

FACULTY OF ELECTRICAL  
ENGINEERING**SUBJECT CARD**

Name in Polish: **Gospodarka energetyczna**  
 Name in English: **Energy management in energy systems**  
 Main field of study (if applicable): **Electrical Engineering**  
 Specialization (if applicable): **Electrical Power Engineering**  
 Level and form of studies: **2nd level, full-time**  
 Kind of subject: **obligatory**  
 Subject code: **ELR052517**  
 Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	30				
Number of hours of total student workload (CNPS):	60				
Form of crediting:	crediting with grade				
For group of courses mark (X) final course:					
Number of ECTS points:	2				
including number of ECTS points for practical (P) classes :					
including number of ECTS points for direct teacher-student contact (BK) classes:	1.40				

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

1. Having basic knowledge of physical phenomena in electric energy generation and familiarity with basics electricity generation technologies
2. Having basic knowledge of economic and social costs of electricity production
3. Having basic knowledge of marketing and management in energy industry

**SUBJECT OBJECTIVES**

- C1. Familiarizing with energy management assessment according to sustainable development rules  
 C2. Familiarizing with energy balance methods of energy technological systems and operation optimization of generating units  
 C3. Familiarizing with methods of initial economic analyses of technological systems for energy generation, transmission and utilizing  
 C4. Familiarizing with structure of energy system, its structural transformation and development trends

**SUBJECT LEARNING OUTCOMES***relating to knowledge:*

- PEU\_W01 Has basic knowledge of energy balancing of technological systems for generation and utilizing of electricity, heat and cold and operation optimization of generation, transmission and distribution units  
 PEU\_W02 Has basic knowledge of cost of generation of electricity, heat and cold  
 PEU\_W03 Has basic knowledge of energy system, its structural transformation and development trends

*relating to skills:**relating to social competences:*

- PEU\_K01 Is aware of necessity of self-reliant information retrieval and creative using of obtained information

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours:
Lec 1	Introduction to the course. Conditions of passing. Basic concepts regarding energy management. Characteristics of energy conversion processes used in technology	2
Lec 2	Global and national energy system - characteristics. World and national primary energy resources. Forecasts of energy demand. Transport and storage of energy carriers	2
Lec 3	National energy sector: characteristics and structural changes. National energy security concept. Directions of national energy policy	2
Lec 4	The impact of energy production on the environment. Sustainable development in the energy sector. Development trends in the energy sector	2
Lec 5	Energy efficiency: basic regulations. Principles of energy efficiency analysis	2
Lec 6	Rules for the energy management. Energy efficiency analysis - examples	2
Lec 7	The economic principles of the energy market	2
Lec 8	Principles of the analysis of the economic effectiveness of investments in the energy sector	2
Lec 9	Analysis of the economic efficiency of investments in energy - examples	2
Lec 10	Principles of preparing energy balances and energy characteristics of devices and systems	2
Lec 11	Energy balances of energy conversion systems - examples	2
Lec 12	Renewable energy sources and CHP in energy management	2
Lec 13	Models and methods of optimization in energy management	2
Lec 14	Optimization in energy management: example applications. Lecture final remarks	2
Lec 15	Final test	2
Total hours:		<b>30</b>

TEACHING TOOLS USED
N1. Information lecture in form of multimedia presentation

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT		
Evaluation <i>F - forming (during semester) P - concluding (at semester end)</i>	Educational effect number	Way of evaluating educational effect achievement
F1(w)	PEU_W01 PEU_W02 PEU_W03 PEU_K01	Writing test
P(w)	P=F1	

PRIMARY AND SECONDARY LITERATURE
<b>PRIMARY LITERATURE:</b> [1] Charun H., Podstawy gospodarki energetycznej. Cz. 1-3, Wybrane zagadnienia dydaktyczne, Koszalin 2004. [2] Górzyński J., Efektywność energetyczna w działalności gospodarczej, PWN, Warszawa 2017. [3] Paska J., Ekonomika w elektroenergetyce, OWPW, Warszawa 2007. [4] Dyka E., Mróz-Radłowska I., Ekonomia w energetyce - wybrane zagadnienia, Wyd. PŁ, Łódź 2014. [5] Mielczarski W., Handbook: Energy Systems & Markets, ISBN: 978-83-62660-03-2, Łódź 2018.
<b>SECONDARY LITERATURE:</b> [1] Oung K., Zarządzanie energią w przedsiębiorstwie, PWN, Warszawa 2015 [2] Nantka M. B., Techniczne aspekty gospodarki energetycznej w budownictwie, t. 1, 2, Wyd. PŚI., Gliwice 2014. [3] Vanek, F. Albright L., Energy systems engineering : evaluation and implementation, McGraw-Hill, New York 2012. [4] Yogi Goswami D., Kreith T., Energy efficiency and renewable energy handbook, CRC Press/Taylor & Francis Group, 2016. [5] Chochowski A., Krawiec A. red.: , Zarządzanie w energetyce. Koncepcje, zasoby, strategie, struktury, procesy i technologie energetyki, Wydawnictwo Difin, Warszawa 2007. [6] Mielczarski W., Rynki energii elektrycznej : wybrane aspekty techniczne i ekonomiczne, ARE, Warszawa 2000. [7] Gosztowt W., Gospodarka energetyczna w przemyśle, WNT, Warszawa 1973.

SUBJECT SUPERVISOR
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