



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Modern methods of research materials and vehicle parts [S1MiTPM1>NMBMiCP]

### Course

Field of study	Year/Semester
Materials and technologies for automotive industry	3/5
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

dr hab. inż. Adam Piasecki  
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### Lecturers

### Prerequisites

Basic knowledge of chemistry, physics, materials science, microscopy methods, and chemical composition testing methods (EDS, WDS). 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 modern methods of testing materials and vehicle parts.

### Course-related learning outcomes

Knowledge:

1. The student should characterize the basic methods of testing the properties of materials.
2. The student should describe the construction of modern machines and devices for testing materials.

Skills:

1. The student is able to propose an appropriate methodology for testing materials.
2. The student is able to conduct research.
3. The student is able to interpret research results.

Social competences:

1. Student is able to work in a group.
2. The student is aware of the importance of modern methods of testing 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 methods of testing materials and vehicle parts.

### Course topics

Lecture: Research methods for assessing the physical and mechanical properties of materials on a macro, micro and nano scale. Research methods for assessing micro- and nanostructure. Research methods for assessing the chemical and phase composition of materials. Calorimetric methods.

Methods for testing tribological properties. Computed tomography.

Laboratory classes: 1. Observation of vehicle parts by microscopic methods (LM, DM, SEM). 2. Atomic Force Microscopy. 3. Dilatometric method. 4. Differential Scanning Calorimetry (DSC). 5. Tribological properties tests.

### 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	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