COURSE DESCRIPTION CARD - SYLLABUS

Course name
Problems of energy security [S2Elenerg1>PBP]

Course

Field of study
Electrical Power Engineering

Year/Semester
2/3

Area of study (specialization)
Smart Grids

Profile of study
general academic

Level of study
second-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
15

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of power engineering, impact of energy generation and use on the environment, transmission and distribution of electricity, energy markets and operation of power systems. Ability to assess the impact of the implementation of the analyzed processes in the field of power engineering on society. Knowledge of legal regulations in the energy sector, market functioning and energy market economy. Ability to self-study in a field related to the chosen field of study. Awareness of the need to expand the competences, readiness to cooperate within a team and strive for sustainable development of utility processes.

Course objective

Understanding the conditions of safe operation of the power system and factors affecting the level of security of electricity supply. Understanding the methods of assessing the level of electricity supply safety and measures of its improvement. Getting to know the entities responsible for electricity security and their tasks.

Course-related learning outcomes

Knowledge:

1. student has knowledge of new threats to energy security related to structural changes in energy systems, ways to increase the level of security and entities responsible for their implementation.

Skills:
1. student is able to analyze the factors influencing level of power supply security, and indicate ways to improve the level of security of the power system operation.
2. student is able to indicate strategic tasks to be implemented in the future in order to maintain and increase the level of electricity security.

Social competences:
1. student is aware of the need to take into account the safety of power supply in system"s operation and the need to anticipate remedial measures against possible threats.
2. student is able to look for solutions regarding the strategy of sustainable development of energy sector and ensuring safe electricity supply.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture:
- knowledge and skills assessment through a problem-based written test,
- continuous assessment of student"s skills and competences during each class through discussions on current problems related to energy security (rewarding attendance and active participation in the classes).
Project:
- assessment knowledge and skills concerning the project tasks, evaluation of the reports on completed tasks,
- additional points for active paritcipation during classes, in particular for the ability to cooperate within a team that handles that project task.

Programme content

Lecture:
Conditions for the safe operation of electrical power systems in technical, economic and environmental aspects. Tasks of the energy generation sub-sector, electricity transmission and distribution network sector and of the proper functioning of the energy market to ensure safe operation of the power system. Assessment of operation safety and hazards in the electricity generation, transmission and distribution sub-sectors. Institutions responsible for current safety of the power system and their tasks. Actions aimed at improving safety of electricity supply and current measures to counteract the occurring threats. Capacity market as a strategic tool to improve generation adequacy. Procedures implemented in the event of threats to the safe operation of the power system and action plans for restoring the system after catastrophic failures. European cooperation in terms of maintaining and improving the security of power systems" operation.
Project:
Diversification of energy sources regarding different energy generation technologies. Threats to energy supply security involving different energy carriers and methods of their assessment and limitation. Generation adequacy and reliability of electricity supply. Assessment of electricity supply safety regarding renewable energy sources.

Teaching methods

Lecture: multimedia presentation - informational and problem lectures supplemented with examples presented on the board, elements of brainstorming and discussion
Project: multimedia presentation with calculation exaples presented on the board, problem methods, expert table method, solving project tasks individually and in groups

Bibliography

Basic
1. Dołęga W., Planowanie rozwoju sieciowej infrastruktury elektroenergetycznej w aspekcie bezpieczeństwa dostaw energii i bezpieczeństwa ekologicznego, Oficyna Wydawnicza Politechniki

Wrocławskiej, Wrocław 2013
2. Gryz J., Podraza A., Ruszel M., Bezpieczeństwo energetyczne. Koncepcje, wyzwania, interesy. Wydawnictwo Naukowe PWN, Warszawa 2018
3. Janusz P., Szczerbowski R., Zaleski P., Istotne aspekty bezpieczeństwa energetycznego Polski, Texter, Warszawa 2017
4. Kaczmarski M., Bezpieczeństwo energetyczne Unii Europejskiej, Wydawnictwa Akademickie i Profesjonalne, Warszawa 2010
5. Pach-Gurgul A., Jednolity rynek energii elektrycznej w Unii Europejskiej w kontekście bezpieczeństwa energetycznego Polski, Wydawnictwo Difin, Warszawa 2012
6. Wiatr J., Orzechowski M., Poradnik projektanta elektryka: podstawy zasilania budynków mieszkalnych, użyteczności publicznej i innych obiektów nieprzemysłowych w energię elektryczną z przykładowymi projektami oraz przepisami prawnymi na płycie CD, Dom Wydawniczy Medium, Warszawa 2012
Additional
1. Andruszkiewicz J., Lorenc J., Weychan A. Distributed generation as efficient measure to improve power generation adequacy. Archives of Electrical Engineering 2019, vol. 68, no. 2, 373-385
2. Andruszkiewicz J., Lorenc J., Staszak B. Efektywne działania prowadzące do poprawy ciągłości zasilania z sieci dystrybucyjnych. Przegląd Naukowo-Metodyczny, Edukacja dla Bezpieczeństwa, 2016 nr 1, 1469-1482
3. Bartodziej G., Tomaszewski M., Polityka energetyczna i bezpieczeństwo energetyczne, Wydawnictwo Federacji Stowarzyszeń Naukowo-Technicznych Energetyka i Środowisko, Warszawa, 2009
4. ENSTO-E E Mid-term Adequacy Forecast 2020
5. Kowalak R., Malkowski R., Szczerba Z., Zajczyk R., Automatyka systemowa a bezpieczeństwo energetyczne kraju. Węzły sieci przesyłowej i rozdzielczej. Tom 3, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2013
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9. Sutkowski T., Rezerwowe i bezprzerwowe zasilanie w energię elektryczną; urządzenia i układy, ESP COSiW, 2007
10. Wojtkowska-Łodej G., Uwarunkowania rozwoju energetyki w zakresie polityki energetycznej i regulacyjnej, ELIPSA Warszawawa 2016

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00