GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Energy conversion laboratory II, PG_00037310 | | |
| Field of study | Technical Physics | | |
| Date of commencement of studies | October 2022 | Academic year of realisation of subject | 2024/2025 |
| Education level | first-cycle studies | Subject group | Optional subject group<br>Subject group related to scientific research in the field of study |
| Mode of study | Full-time studies | Mode of delivery | at the university |
| Year of study | 3 | Language of instruction | Polish |
| Semester of study | 5 | ECTS credits | 1.0 |
| Learning profile | general academic profile | Assessment form | assessment |
| Conducting unit | Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Daniel Pelczarski | |
| | Teachers | dr inż. Daniel Pelczarski | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 0.0 | 0.0 | 15.0 | 0.0 | 0.0 | 15 |

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 | 15 | 2.0 | 8.0 | 25 |

**Subject objectives**

1. Application of knowledge in the field of thermodynamics, quantum physics, gas physics, heat transport and the theory of electric circuits.

2. Ability to plan and measure physical quantities.

3. Ability to develop and present the results of research in writing.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| K6_W07 | Possesses the basic knowledge of the construction and operation of physical instruments, measurement and research equipment used for testing various energy conversion systems. | [SW1] Assessment of factual knowledge |
| K6_W08 | Possesses the knowledge of planning and conducting a physical experiment in the field of renewable energy sources and the critical analysis of its results. | [SW1] Assessment of factual knowledge |
| K6_U04 | Can plan and conduct experiments in the field of research of various energy conversion systems, critically analyze their results, draw conclusions and formulate opinions. Has experience in laboratory work | [SU3] Assessment of ability to use knowledge gained from the subject |
| K6_W12 | Knows the basic principles of occupational health and safety while testing various energy conversion systems | [SW1] Assessment of factual knowledge |

<table>
<tr><td>Subject contents</td><td colspan="3">Set of experiments: 1. Investigation of a solar battery. 2. Investigation of the emission capacity of bodies with different surfaces as a function of temperature. 3. Investigation of  a semiconductor thermogenerator. 4. Investigation of thermoelectric phenomena in metals. 5. Investigation of a solar collector. 6. Comparative studies of absorbers of solar collectors. 7. Heat pump test. 8. Investigation of the solar collector - heat pump assembly. 9. Investigation of fuel cell systems with proton membranes (2 exercises). 10. Examination of the Stirling engine. 11. Investigation of ideal gas transformations. 12. Investigation of a heat pump with Peltier elements. 13. Determination of the value of the thermal insulation coefficient of various materials.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">1. Advanced knowledge of thermodynamics, quantum physics, gas physics, heat transport and electric circuit theory. 2. Advanced knowledge of methods of analysis of experimental data and calculus of uncertainties.</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Acceptance of reports from each exercise according to the schedule</td><td>100.0%</td><td>50.0%</td></tr>
<tr><td>Passing the theoretical admission to each exercise according to the schedule</td><td>50.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1. D. Halliday, R. Resnick, J. Walker, " Fundamentals of Physics", Extended, 10th Edition, Wiley, 2013.<br><br>2. J. Larminie i A.Dicks ,,Fuel cell systems explained"", John Wiley & Sons Ltd., Chichester, 2003.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">1. R. Eisberg, R. Resnick, "Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles, John Wiley & Sons Inc, 1985.<br><br>2. A. Szlek, M. Wróbel, "Renewable Energy Sources: Engineering, Technology, Innovation", Springer Nature Switzerland AG, 2020</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">According to the exercise list.</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
</table>

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