

## GDAŃSK UNIVERSITY

## Subject card

| Subject name and code                          | Fundamentals of Machinery Operation and Power Engineering Devices, PG_00042101   |  |  |                                     |        |  |         |     |
|--|--|--|--|-------------------------------------|--------|--|---------|-----|
| Field of study                                 | Power Engineering  |  |  |                                     |        |  |         |     |
| Date of commencement of studies                | October 2025   |  | Academic year of<br>realisation of subject |                                     |        | 2027/2028  |         |     |
| Education level                                | first-cycle studies  |  | Subject group                              |                                     |        | Obligatory subject group in the<br>field of study<br>Subject group related to scientific<br>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                    |                                     |        | English  |         |     |
| Semester of study                              | 5  |  | ECTS credits                               |                                     |        | 3.0  |         |     |
| Learning profile                               | general academic profile   |  | Assessment form                            |                                     |        | assessment   |         |     |
| Conducting unit                                |  |  |  |                                     |        |  |         |     |
| Name and surname                               | Subject supervisor   |  |  |                                     |        |  |         |     |
| of lecturer (lecturers)                        | Teachers   |  |  |                                     |        |  |         |     |
| Lesson types and methods                       | Lesson type  | Lecture  | Tutorial                                   | Laboratory                          | Projec | t  | Seminar | SUM |
| of instruction                                 | Number of study hours  | 30.0   | 0.0  | 15.0                                | 0.0    |  | 0.0     | 45  |
|  | E-learning hours included: 0.0   |  |  |                                     |        |  |         |     |
| Learning activity<br>and number of study hours | Learning activity  | Participation in didactic<br>classes included in study<br>plan |  | Participation in consultation hours |        | Self-study   |         | SUM |
|  | Number of study hours  | 45   |  | 5.0                                 |        | 25.0   |         | 75  |
| Subject objectives                             | To explain the basic notions concerning wear and tear processes of machines and devices;<br>To bring closer a physics of the operation damages;<br>To teach designing and management methods within the operating system;<br>To train practical skills within the range of engines' and working machines' usage. |  |  |                                     |        |  |         |     |

| Learning outcomes                  | Course outcome   | Subject outcome  | Method of verification   |  |  |  |  |
|------------------------------------|--|--|--|--|--|--|--|
|                                    | [K6_W13] has basic knowledge of<br>the operation of energy equipment<br>in the field of thermal power<br>plants, thermal and energy and<br>heating systems, internal<br>combustion engines, compressors<br>and rotating machines, has basic<br>knowledge of the regulation of<br>energy equipment and methods of<br>their selection depending on the<br>needs<br>IK6_W041 has structured   | Student applies the knowledge  | [SW3] Assessment of knowledge  |  |  |  |  |
|                                    | knowledge of mechanics,<br>including the issues of material<br>strength and general principles of<br>shaping structures, necessary to<br>conduct basic strength analyzes<br>and design simple mechanical or<br>construction systems for power<br>industry or environmental<br>engineering; knows the basics of<br>machine construction and the<br>most commonly used construction<br>and operating materials   | within the range of operation<br>bases for the practical usage and<br>supervising the machines and<br>energy devices in different<br>working states. | contained in written work and projects                                     |  |  |  |  |
|                                    | [K6_W06] knows classic and<br>developmental energy<br>technologies, rules for the<br>selection and operation of heat<br>and energy devices and<br>installations, basic principles of<br>energy systems operation, basic<br>issues regarding the reliability of<br>energy devices and diagnostics,<br>environmental effects of energy<br>technologies used, methods of<br>using renewable energy sources  | Zna podstawy teoretyczne fizyki<br>zniszczenia eksploatacyjne i<br>uszkodzenia energetyczne oraz<br>metody ich identyfikacji.                        | [SW3] Assessment of knowledge<br>contained in written work and<br>projects |  |  |  |  |
|                                    | [K6_U06] is able to use the basic<br>knowledge on the operation of<br>energy equipment in the field of<br>thermal power plants, thermal and<br>energy and heating systems,<br>combustion engines, compressors<br>and rotating machines to assess<br>the technical condition of the<br>system   |  |  |  |  |  |  |
| Subject contents                   | <b>Lecture:</b> Sciences about objects and technical systems' operation; Stages of the machines and energy devices' existence; Informative coupling between the existence stages: design, production and operation; Physical ageing process of the machines and energy devices; Kinds of wear and tear process of machines and the energy devices and ways of its minimisation; Usage of machines and energy devices: the usage modes, the usage system, evaluation measures of the usage system, selected usage problems;                   |  |  |  |  |  |  |
|                                    | Servicing machines and energy devices: the servicing modes, the servicing system, evaluation measures of the servicing system, selected servicing problems; Operation process of machines and energy devices: physical interpretation of the operation process, mathematical models of the operation process, evaluation measures of the operation process; Decision-making control within the operation process of machines and energy devices. Fundamentals of the logistics within the operation system. Analysis of the operation costs. |  |  |  |  |  |  |
|                                    | Labolatory: Preparation of the self-ignition engine for start-up, supervision during operation and engine shutdown. Preparation of a gas turbine engine for starting, supervision during operation and engine shutdown. Preparation of a reciprocating compressor for commissioning, supervision during operation and its discontinuation. Preparation of fuel centrifuges and lubricating oils for commissioning, supervision during operation during operation and fuels.  |  |  |  |  |  |  |
| Prerequisites<br>and co-requisites | Knowledge in the field of construction and principles of operation of energy machines and devices.   |  |  |  |  |  |  |
| Assessment methods                 | Subject passing criteria   | Passing threshold  | Percentage of the final grade  |  |  |  |  |
| and criteria                       | Colloguium   | 50.0%  | 50.0%  |  |  |  |  |
|                                    | Reports from laboratory exercises  | 100.0%   | 50.0%  |  |  |  |  |

| Recommended reading Basic literature                           |                          | H. Czichos: Handbook of Technical Diagnostics: Fundamentals and Application to Structures and Systems. Springer Science & Business Media. 2013. |  |  |
|--|--------------------------|---|--|--|
|  |                          | Hardin J.R. i in. A gas turbine condition-monitoring system. Naval Engineers Journal, November 1995.  |  |  |
|  |                          | Ramsey David: The different types of industrial wear and tear. UK, 2016.  |  |  |
|  |                          |   |  |  |
|  | Supplementary literature | ISO 13372:2012 : Condition monitoring and diagnostics of machines – Vocabulary.   |  |  |
|  | eResources addresses     | Adresy na platformie eNauczanie:  |  |  |
| Example issues/<br>example questions/<br>tasks being completed |                          |   |  |  |
| Work placement   | Not applicable           |   |  |  |

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