COURSE DESCRIPTION CARD - SYLLABUS

Course name

Elective course A: Development of market systems in the energy sector

Course

Field of study

Power Engineering

Year/Semester

3/6

Area of study (specialization)

Study Sustainable Development of Power

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

Tutorials

0

Projects/seminars

0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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The Faculty of Environmental Engineering and Energy

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Responsible for the course/lecturer:

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The Faculty of Environmental Engineering and Energy

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Prerequisites

Student has knowledge of the basics of power engineering, power industry process technology and economy. The student is able to determine the relationships between entities operating in the market. Can determine the economic profitability of energy companies on the market. The student is aware of the readiness to take up teamwork and to make decisions.

Course objective

Getting to know the history, present state and planned development of the energy sector in Poland and Europe. Learning about new technologies on the energy market: renewable energy sources on the energy market and in heating, Power to Gas technology, electricity and heat storage, prosumer energy,

fuel cells. Getting to know the history and prospects for further development of electromobility in Poland and in the world.

Course-related learning outcomes

Knowledge

1. Student has knowledge of the current state and planned development of the energy sector in Poland and Europe. Student has knowledge of new technologies on the energy market.

2. Student has knowledge of the history and prospects for further development of electromobility in Poland and in the world.

Skills

1. Student can list and discuss new technologies on the energy market: renewable energy sources on the energy market and in heating, Power to Gas technology, electricity and heat storage, prosumer energy, fuel cells.

Social competences

1. Student is aware of the technical progress in the market systems and the progress in electromobility, which is associated with the need for training.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

-a problem-based written exam

Laboratory classes:

- rewarding systematic progress in design works, - presentation on the forum, paper / PDF development, - evaluation of the form and content of the implemented project

Programme content

Lecture:

History, current state and planned development of the energy sector in Poland and Europe. New technologies on the energy market: renewable energy sources on the energy market and in heating, Power to Gas technology, electricity and heat storage, prosumer energy, fuel cells. History and prospects for further development of electromobility in Poland and in the world. Energy development strategy. The concept of a virtual power plant - smart grid networks, smart metering and distributed sources. Cooperatives and energy clusters

Laboratory classes:

- EU Emissions Trading System (EU ETS) - is it doing its job? - The system of certificates of origin and the auction system of renewable energy and economic support for various energy facilities: conventional and nuclear steam thermal power plants, - FIT and FIP systems - are they a real facilitation for investors?

- Assessment of the implementation of the idea of energy clusters in Poland - Prosumer - benefits, rights and obligations - is it profitable? - Will I be able to buy energy from a neighbor? - the possibilities of using Blockchain technology in the energy sector and an overview of the first solutions in the world - Development of electromobility on the example of Denmark, Norway, Germany or Finland - what is success? - Development of electromobility in Poland - plans and assessment of their feasibility - Capacity market - does it fulfill its role? - Hydrogen technologies - are they a viable alternative to conventional fuels? - Support for high-efficiency cogeneration after the end of the certificate of origin system - is it more beneficial?

Teaching methods

Lecture:

-multimedia presentation, illustrated with the examples given on the board

Laboratory classes:

- work in groups, performing project tasks, developing problematic issues: literature review, analysis of statistical data on the issue in question, calculations, formulation of hypotheses, discussion, argumentation, conclusions

Bibliography

Basic

1. Szumanowski A., Akumulacja energii w pojazdach, Wydawnictwo Komunikacji i Łączności, Warszawa, 1984.

2. Pach-Gurgul A., Jednolity rynek energii elektrycznej w Unii Europejskiej w kontekście bezpieczeństwa energetycznego Polski, Wydawnictwo Difin, 2012,

3. Chochowski A., Krawiec F. (red), Zarządzanie w energetyce, Wydawnictwo Difin, Warszawa 2008.

4. Kaproń H., Efektywność wytwarzania ciepła sieciowego w warunkach rynkowych, Oficyna Wydawnicza PW, 2003. 7. Górzyński J., Urbaniec K., Wytwarzanie i użytkowanie energii w przemyśle. Oficyna Wydawnicza PW, 2000

Additional

1. Ustawa z dnia 10 kwietnia 1997 r. PRAWO ENERGETYCZNE z Rozporządzeniami Ministra Gospodarki w sprawie szczegółowych zasad kształtowania i kalkulacji taryf oraz zasad rozliczeń w obrocie energia elektryczną.

2. Nagaj R., Regulacja rynku energii elektrycznej w Polsce - ex ante czy ex post, Wydawnictwo Naukowe Uniwersytetu Szczecińskiego, Szczecin 2016.

3. Kaproń H., Kaproń T., Efektywność wytwarzania i dostawy energii w warunkach rynkowych, Kaprint, Lublin 2016.

4. Wojcieszak Ł., Towarowa giełda energii jako instrument liberalizacji rynku gazu w Polsce, Wydawnictwo Fundacja na rzecz Czystej Energii, Poznań 2017.

5. Kwiatkiewicz P.,Szczerbowski R., Sledzik W., Elektromobilność. Środowisko infrastrukturalne i techniczne wyzwania polityki intraregionalnej. FNCE 2020

6. Szczerbowski R,. Strategia zrównoważonego rozwoju a sektor wytwarzania energii w Polsce, Energetyka - 2018, nr 7

Breakdown of average student's workload

	Hours	ECTS
Total workload	67	3,0
Classes requiring direct contact with the teacher	47	2,0
Student's own work (literature studies, preparation for laboratory classes, preparation for exam) [1]	20	1,0

[1] delete or add other activities as appropriate