GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Energy Supply Systems, PG_00069144 | | |
| Field of study | Electrical Engineering, Automation, Robotics and Control Systems | | |
| Date of commencement of studies | February 2025 | Academic year of realisation of subject | 2025/2026 |
| Education level | second-cycle studies | Subject group | |
| Mode of study | Full-time studies | Mode of delivery | at the university |
| Year of study | 1 | Language of instruction | Polish |
| Semester of study | 2 | ECTS credits | 3.0 |
| Learning profile | general academic profile | Assessment form | assessment |
| Conducting unit | Department of Electrical Power Engineering -> Faculty of Electrical and Control Engineering -> Wydziały Politechniki Gdańskiej | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Tomasz Minkiewicz | |
| | Teachers | | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 15.0 | 15.0 | 0.0 | 0.0 | 15.0 | 45 |

E-learning hours included: 0.0

**Learning activity and number of study hours**

| Learning activity | Participation in didactic classes included in study plan | Participation in consultation hours | Self-study | SUM |
|---|---|---|---|---|
| Number of study hours | 45 | 5.0 | 25.0 | 75 |

**Subject objectives**

The aim of the course is to provide students with knowledge of energy supply systems, with particular emphasis on critical infrastructure in the electricity and heat sectors, as well as in the oil and natural gas sectors.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K7_W02] has an in-depth and structured knowledge of electrical measurements electrical measurements, the methods and equipment used for electrical measurements of non-electrical quantities, he/she knows the principles of testing operation tests of electrical equipment, has a structured knowledge of electricity quality issues | not applicable | [SW1] Assessment of factual knowledge |
| [K7_W05] has detailed knowledge of the regulatory processes in the electricity system electricity system, electricity safety and electricity safety automation, is familiar with technologies high voltage | The student defines the structure of the power system and identifies factors affecting its safety. | [SW1] Assessment of factual knowledge |
| [K7_U03] is able to obtain information from literature, databases and other sources, also in English, draw conclusions, formulate and fully justify opinions. substantiate opinions; is able to identify directions for further learning and implement the process of self-education | The student consolidates the knowledge provided in lectures and prepares a presentation on an assigned topic. | [SU4] Assessment of ability to use methods and tools |
| [K7_U02] is able to prepare and deliver a short oral presentation on a selected technical topic | Prepares and presents a presentation in accordance with the guidelines provided by the lecturer. | [SU5] Assessment of ability to present the results of task<br>[SU1] Assessment of task fulfilment |

<table>
<tr><td>Subject contents</td><td>Lecture:<br>Introduction to critical infrastructure and its role in energy security. Overview of sectors: electricity, heating, gas, oil, and hydrogen. Discussion of system structures, raw materials, and technologies for energy production, transmission, and storage.<br><br>Exercises:<br>Analysis and modeling of energy systems, solving technical and economic problems, use of analytical tools.<br>Seminars sample topics:<br>Energy security, new technologies, electrification, energy storage, LNG, hydrogen, energy policy.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of the basics of physics (fundamental physical laws, physical quantities, their units and names, mechanics, electrical engineering). Basic knowledge of mathematics: algebra, geometry and trigonometry, differential and integral calculus.</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Seminar presentation</td><td>60.0%</td><td>20.0%</td></tr>
<tr><td>Exercise test</td><td>60.0%</td><td>30.0%</td></tr>
<tr><td>Lecture test</td><td>60.0%</td><td>50.0%</td></tr>
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</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>Marecki J.: Skojarzona gospodarka cieplno-elektryczna. Wydanie 3. WNT, Warszawa 1991<br>Marecki J., Podstawy przemian energetycznych, WNT, Warszawa 2022<br>Chmielniak T., Technologie energetyczne, WNT, Warszawa 2021<br>Pawlik M., Strzelczyk F., Elektrownie, WNT, Warszawa 2023<br>Szarowski A., Łatkowski L.: Ciepłownictwo. WNT, Warszawa 2006<br>Krygier K.: Sieci ciepłownicze. Materiały pomocnicze do ćwiczeń. Skrypt Politechniki Warszawskiej. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2001<br>A. Szkarowski, Ciepłownictwo: obliczenia, projektowanie, energooszczędność. Warszawa : Wydawnictwo Naukowe PWN, 2020<br>W. Bujalski, Elektrociepłownia przyszłości - możliwości techniczne. nowa Energia nr 4 (80)/2021<br>T. Kowalak, G. Wiśniewski, K. Wiśniewski, K. Michałowska-Knap, Techniczno-ekonomiczne podstawy wykorzystania w systemach ciepłowniczych niezbilansowanej energii elektrycznej z OZE. nowa Energia nr 2 (67)/2019<br>Łaciak, Mariusz, Tomasz Włodek, i Wydawnictwa AGH Wydawca. Badanie możliwości użytkowania i magazynowania skroplonego gazu ziemnego w aspekcie zmienności jego składu / Mariusz Łaciak, Tomasz Włodek. Kraków: Wydawnictwa AGH, 2022. Print.<br>Łaciak, Mariusz, i Akademia Górniczo-Hutnicza im. Stanisława Staszica . Wydawnictwa. Zwiększenie efektywności energetycznej odparowania oraz bezpieczeństwa magazynowania skroplonego gazu ziemnego (LNG) / Mariusz Łaciak. Kraków: Wydawnictwa Akademii Górniczo-Hutniczej im. Stanisława Staszica, 2013. Print.<br>Adamska, Barbara. Magazyny Energii Niezbędnym Elementem Transformacji Energetycznej. Energetyka Rozproszona 7 (2022): 5561. Web.</td></tr>
<tr><td>Supplementary literature</td><td>http://dx.doi.org/10.1016/j.rser.2016.09.061<br>https://doi.org/10.2478/czoto-2022-0007<br>https://discovery.ucl.ac.uk/id/eprint/10153402/13/Siddiqui_10153402_Thesis.pdf<br>Czasopismo: Ciepłownictwo, Ogrzewnictwo, Wentylacja</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>The importance of critical infrastructure for energy security and the identification of threats.<br>The structure of the power system, energy resources, and energy efficiency.<br>Heat sources, heating system generations, and the electrification of heating.<br>Oil and natural gas transmission and storage infrastructure, including the role of LNG terminals.<br>Hydrogen as a future energy carrier application possibilities and technology development.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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