COURSE DESCRIPTION CARD - SYLLABUS

Course name
EM: Power Engineering in the European Union and energy security - Energy Security

Course

Field of study
Electrical engineering

Year/Semester
3/5

Area of study (specialization)
-

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	Laboratory classes	Other (e.g. online)
15	0	0
Tutorials	Projects/seminars	
15	0	

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
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Faculty of Environmental Engineering and Energy

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Responsible for the course/lecturer:

Prerequisites

Basic knowledge in electrical engineering, electrical power systems, information technology, and economics. Knowldge 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 andand existing threats to the security of electiricty 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:

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

Lectures:

Fuel resources and modern energy generation and transmission technologies. EU sustainable energy policy to reduce emissions, promote renewable energy and energy efficiency and the corresponding Polish Energy Policy. Diversification of energy sources including different generation technologies. Clean coal technologies. Risks for security of energy supply characteristic for different energy sources and the methods for the evaluation and limitation of their values. Power system failures as a feature of large complex systems. The basic principles for the defence and restoration of the generating capacity in the power system in the case of a power system failure.

Tutorials:

Threats to security of energy supply using various energy carriers. Methods of their assessment and threats reduction. Scenarios of energy production structure.

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board

Tutorials: solving tasks on the board

Bibliography

Basic

1. M. Kaczmarski, 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	48	2,0
Classes requiring direct contact with the teacher	33	1,0
Student's own work (literature studies, preparation for tutorials, preparation for tests) [1]	15	1,0

[1] delete or add other activities as appropriate