



## Subject card

Subject name and code	Fundamentals of Machinery Operation and Power Engineering Devices, PG_00042101						
Field of study	Power Engineering, Power Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2025/2026		
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			English		
Semester of study	5	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor						
	Teachers						
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	To explain the basic notions concerning wear and tear processes of machines and devices;  To bring closer a physics of the operation damages;  To teach designing and management methods within the operating system;  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 the operation of energy equipment in the field of thermal power plants, thermal and energy and heating systems, internal combustion engines, compressors and rotating machines, has basic knowledge of the regulation of energy equipment and methods of their selection depending on the needs		
	[K6_W04] has structured knowledge of mechanics, including the issues of material strength and general principles of shaping structures, necessary to conduct basic strength analyzes and design simple mechanical or construction systems for power industry or environmental engineering; knows the basics of machine construction and the most commonly used construction and operating materials	Student applies the knowledge within the range of operation bases for the practical usage and supervising the machines and energy devices in different working states.	[SW3] Assessment of knowledge contained in written work and projects
	[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	Zna podstawy teoretyczne fizyki zniszczenia eksploatacyjne i uszkodzenia energetyczne oraz metody ich identyfikacji.	[SW3] Assessment of knowledge contained in written work and projects
	[K6_U06] is able to use the basic knowledge on the operation of energy equipment in the field of thermal power plants, thermal and energy and heating systems, combustion engines, compressors and rotating machines to assess the technical condition of the system		
Subject contents	<p><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;</p> <p>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.</p> <p><b>Laboratory:</b> 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 and storage. Measuring the lubricity of ignition temperature and viscosity of lubricating oils and fuels.</p>		
Prerequisites and co-requisites	Knowledge in the field of construction and principles of operation of energy machines and devices.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Colloquium	50.0%	50.0%
	Reports from laboratory exercises	100.0%	50.0%

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