniowe Cyber : Bel Studio, 2002 Baird, G. ; Aun, C.S. ; Brauder, W.D.S. ; Donn, M.R. ; Pool, F. Energy performance of buildings , Zunde J and Bougdah H Integrated strategies in architecture Taylor & Francis 2006 ISO 13790:2008, Energy performance of buildings - Calculation of energy use for space heating and cooling 													
Additional bibliography:													
<ol style="list-style-type: none"> Ad van Wijk, Welcome in the green village. IOS Press, Delft 2013 Lennart J. Lundqvist, Sweden and ecological governance. Manchester University Press, Manchester 2004 Costanza R., Building a Sustainable and Desirable Economy-in-Society-in-Nature, ANU E Press, Canberra 2012 Berardi U., Moving to Sustainable Buildings: Paths to Adopt Green Innovations in Developed Countries. Versita, London 2013 EN ISO 13790:2006, Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies 													
Result of average student's workload													
Activity	Time (working hours)												
1. Classes participation	45												
2. Works preparation	30												
3. Computer work	15												
4. Works finishing	15												

Student's workload		
Source of workload	hours	ECTS
Total workload	100	3
Contact hours	50	2
Practical activities	45	1