COURSE DESCRIPTION CARD - SYLLABUS

Course name
Microscopy as a research method

Course

Field of study
Materials engineering
Year/Semester
2/4
Area of study (specialization)
-
Profile of study
general academic
Level of study
First-cycle studies
Course offered in
polish
Form of study
full-time
Requirements
compulsory

Number of hours

Lecture
15
Laboratory classes
30
Other (e.g. online)
Tutorials
Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
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Faculty of Materials Engineering and Technical Physics

ul. Piotrowo 3 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Basic knowledge of chemistry, physics, 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

Knowing the microscopic methods of testing materials

Course-related learning outcomes

Knowledge

1. The student should know the microscopic methods of examining materials. - [K_W11]

2. The student should know the preparation methodology for various microscopic methods. - [K_W11]

3. The student should know the physical basics of various microscopic methods. - [K_W11]

Skills

1. The student is able to choose a research method leading to a correct result - [K_U08, K_U09]

2. The student is able to perform a metallographic examination and interpret the obtained structure. - [K_U08, K_U09]

3. The student is able to interpret the structure by transmission electron microscopy - [K_U08, K_U09]

4. The student is able to interpret the image obtained by scanning electron microscopy and to examine the chemical composition by x-ray microanalysis. - [K_U08, K_U09]

Social competences

1. The student is able to work in a group - [K_K03]

2. The student is aware of the importance of modern microscopic methods of researching materials in the modern economy and for society - [K_K02]

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

Lecture: Light microscopy – structure and functioning of metallographic microscope, investigation methods, sample preparation. Transmission electron microscopy – the physical background, structure and functioning of the microscope, interaction of the electron beam with the matter, basic research methods, sample preparation, interpretation of the microscopic images and diffraction patterns. Scanning electron microscopy - structure and functioning of the microscope, the research methods and their application, sample preparation, the interpretation of the obtained images. Microanalytical methods in electron microscopy.

Laboratory classes: 1. Light microscopy. Metallographic specimens. 2. Polishing and etching of specimens. 3. Microscopic observations. 4. Methods of quantitative metallography in light microscopy. 5. Performing intermediate and extraction replics. 6. Thin foils. 7. Observations of preparations in transmission electron microscopy. 8. Diffraction analysis. 9. Scanning electron microscopy. 10. X-ray microanalysis.

Teaching methods

multimedia presentations

Bibliography

Basic

1. Kubiński W., Wybrane metody badania materiałów. Badanie metali stopów. Wyd. PWN. 2016.

2. Barbacki A. (red.), Metody i techniki strukturalnych badań metali, Wyd. Politechniki Poznańskiej, Poznań 1994.

Additional

1. Barbacki A. (red.), Mikroskopia elektronowa, Wyd. Politechniki Poznańskiej, Poznań 2005.

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

Breakdown of average student's workload

	Hours	ECTS
Total workload	72	3,0
Classes requiring direct contact with the teacher	47	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)[1]	25	1,0

[1] delete or add other activities as appropriate