



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Energy security [S2ZE1E>BE]

Course

Field of study

Green Energy

Year/Semester

1/2

Area of study (specialization)

–

Profile of study

general academic

Level of study

second-cycle

Course offered in

english

Form of study

full-time

Requirements

elective

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

dr inż. Jerzy Andruszkiewicz

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Lecturers

Prerequisites

Basic knowledge in electrical power engineering, thermal power engineering, energy management and fuels and their use. Ability to effectively self-study topics related to the chosen field of study. Awareness of the need to extend competences, readiness to cooperate within a team.

Course objective

Gaining knowledge on shaping the security of complex energy systems and familiarizing with the trends of changes in the energy sector in Poland, as well as in the European Union, concerning reliability of energy supply. Acquainting with the issues related to reliability of electricity supply to final consumers, generation adequacy in the power system and system failures.

Course-related learning outcomes

Knowledge:

1. Student has the knowledge on basic threats to energy security and actions for its improvement.
2. Student knows the main legal, organizational and economic regulations influencing the energy security in Poland and in the European Union and is familiar with the latest trends and developments in terms of increasing energy security.

Skills:

1. Student is able to assess the impact of energy sector on the environment.
2. Student is able to analyze the current energy situation and propose actions to increase energy security.

Social competences:

1. Student is aware of the need to take actions to increase safety of electricity supply and understands the non-technical aspects and effects related to the operation of the power industry, including its impact on the environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- knowledge and skills assessment through two problem-based written tests,
- 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 classes).

Project:

- knowledge and skills assessment concerning the project tasks, evaluation of the reports on the completed tasks,
- assessment of active participation in classes, rewarding in particular the ability to cooperate within the team handling the project task.

Programme content

Lecture:

Conditions for safe operation of power systems in technical, economic and environmental aspects. Tasks of the energy generation subsectors, grid sectors of electricity transmission and distribution and the proper operation of the energy market to ensure safe operation of the power system. Assessment of operational security and hazards occurring in the generation, transmission and distribution sub-sectors. Institutions responsible for the security of the power system operation and their tasks. Actions aimed at increasing security of electricity supply and measures to counteract the existing threats. Capacity market as a strategic tool to improve generation adequacy. Procedures implemented in case of threats to the safe operation of the power system and action plans for system restoration in the event of catastrophic failures. Generation adequacy assessment in the European and Polish power system according to the ENTSO-E methodology.

Project - possibility to choose one of the following variants:

generation adequacy analysis in the Polish power system, assessment of competitiveness of the energy market and diversification of energy supplies in terms of operational security of energy systems, reliability of electricity supply in transmission networks (ENS, AIT indices) and distribution networks (SAIDI, SAIFI indices), selection of backup power sources, costs determination of the sustainable development strategy.

Teaching methods

Lecture: multimedia presentation - informational and problem lectures supplemented with examples presented on the board, elements of brainstorming and discussion

Project: solving project tasks in groups, analysis of literature data, consultations with the teacher

Bibliography

Basic:

1. Executive Summary of Poland's National Energy and Climate Plan for the years 2021-2030 (NECP PL); <https://www.gov.pl/web/klimat/national-energy-and-climate-plan-for-the-years-2021-2030>
2. Energy Policy of Poland until 2040 Extract - Ministry of Climate and Environment <https://www.gov.pl/web/climate/energy-policy-of-poland-until-2040-epp2040>
3. Mid-term Adequacy Forecast. Appendix 1. Detailed Results and Input Data. 2020 Edition; https://eepublicdownloads.entsoe.eu/clean-documents/sdc-documents/MAF/2020/MAF_2020_Appendix_1_Input_Data_Detailed_Results.pdf
4. Capacity mechanisms in individual markets within the IEM

https://ec.europa.eu/energy/sites/ener/files/documents/20130207_generation_adequacy_study.pdf
5. 6th CEER Benchmarking Report on the Quality of Electricity and Gas Supply;
<https://www.ceer.eu/documents/104400/-/-/d064733a-9614-e320-a068-2086ed27be7f>

Additional:

1. Electricity Market Characteristics. Energy Regulatory Office;
<https://www.ure.gov.pl/en/markets/electricity/elctricitymrket/292,Electricity-Market-Characteristics.html>
2. Mid-term Adequacy Forecast. Appendix 2. Methodology. 2020 Edition;
https://eepublicdownloads.entsoe.eu/clean-documents/sdc-documents/MAF/2020/MAF_2020_Appendix_2_Methodology.pdf
3. Planned Polish capacity mechanism;
https://ec.europa.eu/competition/state_aid/cases/272253/272253_1977790_162_2.pdf

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