



COURSE DESCRIPTION CARD - SYLLABUS

Course name

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

Course

| | |
|--|-------------------|
| Field of study | Year/Semester |
| Electrical Engineering | 3/6 |
| Area of study (specialization) | Profile of study |
| Study Sustainable Development of Power | general academic |
| Level of study | Course offered in |
| First-cycle studies | Polish |
| Form of study | Requirements |
| full-time | elective |

Number of hours

| | | |
|-----------|--------------------|---------------------|
| Lecture | Laboratory classes | Other (e.g. online) |
| 30 | 15 | 0 |
| Tutorials | Projects/seminars | |
| 0 | 0 | |

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

Student has a knowledge in the scope of basis of power engineering, electric energy management, technology of processes in power engineering, and economy.

Student is able to determine relationships between business entities acting on market.

Student is ready to work in team and to make a decision

Course objective

Getting to know the history, current status and planned development of the energy sector in Poland and Europe. Getting to know new technologies on the energy market: renewable energy sources in the



energy and heating markets, technology Power to Gas, warehouses of electricity and heat, prosumer energy, fuel cells.

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

Course-related learning outcomes

Knowledge

1. The student has knowledge of the current state and planned development of the energy sector in Poland and Europe. The student has knowledge of new technologies in the energy market.
2. The student has knowledge of the history and perspectives of further development of electromobility in Poland and in the world.

Skills

He can list and discuss new technologies on the energy market: renewable energy sources in the energy and heating markets, technology Power to Gas, warehouses of electricity and heat, prosumer energy, fuel cells.

Social competences

Is aware of technical progress within market systems and advances in electromobility, which is associated with the need for further education

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- a problem-based written exam or an oral exam

Design laboratory:

- 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 status and planned development of the energy sector in Poland and Europe. New technologies on the energy market: renewable energy sources in the energy and heating markets, technology Power to Gas, warehouses of electricity and heat, prosumer energy, fuel cells. History and prospects of further development of electromobility in Poland and in the world. Energy development strategy. Concept of virtual power plant - smart grid networks, smart metering and dispersed sources. cooperatives and energy clusters.



Design laboratory:

- The EU Emissions Trading System (EU ETS) - is it doing its job?
- The system of certificates of origin and the RES support auction system
- FIT and FIP systems - are they 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 examples given on the board

Laboratory: work in groups, carrying out project tasks, developing problematic issues: literature review, analysis of statistical data on the subject matter, 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.



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 energią 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. Nowak B., Wewnętrzny rynek energii w Unii Europejskiej, Wydawnictwo C.H.Beck, 2009.

Breakdown of average student's workload

| | Hours | ECTS |
|---|-------|------|
| Total workload | 82 | 3,0 |
| Classes requiring direct contact with the teacher | 62 | 2,0 |
| Student's own work (literature studies, preparation for the laboratory, project preparation, preparation for the exam) ¹ | 20 | 1,0 |

¹ delete or add other activities as appropriate