



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Energy security

### Course

Field of study

Power Engineering

Area of study (specialization)

-

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

3/6

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

20

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

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### Prerequisites

Basic knowledge in electrical power engineering, thermal energy, energy management and fuels and their use. Ability to self-study effectively 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 security of complex energy systems and familiarizing with the forecasts of changes in the energy sector in Poland as well as in European Union concerning reliability of energy supply. Acquainting with issues related to reliability of electricity supply, 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 analyse 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 of energy sector operation, including the 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 the classes).

## Programme content

### Lecture:

Main objectives of the European energy policy. Sustainable energy policy. Concepts of reliability, adequacy and energy security. Main security threats. Instruments shaping energy security. Legal regulations, management and marketing. European emission trading system. Methods for CO<sub>2</sub> emissions' reduction. Energy sources diversification. Main objectives included in documents "Polish energy policy until the year 2030" and "Polish energy policy until the year 2040". Electricity and heat generation costs (CO<sub>2</sub>, SO<sub>2</sub>). Clean coal technologies. Certificates of origin as instruments supporting energy security. Electricity tariffs as an element shaping energy security. Measurement, settlement and IT systems. Reliability of electricity supply. Role of ENTSO-E in ensuring energy security in Europe (TYNDP). Security of gas supply. System failures as a feature of large complex systems. Basic principles of defense and restoration of power systems in case of emergency states or after failures. Methods to restore generation capacity in the power system in the event of a catastrophic failure.

## Teaching methods



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

## Bibliography

### Basic

1. Gryz J., Podraza A., Ruszel M., Bezpieczeństwo energetyczne. Koncepcje, wyzwania, interesy. Wydawnictwo Naukowe PWN, Warszawa 2018
2. Janusz P., Szczerbowski R., Zaleski P., Istotne aspekty bezpieczeństwa energetycznego Polski, Texter, Warszawa 2017
3. Kaczmarek M., Bezpieczeństwo energetyczne Unii Europejskiej, Wydawnictwa Akademickie i Profesjonalne, Warszawa 2010
4. Ministerstwo Gospodarki, Polityka energetyczna Polski do 2030 roku, Załącznik do uchwały nr 202/2009 Rady Ministrów z dnia 10 listopada 2009 r.
5. Ministerstwo Energii, Polityka energetyczna Polski do 2040 roku - projekt, Warszawa 2019
6. Pach-Gurgul A., Jednolity rynek energii elektrycznej w Unii Europejskiej w kontekście bezpieczeństwa energetycznego Polski, Wydawnictwo Difin, Warszawa 2012
7. ENTSOE - Ten Year Network Development Plan (TYNDP), 2018

### Additional

1. Dobrzyński K., Klucznik J., Malkowski R., Szczerba Z., Automatyka systemowa a bezpieczeństwo energetyczne kraju. Zabezpieczenia. Tom 2, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2013
2. 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
3. Machowski J., Regulacja i stabilność systemu elektroenergetycznego, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2007
4. Pawlik M., Strzelczyk F., Elektrownie, WNT Warszawa 2012, 2017
5. Radsak D., Sroka K., Obrona i odbudowa zdolności wytwórczych elektrowni i elektrociepłowni w warunkach awarii katastrofalnych systemu elektroenergetycznego, Przegląd Naukowo-Metodyczny nr 1/2017 (34)
6. Wojtkowska-Łodej G., Uwarunkowania rozwoju energetyki w zakresie polityki energetycznej i regulacyjnej, ELIPSA Warszawa 2016
7. Złotecka D., Sroka K., The characteristics and main causes of power system failures basing on the analysis of previous blackouts in the world, 2018 International Interdisciplinary PhD Workshop (IIPhDW), IEEE Xplore, s. 257 - 262



### Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,0
Classes requiring direct contact with the teacher	25	1,0
Student's own work (literature studies, preparation for tests) <sup>1</sup>	30	1,0

<sup>1</sup> delete or add other activities as appropriate