



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Modern methods of research materials [S1IMat1>NMBM]

### Course

Field of study

Materials Engineering

Year/Semester

3/5

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2,00

### Coordinators

dr inż. Adam Piasecki

adam.piasecki@put.poznan.pl

### Lecturers

### 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 modern methods of testing materials

### Course-related learning outcomes

Knowledge:

1. students should describe the basic methods for testing the properties of materials. - [k\_w08, k\_w11]
2. students should describe the construction of modern machines and equipment for material testing. - [k\_w11]

Skills:

1. the student is able to propose appropriate methodology for testing materials. - [k\_u01, k\_u05, k\_u10]
2. the student is able to conduct research. - [k\_u08, k\_u18]

3. the student is able to analyze test results - [k\_u01, k\_u05, k\_u08]

Social competences:

1. the student is able to work in a group - [k\_k03]

2. the student is aware of the importance of modern 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:

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: Testing methods to assess physical and mechanical properties of materials. Testing methods to assess microstructure: optical microscopy, scanning electron microscopy, transmission electron microscopy, X-ray diffraction, testing methods to assess material surfaces. Testing methods to assess the chemical and phase composition of materials. Calorimetric methods. Tribology.

Laboratory classes: 1. Scanning electron microscopy. 2.EDS X-ray microanalysis. 3. Atomic force microscopy. 4. Dilatometric method. 5. Differential scanning calorimetry. 6. Tribological research.

### Teaching methods

multimedia presentations

### Bibliography

Basic

1. Kubiński W., Wybrane metody badania materiałów. Badanie metali stopów. Wyd. PWN. 2020.

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	60	2,00
Classes requiring direct contact with the teacher	34	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	1,00