



Subject card

Subject name and code	Structural Research of Materials, PG_00039768						
Field of study	Materials Engineering, Materials Engineering, Materials Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject				2022/2023	
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	2	Language of instruction				Polish	
Semester of study	4	ECTS credits				3.0	
Learning profile	general academic profile	Assessment form				assessment	
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. Marek Szkodo					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30		5.0		40.0	75
Subject objectives	The purpose of the course is to familiarize students with methods of studying the microstructure of engineering construction materials, mainly by microscopic methods.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_W06	The student knows the structure of optical and electron microscopes and how to prepare material samples to determine their microstructure using various microscopes.			[SW1] Assessment of factual knowledge		
	K6_K01	The student understands the relationship between the microstructure of engineering materials and their properties and is aware of what methods can be used to determine the microstructure of materials.			[SK5] Assessment of ability to solve problems that arise in practice		
	K6_U01	The student is able to select an appropriate method of preparing a material sample so as to determine its microstructure.			[SU4] Assessment of ability to use methods and tools		
	K6_W04	The student knows the construction of optical and electron microscopes and how the microstructural structure of engineering materials can be determined with these tools.			[SW1] Assessment of factual knowledge		
	K6_U02	The student is able to use an optical microscope to select an appropriate method for studying the microstructure of engineering materials			[SU5] Assessment of ability to present the results of task		
Subject contents	Construction and principle of operation of an optical microscope and various electron microscopes. Resolution capacity, total and useful magnification of the microscope, objective aperture and how to select an eyepiece for selected objectives. Methods of obtaining contrast in light and electron microscopy. Preparation of specimens for examination on the light and electron microscope.						

Prerequisites and co-requisites	brak		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	passing akk the laboratory classes	60.0%	50.0%
	exam	60.0%	50.0%
Recommended reading	Basic literature	Mikroskopia optyczna Maksymilian Pluta  Transmission Electron Microscopy: A Textbook for Materials Science: by C. Barry Carter David B. Williams  Scanning Electron Microscopy and X-Ray Microanalysis. A Text for Biologists, Materials Scientists, and Geologists: Goldstein, J., Newbury, D.E., Echlin, P., Joy, D.C., Romig Jr., A.D., Lyman, C.E., Fiori, C., Lifshin, E.  Imaging Optics. Joseph Braat, Peter Török	
	Supplementary literature	Introduction to Optical Microscopy. Jerome Mertz	
	eResources addresses	Adresy na platformie eNauczanie:	
	Example issues/ example questions/ tasks being completed	Draw a diagram of an optical microscope  List the methods of obtaining contrast on an optical microscope  List the steps in making extraction films	
Work placement	Not applicable		

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