



Subject card

Subject name and code		Light and Electron Microscopy, PG_00039769						
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		Zakład Materiałoznawstwa I Technologii Materiałowych -> 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	dr inż. Alicja Stanisławska dr hab. inż. Marek Szkodo					
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 the construction, principle of operation and ways of using light and electron microscopes. Students also gain knowledge about the preparation of specimens for microscopic studies using different types of microscopes and also learn the basics of computer image analysis.						
Learning outcomes		Course outcome	Subject outcome			Method of verification		
		K6_W06	Able to use image analysis software and perform computer image transformations to obtain information about the structural components present in the analyzed image.			[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects		
		K6_K01	Can solve problems that occur in practice, related to conducting analysis of the structure of engineering materials.			[SK5] Assessment of ability to solve problems that arise in practice		
		K6_U01	Can calculate the resolving power of different types of microscopes and knows their research capabilities and limitations. Can prepare a sample for metallographic testing.			[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		
		K6_U02	Able to select a suitable eyepiece for the selected objective and also able to choose a suitable method of obtaining contrast on the optical path depending on the purpose of microscopic observation.			[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		
		K6_W04	He knows the construction and principle of operation of various microscopes and how to use them to obtain information about the structure and properties of engineering materials.			[SW2] Assessment of knowledge contained in presentation		

Subject contents	<p>Construction and principle of operation of an optical microscope. Types of illuminators in light microscopes. Methods of obtaining contrast in light microscopes. Concepts of resolving power, objective aperture, total and usable magnification of a microscope. Selection of eyepiece for the selected objective. Methods of preparing specimens for microscopic examination. Construction of electron microscopes. Physical phenomena occurring when the electron beam interacts with the material under study. Contrast in a transmission electron microscope. Preparation of specimens for testing on TME.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Passing colloquium at the end of lectures	50.0%	100.0%
Recommended reading	Basic literature	<p>1. D. Williams, C.B. Carter- Transmission Electron Microscopy, Plenum Press, New York, 1996 I 2009 (tom 1-4). 2. J.I. Goldstein, D.E. Newbury i inni: Scanning electron microscopy @ X ray microanalysis, Plenum Press, NY, 1992, drugie wydanie 1995</p>	
	Supplementary literature	<p>1. D. Williams, C.B. Carter- Transmission Electron Microscopy, Plenum Press, New York, 1996 I 2009 (tom 1-4). 2. J.I. Goldstein, D.E. Newbury i inni: Scanning electron microscopy @ X ray microanalysis, Plenum Press, NY, 1992, drugie wydanie 1995</p>	
	eResources addresses	<p>Adresy na platformie eNauczenie: Mikroskopia świetlna i elektronowa sem. IV 2023 - Moodle ID: 30644 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=30644</p>	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Draw a diagram of a light microscope. 2. Draw the Nacher illuminator and mark the course of light rays passing through it. 3. List the ways of obtaining contrast on the optical path in light microscopes. 4. What information can be obtained from analyzing the shape of digestive cavities. 5. What are the morphological transformations of the image. 		
Work placement	Not applicable		

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