



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Microscopy methods in materials testing [S1MiTPM1>MMwBM]

Course

Field of study	Year/Semester
Materials and technologies for automotive industry	2/4
Area of study (specialization)	Profile of study
–	general academic
Level of study	Course offered in
first-cycle	Polish
Form of study	Requirements
full-time	compulsory

Number of hours

Lecture	Laboratory classes	Other
15	15	0
Tutorials	Projects/seminars	
0	0	

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of chemistry, physics, and materials science. Logical thinking, use of the information obtained from the library and the Internet. Understanding the need for learning and acquiring new knowledge.

Course objective

Learning microscopy methods for examining materials.

Course-related learning outcomes

Knowledge:

1. The student should know the microscopy methods of examining materials.
2. The student should know the preparation methodology for various microscopy methods.
3. The student should know the physical basis of various microscopy methods.

Skills:

1. The student is able to select a research method leading to obtaining the correct result.
2. The student is able to perform a metallographic cross-section and interpret the obtained structure.

3. The student is able to interpret the structure using electron microscopy.
4. The student is able to examine the chemical composition using X-ray microanalysis.

Social competences:

1. Student is able to work in a group.
2. The student is aware of the importance of modern microscopy methods in the study of materials in the modern economy and for society.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: - credit on the basis of a test consisting of both open and test questions carried out at the end of the semester. Scale of estimate: 51-60% - dst(C), 61-70% - dst+(C+), 71-80% - db(B), 81-90% - db+(B+), 91-100% - bdb(A).

Laboratory classes: evaluation of students knowledge necessary to prepare, and carry out the lab tasks and evaluation of reports.

Programme content

During the course, the student will learn the methods of light and electron microscopy.

Course topics

Lecture: Light microscopy - structure and operation of a metallographic microscope, research methods, preparation. Quantitative metallographic methods in microscopy. Scanning electron microscopy, principle of operation and structure of a scanning electron microscope, research methods and their scope of application, sample preparation, interpretation of obtained images. Microanalytical studies in electron microscopy. Transmission electron microscopy - physical basics, structure and operation of a microscope, basic research methods, preparation. Basics of X-ray microanalysis.

Laboratory classes: 1. Light microscopy - preparation of metallographic sections (part 1). 2. Light microscopy - preparation of metallographic sections (part 2) 3. Microscopy observations. 4. Quantitative metallography methods in microscopy. 5. Scanning electron microscopy with basic EDS X-ray microanalysis.

Teaching methods

multimedia presentations.

Bibliography

Basic:

1. A. Barbacki (red.), Mikroskopia elektronowa, Wyd. PP, 2007.
2. A. Barbacki (red.), Metody i techniki strukturalnych badań metali, Wyd. P.P., Poznań 1994.
3. L.A. Dobrzański, E. Hajduczek, Metody badań metali t. 2, WNT 1987.

Additional:

1. Kurzydłowski K., Lewandowska M., Nanomateriały inżynierskie konstrukcyjne i funkcjonalne, Wyd. PWN. 2010.

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00