GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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| Subject name and code | Compressors and Fans, PG_00042141 | | |
| Field of study | Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering | | |
| Date of commencement of studies | October 2020 | Academic year of realisation of subject | 2022/2023 |
| 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 | 6 | ECTS credits | 3.0 |
| Learning profile | general academic profile | Assessment form | assessment |
| Conducting unit | Zakład Maszyn Przepływowych -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. inż. Marian Piwowarski | |
| | Teachers | dr hab. inż. Marian Piwowarski<br>mgr inż. Stanisław Głuch<br>dr hab. inż. Zbigniew Kneba | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 30.0 | 0.0 | 15.0 | 0.0 | 0.0 | 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 present the theoretical foundations, principles of operation and construction of compressors and fans. Analysis of selected design and operational problems of these machines.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
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| K6_U08 | The student is able to design the basic parameters of the compressor, select auxiliary devices and evaluate them in terms of technical and economic. | [SU3] Assessment of ability to use knowledge gained from the subject |
| K6_W13 | Student plans the basic service work of compressors and fans. Carries out measurements, develops and analyzes the results of the measurements of these machines | [SW1] Assessment of factual knowledge |
| K6_W12 | Student applies the theory of thermal machines (thermodynamics, fluid mechanics) to describe the the real process. The student explains the principles of operation of compressors and fans. Analyzes and evaluates the construction of these machines. | [SW1] Assessment of factual knowledge |

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| Subject contents | Introduction: types of compressors, how to implement displacement compression, scopes and fields of applications for compressors, positive displacement compressors trends. Basic concepts and theoretical issues: the compressor ideal and real, comparative cycles for gas compressors and refrigeration compressors, compressor capacity, compression energy, compression efficiency, multi-stage compression. The construction of selected varieties of positive displacement compressors: reciprocating compressors, single shaft rotary compressor (vane, piston rotating, scroll), double shaft rotary compressor (Roots, screw). Timing of displacement compressors: the method of timing, construction and operation of the compressor valves. Operation of positive displacement compressors: the selection of the compressor to the compressedgas of customer"s needs, a review of methods of performance control, the drive of compressors, the problems start. Classification and overview of compressor, blower, and fan types. Construction and operation of blowers and fans. Construction and operation of flow compressors. Single radial stage theory. Single axial stage theory. Computational methods for compressors and fans. Characteristics and control methods. Performance issues. LABORATORY Compressor test bads: presentation of test bads - the construction of compressors, measurement systems. Maintenance: review of the selected systems and components of the compressors (capacity control systems, oil, pistons, rotors, valves, seals), regulatory activities. Compressor characteristics: methods of measuring capacity and drive power of the compressor, performance measurement and preparation of characteristics of the compressor. |
| Prerequisites and co-requisites | Thermodynamics<br><br>Fluid mechanics<br><br>Elements of machine design |

Assessment methods and criteria

| Subject passing criteria | Passing threshold | Percentage of the final grade |
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| Practical exercise | 100.0% | 25.0% |
| Test | 50.0% | 75.0% |

Recommended reading

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| Basic literature | Hanlon P. C. *Compressor handbook*, McGraw-Hill Companies, Inc, NY, 2001 |
| Supplementary literature | Boyce, M. P. *Gas turbine engineering handbook,* Oxford, UK, 2006 |
| eResources addresses | Adresy na platformie eNauczanie:<br>Sprężarki i wentylatory, (PG_00042141) - Moodle ID: 29724<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29724 |

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| Example issues/ example questions/ tasks being completed | Compressor characteristics.Characteristics of parallel cooperation of compressors.In what range of speed differentiator are the stages of axial compressors, radial compressors, and fans designed? |
| Work placement | Not applicable |