



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Corrosion and protection against corrosion

Course

Field of study

Biomedical engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/4

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

prof. dr hab. inż. Jarosław Jakubowicz

Responsible for the course/lecturer:

Prerequisites

Students should have a basic knowledge of materials science and chemistry. They should also have the ability to think logically and to obtain information from various sources as well as be ready to cooperate within a team. In addition, they should understand the need to learn and acquire new knowledge

Course objective

Providing to students information about corrosion phenomena and damages, and methods of corrosion protection.

Course-related learning outcomes

Knowledge

1) Students have knowledge of basic types of corrosion and methods of corrosion protection .

Skills

1) Students are able to choose the material to a corrosive environment .

2) Students are able to offer a way of protection against corrosion.

3) Students are able to perform corrosion tests.



Social competences

- 1) Students can work together in a team.
- 2) Students are aware of the role of corrosion and protection against corrosion in modern economy and for societies.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

- 1) Knowledge acquired during the lectures is verified at the final test lasting 45 minutes. There are two credit deadlines in the May / June of the summer semester to which every student is entitled. In addition, students can improve their grades in September. Final test consists of 3-5 questions. The pass threshold is 50% of the points.
- 2) Skills acquired as part of the laboratory classes are checked on an ongoing basis during each class in the form of an oral or written answer to the questions asked and assessed on the basis of reports from each laboratory exercise. Each laboratory exercise requires a positive evaluation. At the end of the semester, after completing compulsory exercises, there is a possibility to pass a corrective exam of selected exercises.

Programme content

Lecture:

1. Electrochemical aspects of corrosion: types of electrodes, electrode reactions, polarity of the electrodes, electrochemical cell, double layer, electrode potential.
2. Thermodynamical aspects of corrosion processes: Pourbaix diagrams.
3. Passive state of metals.
4. Types of corrosion: general, galvanic, crevice, pitting, intergranular, stress, fatigue, hydrogen, selective, microbiological.
5. Oxidation at high temperatures and corrosive processes mechanism.
6. Effect of environment on corrosion processes: environment type, concentration of the oxidant, environment move, temperature, pH, aggressive ions.
7. Corrosion resistance of selected metals and their alloys.
8. Methods for corrosion protection of metals: materials, modification of the environment, protective coatings, electrochemical protection.
9. Corrosion of plastics and ceramics.
10. Methods of corrosion investigations.

Laboratory classes:

1. Identify of corrosion resistance based on polarization curves. part. 1.
2. Identify pf corrosion resistance based on polarization curves. part. 2.
3. High temperature corrosion. part. 1.
4. High temperature corrosion. part. 2.
5. Reasons of corrosive wear of machine parts.

Teaching methods



- 1) Lecture: multimedia presentation, illustrated with examples on the board.
- 2) Laboratory exercises: macro- and microscopic observations; corrosive measurements; performance of tasks given by the teacher - practical exercises.

Bibliography

Basic

1. J. Baszkiewicz, M. Kamiński, Korozja materiałów, Oficyna wydawnicza PW, Warszawa 2006.
2. H. Bala, Korozja materiałów – teoria i praktyka, WIPMiFS, Częstochowa 2002.

Additional

1. W. Gumowska, E. Rudnik, I. Harańczyk, Korozja i ochrona metali, ćwiczenia laboratoryjne, AGH, Kraków 2007.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests) ¹	20	1,0

¹ delete or add other activities as appropriate