

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Mechanizmy rynkowe w energetyce z uwzględnieniem pozycji OZE**
 Name in English: **Market Mechanisms in Power Systems with Distributed Energy Sources**
 Main field of study (if applicable): **Electrical Engineering**
 Specialization (if applicable): **Renewable Energy Sources**
 Level and form of studies: **2nd level, full-time**
 Kind of subject: **obligatory**
 Subject code: **ELR042520**
 Group of courses: **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:	crediting with grade				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
including number of ECTS points for direct teacher-student contact (BK) classes:	1.40				0.70

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knows the principles a power system operation and control, is familiar with electricity generation and transmission techniques.
2. Has sufficient range of language means at his/her disposal to relatively flawlessly speak out (orally and written), formulate and justify opinions, explain his/her position, show advantages and disadvantages of different solutions, participate in discussion and present general, scientific and technical subject matter.
3. Can use basic hardware and software, create and edit a text on basic level, create computer presentations.
4. Understands a need and knows possibilities of continuous education, increasing of professional, personal and social competences.
5. Has awareness of responsibility for own work.

SUBJECT OBJECTIVES

- C1. Possession a knowledge of function of electric energy sector including renewable energy sources.
 C2. Getting to know market and regulatory mechanisms in power sector.
 C3. Possession a knowledge of electric energy market.
 C4. Possession a knowledge of goals of national and union energy policy.
 C5. Acquisition of abilities to solve problems connected with energy market in aspect of renewable energy sources.
 C6. Acquisition of abilities to interpret market and regulatory mechanisms in power sector.

SUBJECT EDUCATIONAL EFFECTS*relating to knowledge:*

- PEK_W01 Knows function of electric energy sector including renewable energy sources.
 PEK_W02 Knows market and regulatory mechanisms in power sector.
 PEK_W03 Possesses a knowledge of electric energy market.

relating to skills:

- PEK_U01 Can solve problems connected with energy market in aspect of renewable energy sources.
 PEK_U02 Can interpret market and regulatory mechanisms in power sector.

relating to social competences:

- PEK_K01 Can think and act in creative and enterprising way. He/she is able to rank appropriately the priorities needed for realizing the respective task.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours:
Lec 1	Energy market. Sources of original energy in present-day World. Producers and consumers of energetic resources.	2
Lec 2	Production and consumption of electric energy, scenarios of generation.	2
Lec 3	Deregulation and restructuring of power sector. Liberalization of electric energy market.	2
Lec 4	Heat market in Poland.	2
Lec 5	Mechanisms of energy market.	2
Lec 6	Regulation of energy market.	2
Lec 7	State' interventionism and market rules. Regulatory mechanisms on energy market.	2
Lec 8	Infrastructural multi-energy utilities.	2
Lec 9	Financial relations between market entities.	2
Lec 10	Realization of the European energy policy goals: effectiveness, use of renewable energy sources, counteraction of climate changes.	2
Lec 11	Marketing position of RES.	2
Lec 12	Strategic analysis of different kinds of RES.	2
Lec 13	Regionalisation and energy markets.	2
Lec 14	National regionalisation of energy markets.	2
Lec 15	Test.	2
Total hours:		30

Form of classes - seminar		Number of hours:
Sem 1	Models of electric energy market.	2
Sem 2	Legal, institutional and technical infrastructure of electric energy market.	2
Sem 3	Tariffs and prices on electric energy market.	2
Sem 4	Competitive electric energy market.	2
Sem 5	Renewable energy market.	2
Sem 6	Producer on electric energy market.	2
Sem 7	Consumer on electric energy market.	2
Sem 8	Repetition and summing up.	1
Total hours:		15

TEACHING TOOLS USED

- N1. Lecture with the use of audiovisual techniques, multimedia presentations.
- N2. Multimedia presentation.
- N3. Problem discussion.
- N4. Case study.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation <small>F - forming (during semester) P - concluding (at semester end)</small>	Educational effect number	Way of evaluating educational effect achievement
F1(w)	PEK_W01 PEK_W02 PEK_W03 PEK_K01	Test.
P(w)	P=F1	
F1(s)	PEK_U01 PEK_U02	Activity on seminar classes.
F2(s)	PEK_U01 PEK_U02	Preparing and presenting a presentation.
P(s)	$P = 0.2F1 + 0.8F2$	

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Kowalska A., Wilczyński A., Źródła rozproszone w systemie elektroenergetycznym. Wydawnictwo Kaprint, Lublin, 2007.
 [2] Malko J., Wilczyński A., Rynki energii – działania marketingowe. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2006.
 [3] Joerss W., Uyterlinde M., Loeffler P., Morthost P.E., Decentralised Power Generation in the Liberalised EU Energy Markets, Springer-Verlag Berlin Heidelberg, 2003.
 [4] Murray B, Power Markets and Economics: Energy Costs, Trading, Emissions, John Wiley and Sons Ltd. Chichester, England, 2009.
 [5] Chochowski A, Krawiec Fr., Zarządzanie w energetyce. Difin, Warszawa 2008.
 [6] Niedziółka D., Regionalizacja rynków energii. Oficyna Wydawnicza Szkoły Głównej Handlowej, Warszawa 2011.

SECONDARY LITERATURE:

- 1] Shahidepour M., Yamin, Zuyi Li H., Market Operations in Electric Power Systems: Forecasting, Scheduling, and Risk Management, John Wiley and Sons Ltd. New York, 2002.
 [2] Czasopisma: Rynek Energii, IEEE Power & Energy, Power Engineering, Renewable Energy World.
 [3] Krawiec F., Krawiec S., Zarządzanie marketingiem w firmie energetycznej. Difin, Warszawa 2001.

SUBJECT SUPERVISOR

Artur Wilczyński, artur.wilczynski@pwr.edu.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT **ELR042520 - Market Mechanisms in Power Systems with Distributed Energy Sources** AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Electrical Engineering** AND SPECIALIZATION **Renewable Energy Sources**

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
PEK_W01	S2OZE_W13	C.1 C.4	Lec1 Lec2 Lec4 Lec7 Lec8 Lec10 Lec11 Lec12 Lec14 Lec15	N.1
PEK_W02	S2OZE_W13	C.2	Lec1 Lec4 Lec5 Lec6 Lec9 Lec13 Lec15	N.1
PEK_W03	S2OZE_W13	C.3	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec13 Lec15	N.1
PEK_U01	S2OZE_U08	C.5	Sem1 Sem2 Sem3 Sem4 Sem5 Sem6 Sem7 Sem8	N.2 N.3 N.4
PEK_U02	S2OZE_U08	C.6	Sem1 Sem2 Sem3 Sem4 Sem5 Sem6 Sem7 Sem8	N.2 N.3 N.4
PEK_K01	K2ETK_K06	C.5 C.6	Sem1 Sem2 Sem3 Sem4 Sem5 Sem6 Sem7 Sem8	N.2 N.3 N.4