



## Subject card

Subject name and code	Diagnostics, operation of machinery and devices, PG_00055251						
Field of study	Management and Production Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2024/2025		
Education level	first-cycle studies	Subject group			Optional subject group 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			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Daniel Chuchała				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	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	60		4.0		61.0	125
Subject objectives	Providing basic knowledge of correct exploitation and repair of equipment and production machines.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_K01] feels the need for self-realization by learning throughout life, is looking for modern and innovative solutions in their actions, is able to think creatively and act in an entrepreneurial way	The student recognizes the most common types of drives modern numerically controlled machines and their basic components. Explains the principles of operation wear mechanisms of various types of drives and determines the scope of their maintenance.	[SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work
	[K6_U11] is able to identify and formulate simple engineering tasks related to the diagnostics of the technical condition of machines and devices using appropriate methods, techniques and tools	The student knows and is able to use the appropriate nomenclature that allows to describe the technical condition of machine tools and their components as well as the cutting tools and universal equipment used in manufacturing processes.	[SU3] Assessment of ability to use knowledge gained from the subject
	[K6_W06] has knowledge of the life cycle of products and mechanical devices and systems, in the field of machine parts manufacturing techniques, as well as the possibilities and trends in the development of machines and production devices and process control	The student knows the basic types of materials used to manufacture machine tool parts and the basic wear mechanisms during proper operation.	[SW1] Assessment of factual knowledge
	[K6_U08] can assess the usefulness of routine methods and tools for solving practical production tasks in measuring in order to supervise processes and analyze the functioning of production systems	The student is able to choose the correct maintenance plan for the technological machine in order to maintain it in a state of full production capacity	[SU4] Assessment of ability to use methods and tools
[K6_W13] has detailed knowledge of the production and operation of machines and devices, diagnosing their technical conditions and selection of regeneration techniques	The student is able to select systems and tools to assess the technical condition of a technological machine depending on the manufacturing process being carried out.	[SW1] Assessment of factual knowledge	
Subject contents	<p>LECTURE: Basic issues - the exploitation of machines. Types of consumption and factors affecting usage of machines and devices. Durability and reliability of machines and devices. Quality of products: structural, technological and utility. Factors affecting utility quality of products. The top layer of products. The concept, development and construction of the surface layer. Influence of surface layer on usage durability (life span) of products. Types and mechanisms of usage in machine elements. Identification, testing methods and prevention of different types of usage in machine elements. System of technical services for machines and devices. Principles of correct operation of machines and devices. Types and arrange of technical services for machines. Principles of performing current, average and major repairs. Repairs by replacement and modernization. Cycles, systems and methods of repairs. Organization of renovation works. Current maintenance of machines. Evaluation of technical and prepare the machines for repair. The technological process of machines repairs. Stages (phases) of renovation works. Washing, cleaning and dismantling of machines and their elements. Tools used to disassembly and assembly. Verification tests and faults detection by defectoscopy. General methods for repairs and regenerations of machine elements. Installation, testing and acceptance repaired machines. Technical Documentation of repair works. Repair and regeneration of typical machine elements. Verification principles of threaded joints, inletting, multi-inletting, splining, shrinking and methods for their repairs (regenerations). Causes of damages, verification, repair and regeneration: bodies, shafts, bushes, gears and bearings. Research and acceptance testing machines after repairs. Repairs of machinery in the EU legal system - VI of the EU Machinery Directive.</p> <p>LABORATORY: Determination of the characteristics of quality products. Rating the value in use of the product. The use SWOT analysis to evaluate the product. Removal and installation teams and machine parts. Research and analysis of surface texture of the surface layer. Forged thread as a method to improve the quality of technology and use. Renovation of internal threads through the use of threaded inserts. Create an annual maintenance plan for the milling center. Maintenance and lubrication machines. Eligibility machines for repair and verification of machine parts. Regeneration (repair) machine shaft necks. Utility problems of automatic tool change mechanisms in CNC machine tools. Maintenance and wear assessment of the chip evacuation system. Preparation of cooling lubricant and evaluation of its usability.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory	100.0%	30.0%
	Lecture	56.0%	70.0%

Recommended reading	Basic literature	<p>1. Chrzanowski S.: Remonty urządzeń cieplnych elektrowni. PWT, Warszawa 1980.</p> <p>2. Górecka R., Polański Z.: Metrologia warstwy wierzchniej. WNT, Warszawa 1983.</p> <p>3. Legutko S.: Podstawy eksploatacji maszyn. WPP, Poznań 2002.</p> <p>4. Ratajczak A., Tomkowiak P., Wieczorowski K.: Technologia remontów maszyn i urządzeń technologicznych. PWN, Warszawa 1982.</p> <p>5. Słowiński B.: Inżynieria eksploatacji maszyn. Wyd. Uczelniane Politechniki Koszalińskiej, Koszalin 2014.</p> <p>6. Wrotkowski J., Paszkowski B., Wojdak J.: Remont maszyn. Demontaż naprawa elementów montaż. WNT, Warszawa 1987.</p>
	Supplementary literature	<p>1. Piaseczny L.: Technologia naprawy okrętowych silników spalinowych. WM, Gdańsk 1992.</p> <p>2. Wieczorek B.: Technologia remontu turbin parowych. WNT, Warszawa 1966.</p>
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>1. The mechanism of abrasion and impact on the operation of the machine elements. 2. Dependence of wear of machine parts from the geometric structure of the surface. 3. The types and extent of repairs machines. 4. Rules repair verification machine parts. 5. Causes of damage and repair methods (regeneration) shafts. 6. The use of welding techniques for repairing machines.</p>	
Work placement	Not applicable	