**SYLLABUS**

**regarding the qualification cycle FROM** 2023 **TO** 2024**.**

1. Basic Course/Module Information

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| --- | --- |
| Course/Module title | Engineering materials |
| Course/Module code \* |  |
| Faculty (name of the unit offering the field of study) | College of Natural Sciences |
| Name of the unit running the course | Institute of Material Engineering |
| Field of study | Material Engineering |
| Qualification level | I |
| Profile | generally academic |
| Study mode | Full time |
| Year and semester of studies | I year, I semester |
| Course type | directional |
| Language of instruction | Polish/English |
| Coordinator | Dr. hab. Ireneusz Stefaniuk Prof.UR |
| Course instructor | Dr hab. Ireneusz Stefaniuk Prof.UR |

\* - as agreed at the faculty

1.1.Learning format – number of hours and ECTS credits

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Semester  (n0.) | Lectures | Classes | Colloquia | Lab classes | Seminars | Practical classes | Internships | others | **ECTS credits** |
| 4 |  | 30 |  |  |  |  |  |  | **5** |

1.2. Course delivery methods

- carried out in a traditional way

1.3. Course/Module assessment (exam, pass with a grade, pass without a grade)

Classes: assessment: credit with a grade

2. Prerequisites

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| Basic knowledge of physics: general physics, solid state physics,, atomic physics and optics. |

3. Objectives, Learning Outcomes, Course Content, and Instructional Methods

3.1. Course/Module objectives

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| --- | --- |
| O1 | To familiarize students with the basic problems of the comprehensive properties and application of engineering materials: metals and alloys, ceramics, plastics, composites, special materials, biomedical and biomimetic, nanomaterials and nanotechnologies. |
| O2 | After completing this course, the student should know engineering materials and the rules of their selection for technical applications depending on their structure and properties. |
| O3 | Know the basic physical properties of engineering materials and the methods of their research. Be familiar with the use of modern engineering materials and their development trends. |

3.2. Course/Module Learning Outcomes (to be completed by the coordinator)

|  |  |  |
| --- | --- | --- |
| Learning Outcome | The description of the learning outcome  defined for the course/module | Relation to the degree programme outcomes |
| LO\_01 | has elementary knowledge of the structure of matter and the methodology of research on structure and physical properties | K\_W04 |
| LO\_02 | has the knowledge to determine the properties of materials using computer techniques | K\_W07 |
| LO\_03 | has knowledge of raw materials, products, and processes used in the material manufacturing industry | K\_W09 |
| LO\_04 | knows the basic methods, techniques, tools, and materials for the design of technical elements and devices | K\_W09 |
| LO\_05 | has elementary knowledge of the life cycle of products, especially in terms of the production of nanomaterials applicable in the aviation industry | K\_W10 |
| LO\_06 | is able to prepare documented studies and written works in the field of materials for the aviation industry and nanomaterials | K\_U02 |
| LO\_07 | is able to identify the methodology of physical research (experimental and theoretical) for solving engineering tasks | K\_U05 |
| LO\_08 | is able to connect the structure of the material with its properties to a basic degree in terms of possible engineering applications | K\_U7 |
| LO\_09 | understands the need to enrich their knowledge and skills to changes taking place in technique and technology | K\_K01 |

**3.3. Course content (to be completed by the coordinator)**

1. Lectures

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| Content outline |
|  |

1. Classes, ~~tutorials/seminars, colloquia, laboratories, practical classes~~

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| Content outline |
| 1. General Properties of Engineering Materials 2. Atomic structure and interatomic bonds in engineering materials 3. The Structure of metals and polymers 4. Defects in Engineering Materials, Solid Solutions 5. Ceramic materials. 6. Composite material. 7. Electronic-related materials 8. Selected Mechanical Properties of engineering materials |

3.4. Methods of Instruction

e.g.

*Lecture: a problem-solving lecture/a lecture supported by a multimedia presentation/ distance learning*

*Classes: text analysis and discussion/project work (research project, implementation project, practical project)/ group work (problem solving, case study, discussion)/didactic games/ distance learning*

*Laboratory classes: designing and conducting experiments*

Classes: text analysis and discussion/project work, group work (problem solving, case study)

4. Assessment techniques and criteria

4.1 Methods of evaluating learning outcomes

|  |  |  |
| --- | --- | --- |
| Learning outcome | Methods of assessment of learning outcomes (e.g. test, oral exam, written exam, project, report, observation during classes) | Learning format (lectures, classes,…) |
| LO-01 | *reports, observation during classes, oral test* | classes |
| LO-02 | *reports, observation during classes, oral test* | classes |
| LO-03 | *reports, observation during classes, oral test* | classes |
| LO-04 | *reports, observation during classes, oral test* | classes |
| LO-05 | *reports, observation during classes, oral test* | classes |
| LO-06 | *reports, observation during classes, oral test* | classes |
| LO-07 | *reports, observation during classes, oral test* | classes |
| LO-08 | *reports, observation during classes, oral test* | classes |
| LO-09 | *OBSERVATION DURING CLASSES* | classes |

4.2 Course assessment criteria

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| Completion of the course will confirm the student's achievement of the intended learning outcomes. Verification of achieved learning outcomes is continuously monitored during the course of classes. The grade obtained from passing the subject will assess the degree of effects achieved. Verification of the learning outcomes of the teacher's knowledge and skills takes place through tests, reports, class participation, and discussion. Verification of the learning outcomes of the classes without the participation of teachers will be based on the assessment of the student's preparation for laboratory exercises. Verification of social competences will take place through active participation in classes and participation in discussions.  Classes: Form of credit: credit with grade  The condition of passing the course is: obtaining a grade from knowledge and substantive preparation for the exercises.  The final grade is the average of partial grades.  Ects grading scale:  A – excellent (91 – 100)%  B - very good (81 – 90)%  C – good (71 – 80)%  D – satisfactory (61 – 70)%  E – sufficient (51 – 60)%  F – fail (0 – 50)% |

5. Total student workload needed to achieve the intended learning outcomes

– number of hours and ECTS credits

|  |  |
| --- | --- |
| Activity | Number of hours |
| Scheduled course contact hours | 30 |
| Other contact hours involving the teacher (consultation hours, examinations) | 4 |
| Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.) | 91 |
| Total number of hours | 125 |
| Total number of ECTS credits | 5 |

\* One ECTS point corresponds to 25-30 hours of total student workload

6. Internships related to the course/module

Not applicable

7. Instructional materials

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| Compulsory literature:  1. Michael F. Ashby, David R. H. Jones. Engineering Materials 1, An Introduction to Properties, Applications, and Design. Elsevier 2013.  2. Michael F. Ashby, David R. H. Jones. Engineering Materials 2, An Introduction to Microstructures and Processing. Elsevier 2013. |
| Complementary literature:  3. Engineering Materials Technology: Jacobs, James A., Kilduff, Prentice-Hall 1997 |

Approved by the Head of the Department or an authorised person