



Subject card

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| Subject name and code | Steam and gas turbines, PG_00055896 | | | | | | |
| Field of study | Power Engineering, Power Engineering, Power Engineering | | | | | | |
| Date of commencement of studies | October 2022 | Academic year of realisation of subject | | | 2024/2025 | | |
| 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 | 3 | Language of instruction | | | Polish | | |
| Semester of study | 5 | ECTS credits | | | 6.0 | | |
| Learning profile | general academic profile | Assessment form | | | exam | | |
| Conducting unit | Department of Energy and Industrial Apparatus -> Faculty of Mechanical Engineering and Ship Technology | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | prof. dr hab. inż. Krzysztof Kosowski | | | | |
| | Teachers | | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 45.0 | 15.0 | 15.0 | 0.0 | 0.0 | 75 |
| | 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 | 75 | 6.0 | | 69.0 | | 150 |
| Subject objectives | Present the principles of turbomachinery theory and design. | | | | | | |
| Learning outcomes | Course outcome | Subject outcome | | | Method of verification | | |
| | [K6_U07] is able to use basic knowledge of fluid flow machines and methods related to their design in an analytical and numerical approach to the preliminary design of an energy installation | Students can perform preliminary design calculations of turbine power plants | | | [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment | | |
| | [K6_W02] has a basic knowledge of physics (including optics, electricity and magnetism), chemistry, technical thermodynamics, fluid mechanics and general mechanics needed to understand and describe the basic phenomena occurring in devices and systems, energy plants and transmission networks and their environment | Students know: - fundamentals of thermodynamic cycles of power plants with steam and gas turbines , - theory of turbine stage, energy losses in turbines, - multi stage turbines | | | [SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge | | |
| | [K6_W09] knows the dangers of electrical devices and the principles of protection against them, has basic knowledge of heat exchangers, has basic knowledge of power equipment such as pumps, compressors, turbines, combustion engines, boilers, pipelines and their accessories and methods of their selection depending on the needs | Students know: - fundamentals of steam turbines, gas turbines and compressors, - the main parameters of turbomachinery, | | | [SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge | | |
| Subject contents | LECTURE: STEAM AND GAS TURBINES: Actualizing power cycles. The Carnot cycle: cycle and heat flow diagrams. Comparison of steam, gas, and combined cycle efficiencies. The Brayton cycle. The Rankine cycle. Methods for carnotization of cycles. The steam-gas cycle. Effect of process irreversibilities on cycle efficiency. Efficiency of the power plant. Purpose of main components of steam and gas turbines. Principle of operation of a turbine stage. Course of the thermodynamic process in a turbine stage. Characteristics of turbine stages. LABORATORY: Measurements of model hydraulic turbine operating parameters. Preparation of the I propeller water turbine characteristics. Preparation of the universal characteristic of Kaplan turbine. | | | | | | |

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| Prerequisites and co-requisites | Fluid Mechanics, Thermodynamics | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Lecture written test | 60.0% | 70.0% |
| | Laboratory experiment reports | 100.0% | 30.0% |
| Recommended reading | Basic literature | <p>1. Perycz S.: Turbiny parowe i gazowe. Maszyny przepływowe tom 10. Zakład Narodowy im. Ossolińskich Wydawnictwo Polskiej Akademii Nauk. Wrocław 1992.</p> <p>32 Kosowski K. at al, Steam and Gas turbines, Alstom</p> | |
| | Supplementary literature | No requirements | |
| | eResources addresses | | |
| Example issues/ example questions/ tasks being completed | <p>Design parameters of steam turbine power plants.</p> <p>Heat exchangers of feed water in steam plants.</p> <p>Design parameters of gas turbine units.</p> <p>Principle of turbine stage operation.</p> <p>Design of multistage turbines.</p> | | |
| Work placement | Not applicable | | |