



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Energy Security [N1Eltech1>PO-E-BE]

Course

Field of study

Electrical Engineering

Year/Semester

4/7

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

part-time

Requirements

elective

Number of hours

Lecture

10

Laboratory classes

0

Other

0

Tutorials

10

Projects/seminars

0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge in electrical engineering, electrical power systems, information technology, and economics. Knowledge of basic characteristics of various energy sources and energy transmission technologies. Ability to perform basic calculations concerning power flow and electrical circuits. Awareness of the need to extend competences, readiness to cooperate within a team.

Course objective

Understanding the Polish Energy Policy and European Union's strategy for energy supply, use of the environment, promotion of renewable energy and energy efficiency and the resulting actions taken in Poland. Knowledge about the measures undertaken to implement this strategy. Understanding the principles of development of the European energy market and existing threats to the security of electricity supply and possible measures to counteract them.

Course-related learning outcomes

Knowledge:

1. Student has basic knowledge in the field of development in the area of efficient and safe production and transmission/distribution of energy to consumers.

2. Student knows the development of EU energy strategy and its implementation at the national level in the aim to achieve sustainable development of the energy sector.

3. Student has theoretically founded knowledge about the directions of development of power engineering and the strategy of defense and restoration of the generating capacity in the power system in the case of a cascading failure

Skills:

1. Student is able to evaluate the applied technology of electricity and heat generation concerning the cost of production, market situation, environment conditions and utility and economic criteria.

2. Student can investigate and propose the modifications of current approach for the development of energy sources and market systems for energy offering that meet the guidelines of the European Union and Polish Energy Policy.

Social competences:

1. The student understands the non-technical aspects and effects related to the operation of the energy sector, including its impact on the environment.

2. The student is aware of the need to maintain the security of the power system in order to ensure continuity and reliability of electricity supply.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lectures:

- knowledge and skills assessment through a problem-based written test,
- continuous assessment during each class (rewarding attendance and active participation in the classes).

Tutorials:

- assessment of the knowledge necessary to solve problems in a given task area through written tests,
- continuous assessment during each class - rewarding the increase in the ability to use presented principles and methods.

Additional points for active participation in the classes, in particular:

- suggesting alternative solutions for considered issues,
- efficiency of using gained knowledge in solving problems,
- ability to cooperate within a team that handles a given task,
- remarks allowing for improvements of didactic materials.

Programme content

The subject will cover issues related to the broadly understood energy security of Poland and the world.

The program content includes the issues of energy potential, modern technologies for generating energy based on conventional and renewable resources, as well as the assessment of threats to energy supplies resulting from various factors. Current strategies and goals of sustainable energy policy of Poland and the European Union will also be presented.

Course topics

Lecture:

The lectures will cover in detail such issues as: fuel resources and modern technologies for energy generation and transmission, sustainable EU energy policy in the field of reducing harmful emissions, supporting renewable sources and improving energy security and the corresponding Polish Energy Policy, diversification of energy sources taking into account various generation technologies, clean coal technologies, threats to the security of energy supplies using various energy carriers and methods of their assessment and reduction, system failures as a feature of large complex systems and basic principles of defense and reconstruction of power systems during emergency states and after failures.

Tutorials:

The exercises will analyze threats to the security of energy supplies using different energy carriers and methods of their assessment and reduction. Possible scenarios for the structure of generation and selection of sources will also be presented.

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board
Tutorials: solving tasks on the board

Bibliography

Basic

1. M. Kaczmarek, Bezpieczeństwo energetyczne Unii Europejskiej. Wydawnictwo Akademickie i Profesjonalne, 2010.
2. Gryz J., Podraza A., Ruszel M., Bezpieczeństwo energetyczne. Koncepcje, wyzwania, interesy. Wydawnictwo Naukowe PWN, Warszawa 2018
3. A. Pach-Gurgul, Jednolity rynek energii elektrycznej w Unii Europejskiej w kontekście bezpieczeństwa energetycznego Polski, Difin 2012.

Additional

1. Praca zbiorowa. Safety of the Polish Power System. Defence and Restoration Plans, Electrical Engineering Issue 57, Published by Poznan University of Technology, Poznań, 2008.
2. J. Machowski: Regulacja i stabilność systemu elektroenergetycznego, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2007.
3. D. Radsak, K. Sroka: Obrona i odbudowa zdolności wytwórczych elektrowni i elektrociepłowni w warunkach awarii katastrofalnych systemu elektroenergetycznego, Przegląd Naukowo-Metodyczny rokX nr 1/2017 (34) Poznaniu
4. Załącznik do Decyzji wykonawczej Komisji (UE) 2017/1442 z dnia 31 lipca 2017 r. ustanawiającej konkluzje dotyczące najlepszych dostępnych technik (BAT) w odniesieniu do dużych obiektów energetycznego spalania zgodnie z dyrektywą Parlamentu Europejskiego i Rady 2010/75/UE

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