



Subject card

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|---|--|--|--|------------|------------|--|-----|
| Subject name and code | Natural energy resources, PG_00055885 | | | | | | |
| Field of study | Power Engineering, Power Engineering, Power Engineering | | | | | | |
| Date of commencement of studies | October 2022 | Academic year of realisation of subject | | | | 2023/2024 | |
| Education level | first-cycle studies | Subject group | | | | Obligatory subject group in the field of study 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 | 2 | Language of instruction | | | | Polish | |
| Semester of study | 3 | ECTS credits | | | | 3.0 | |
| Learning profile | general academic profile | Assessment form | | | | assessment | |
| Conducting unit | Department of Energy and Industrial Apparatus -> Faculty of Mechanical Engineering and Ship Technology | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr inż. Bartosz Dawidowicz | | | | |
| | Teachers | | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 15.0 | 0.0 | 15.0 | 0.0 | 0.0 | 30 |
| | 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 | 30 | 8.0 | | 37.0 | | 75 |
| Subject objectives | Presentation of the modern achievements and tendencies in the area of renewable energy resources utilization. Classification of renewable energy resources. Possibilities of renewable energy resources utilization in Polish conditions. Discussion of theoretical backgrounds of selected technologies. | | | | | | |
| Learning outcomes | Course outcome | | Subject outcome | | | Method of verification | |
| | [K6_W10] knows the basic installations in the field of renewable energy sources and their impact on the environment | | The student has theoretical knowledge of energy installations as well as the construction and operation of renewable energy sources. Is aware of the impact of the above-mentioned installation on the environment. | | | [SW1] Assessment of factual knowledge | |
| | [K6_U02] is able to apply the learned mathematical methods to the analysis and design of elements, systems and energy systems | | The student performs calculations, correctly interprets the obtained results and performs a project using engineering tools. | | | [SU3] Assessment of ability to use knowledge gained from the subject | |
| | [K6_W06] knows classic and developmental energy technologies, rules for the selection and operation of heat and energy devices and installations, basic principles of energy systems operation, basic issues regarding the reliability of energy devices and diagnostics, environmental effects of energy technologies used, methods of using renewable energy sources | | The student's knowledge includes knowledge of classical and renewable energy sources. He knows the physical laws of these processes. They presented the construction and operation of energy conversion devices. Has knowledge of the effects of both classic and renewable energy sources on the natural environment. He knows what are the limitations of the use of renewable energy sources and their profitability. | | | [SW1] Assessment of factual knowledge | |
| Subject contents | Energy resources. Ocean and sea resources. Tidal energy. Wave energy. Osmotic energy. Ocean thermal energy conversion. Wind energy. Betz criterion. Aerogenerators. Hydro-power. Water turbines. Hydropower stations - types and characteristics. Geothermal energy. Dry rock and aquifer resources. Geothermal power stations and heat-generating plants. Solar energy. Solar collectors. Solar ponds. Solar "power tower". Solar "thermal tower". Photovoltaics. Exercises - estimation of the power of tidal-, wave- and osmotic power plant as well as OTEC cycle, - wind power, rotor diameter of aerogenerator, - calculation of the power of hydropower plant, - efficiency of geothermal power plant, - surface area and efficiency of solar collector Laboratory 1. Characteristics of solar collector 2. Characteristics of photovoltaic panel 3. Characteristics of micro-wind generator | | | | | | |

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| Prerequisites and co-requisites | Thermodynamics, fluid mechanics, heat transfer | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Laboratory - report, test | 56.0% | 30.0% |
| | Lecture - test | 56.0% | 35.0% |
| | Exercises - test | 56.0% | 35.0% |
| Recommended reading | Basic literature | 1. Mikielwicz J., Cieśliński J.T.: Niekonwencjonalne urządzenia i systemy konwersji energii. Maszyny Przepływowe pod red. E.S. Burki. Tom 24. IMP PAN, Ossolineum Wrocław 1999. 2.Cieśliński J.T.: Niekonwencjonalne urządzenia i układy energetyczne. Przykłady obliczeń. Wyd. PG 1997. 3. Lewandowski W.M.: Proekologiczne źródła energii odnawialnej. WNT W-wa, 2001. 4 Twidell J.W., A.D Weir: Renewable energy sources. London: Chapman and Hall 1990 | |
| | Supplementary literature | Journal: Czysta Energia | |
| | eResources addresses | | |
| Example issues/ example questions/ tasks being completed | 1. Physical properties of renewable sources 2. OTEC system 3. Classification of hydro power plants and their advantages 4. Types of geothermal sources and scheme of the binary power plant 5. Features of wind/electricity generating systems 6. Solar constant | | |
| Work placement | Not applicable | | |