COURSE DESCRIPTION CARD - SYLLABUS

Course name
Heat-resistant materials in the automotive industry [S1MiTPM1>MŻiŻwPM]

Course

Field of study
Materials and technologies for automotive industry

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of chemistry, materials science, metallurgy and heat treatment of materials. Ability to think logically, use information obtained from the library and the Internet.

Course objective

Getting acquainted with issues related to heat resistance. Students are provided with a complete set of information on the microstructure and properties of heat-resistant materials, as well as their application in the automotive industry.

Course-related learning outcomes

Knowledge:
1. Has the knowledge of physics, chemistry, electrochemistry and structure of materials necessary to understand the phenomena occurring during the exploitation of automotive materials at elevated temperatures.
2. Has knowledge of the structure of materials and knows the methods of forming their structure to achieve heat resistance.
3. Has detailed knowledge of testing the properties of automotive materials at elevated temperatures.

Skills:
1. Can plan and carry out measurements of automotive material properties at elevated temperatures.
2. Can analyze, evaluate and solve technical problems of automotive industry related to operation at elevated temperature.
3. Can select heat-resistant and heat-resistant materials for automotive applications.

Social competences:
1. Understands the need to expand the knowledge of heat resistance and heat resistance of materials.
2. Can appropriately determine the importance of material characteristics that provide heat resistance and heat resistance.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: written credit at the end of the semester (credit if at least 51% of the points are obtained).
Laboratory: Credit on the basis of a written test/ oral answer and written studies from the realized program content during exercises. In order to receive credit, the written test/ oral answer and all reports must be passed with a positive mark.

Programme content

Get acquainted with detailed information on heat resistance, and learn about the basic materials in the group of heat-resistant materials along with their properties and applications.

Course topics

Lecture:
1. Basic issues of heat resistance.
2. Test methods of heat resistance.
3. Working conditions and requirements for heat-resistant materials.
4. Classification of heat-resistant materials.
5. Heat-resistant materials used in the automotive industry and their properties.
6. Operation and causes of wear of vehicle components made of heat-resistant materials.

Laboratory:
1. Interpretation of the results obtained from the heat resistance test.
2. The mechanism of scale formation on metals and alloys.
3. Heat-resistant steels.
4. Non-ferrous alloys.
5. Ceramic materials.

Teaching methods

1. Lecture: multimedia presentation
2. Laboratory exercises: practical exercises, discussion and teamwork.

Bibliography

Basic:
1. Głowacka M., Landowski M., Łabanowski J.: Współczesne materiały inżynierskie. Wybrane grupy materiałów. Wydawnictwo Politechniki Gdańskiej, 2021.
2. Mrowec S., Werber T.: Nowoczesne materiały żaroodporne. Wydawnictwa Naukowo-Techniczne. Wydawca, 1982.
3. Stanisław Mrowec: Kinetyka i mechanizm utleniania metali. Wydawnictwo "Śląsk", 1982.
4. Hernas A.: Żarowytrzymałość stali i stopów. Wydawnictwo Politechniki Śląskiej, 1999.

Additional:
1. Mikułowski B.: Stopy żaroodporne i żarowytrzymałe. Nadstopy. Wydawnictwo AGH Kraków, 1997.
2. Colombier L., Hochmann J.: Stale odporne na korozję i stale żaroodporne. Wydawnictwo "Śląsk", 1964.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	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)	20	1,00