**SYLLABUS**

**regarding the qualification cycle 2024/2025**

1. Basic Course/Module Information

|  |  |
| --- | --- |
| Course/Module title | Protective coatings and their production |
| 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 | II |
| Profile | generally academic |
| Study mode | Full time |
| Year and semester of studies | II year, II semester |
| Course type | specialization education: Nanocomposite and functional materials |
| Language of instruction | Polish/english |
| Coordinator | Iwona Rogalska |
| Course instructor | Iwona Rogalska |

\* - 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** |
| 2 |  |  |  | 30 |  |  |  |  | 5 |

1.2. Course delivery methods

- conducted in a traditional way

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

Laboratory: assessment: credit with a grade

2. Prerequisites

|  |
| --- |
| Basic knowledge of physics and solid state physics |

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

3.1. Course/Module objectives

|  |  |
| --- | --- |
| O1 | Knowledge of basic coatings applied by pvd and cvd techniques. |
| O2 | Knowledge of basic coating techniques |
| O3 | The ability to select and assess the suitability of the coating for selected applications |
| O4 | The acquisition of skills in the professional literature |
| O5 | Acquiring the ability to work in team |

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 | Student has knowledge in the field of modelling the functionality of new materials, technologies for their production and methods for assessing the properties of structure and structure of matter. | IMII\_W02  IMII\_W03  IMII\_W07 |
| LO\_02 | Student is able to prepare oral presentations and presentations on the design of the functionality of materials, assessment of their suitability and methods of production and characterization. He can determine the directions of development and trends of changes and threats. Student can plans the course of experimental work. | IMII\_U03  IMII\_U04  IMII\_U07  IMII\_U08  IMII\_U10  IMII\_U11 |
| LO\_03 | Student understands the need to increase their own competence and the need for teamwork to achieve synergy. He is able to act creatively, understands the principles of ethics and finds his place and role in the team. | MII\_K01  IMII\_K02  IMII\_K03  IMII\_K05  IMII\_K06 |

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

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

|  |
| --- |
| Content outline |
| Laboratory each week 4 hours for 15 weeks (one semester)  1. Definition of a project task - goal, motivation, competences, resources  2. Selection of the industry sector - indicated connection with the aviation industry  3. Indication of areas and typical applications using protective covers  4. Selection of the coating material used in the specific application  5. Determination of material parameters of the selected coating based on literature data  6. Indication and description of the technology allowing for the production of a selected coating with an indication of the advantages and disadvantages and typical parameters of the coating depending on the manufacturing technique  7. Description of the process of producing the selected layer using PVD equipment located in the protective technology lab  8. Evaluation and passing the project. |

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*

Exercises in the laboratory, project

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 | *Observation during classes / project* | classes |
| LO-02 | *Observation during classes / project* | classes |
| LO-03 | *OBSERVATION DURING CLASSES* | classes |

4.2 Course assessment criteria

|  |
| --- |
| Credit - verification of students' knowledge is carried out by:  • practical execution of the project  • project analysis and observations revealing theoretical knowledge and the ability to use it in practice  Completion of the course will confirm the student's achievement of the intended learning outcomes. Verification of achieved learning outcomes is monitored on an ongoing basis during the course of classes. The grade obtained from passing the subject will assess the degree of effects achieved.  Laboratory: Partial grades issued on the basis of observation and discussion during classes on elements developed by project teams. The final grade is the arithmetic average of partial grades, with the student passing each part of the material positively.  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 | Laboratory 30 hours |
| Other contact hours involving the teacher (consultation hours, examinations) | 4 |
| Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.) | 76 |
| Total number of hours | 110 |
| 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

|  |
| --- |
| Compulsory literature:  1. Anna szaynok, stanisław kuźmiński, podstawy fizyki powierzchni półprzewodników, wnt, warszawa 2000,  2. Z.bojarski, m.gigla, k.stróż, m.surowiec, krystalografia, pwn, warszawa 2001,  3. Tkaczyk s. I in. Powłoki ochronne. Skrypt politechniki śląskiej nr 2024, gliwice 1997 – udostępnia prowadzący |
| Complementary literature:  Kurt lesker http://www.lesker.com/  Oerlikon:http://www.oerlikonbalzerscoating.com/bpl/pol/  Apvacuum http://www.apvacuum.com/  Http://iongalenica.pl/oferta/ |

Approved by the Head of the Department or an authorised person