**SYLLABUS**

**regarding the qualification cycle FROM 2024TO 2025**

1. Basic Course/Module Information

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| --- | --- |
| Course/Module title | **Noise and vibration control methods** |
| 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 Materials Engineering* |
| Field of study | **MECHATRONICS** |
| Qualification level | SECOND-CYCLE STUDIES |
| Profile | *academic* |
| Study mode | *FULL-TIME STUDIES* |
| Year and semester of studies | *YEAR 1, SEMESTER 2* |
| Course type | *LABORATORIES* |
| Language of instruction | ENGLISH |
| Coordinator | *Prof. Lucyna Leniowska, DSc., PhD, Eng.* |
| Course instructor | *Prof. Lucyna Leniowska, DSc., PhD, Eng.* |

\* - 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

Presentation, discussion, group work, project.

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

Project, pass with a grade

2. Prerequisites

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| Required basic knowledge of issues taught in the following subjects: physics, acoustics, mechanics, control engineering. |

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

3.1. Course/Module objectives

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| O1 | Acquaintance of students with the sources of vibration and noise, their effects and passive and active methods of their reduction. |
| O2 | Gaining knowledge and skills in the analysis and reduction of vibration and noise. |

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

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| --- | --- | --- |
| Learning Outcome | The description of the learning outcome  defined for the course/module | Relation to the degree programme outcomes |
| LO\_01 | KNOWLEDGE:  Defines the basic acoustic quantities and knows the basic concepts and laws of acoustics: the Weber-Fechner law, auditory perception, isophones, types of sound sources, diffraction and interference.  Knows and applies active and passive methods of vibration and noise reduction. Has knowledge of acoustic engineering necessary to formulate and solve simple technical problems. |  |
| LO\_02 | SKILLS:  The student is able to formulate and solve problems related to the reduction of vibrations and noise based on the laws of acoustics, mechanics, automation, and to model the phenomena and systems of vibration reduction. |  |
| LO\_03 | SOCIAL COMPETENCES:  Define priorities for the implementation of tasks, can work in a group. |  |

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

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

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| Content outline |
| Introduction to acoustics engineering. Basic concepts and laws. |
| Sources of mechanical and acoustic vibrations. Vibration monitoring and measurement. |
| Review of active methods of vibration and noise reduction. Feedback and feedforward vibration and noise reduction systems. |
| Passive methods of reducing vibration and noise levels. Sound absorbing materials and systems. Acoustic insulation. |
| Non-contact vibration measurements. Vibroacoustic diagnostics of machines. |
| Introduction to project: Designing control systems to reduce vibrations and noise. |

3.4. Methods of Instruction

Presentations, computer simulations, analysis of examples, discussion, group work, projects.

4. Assessment techniques and criteria

Preparation and presentation of the project

4.1 Methods of evaluating learning outcomes

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| --- | --- | --- |
| 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 | project | classes |
| LO-o2 | project | classes |
| LO-o3 | observation during classes | classes |

4.2 Course assessment criteria

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| The correctness of the solution is assessed. |

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

– number of hours and ECTS credits

*OBSERVATION DURING CLASSES*

|  |  |
| --- | --- |
| Activity | Number of hours |
| Scheduled course contact hours | 30 |
| Other contact hours involving the teacher (consultation hours, examinations) | 10 |
| Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.) | 85 |
| 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

|  |  |
| --- | --- |
| Number of hours | *no* |
| Internship regulations and procedures |  |

7. Instructional materials

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| Compulsory literature:   1. *F. Alton Everest, Ken C. Pohlmann, Master Handbook of Acoustics, Seventh Edition, McGraw-Hill Education Ltd 2021* 2. *R J Peters i, B J Smith, M. Hollins, Acoustics and Noise Control, Taylor and Francis 2015.* 3. *Preumont A.,Seto K. Active Control of Structures. Wiley & Sons, Ltd, Publication 2008* |
| Complementary literature:   1. *Fahy F. J., (2001), Foundations of Engineering Acoustics, Academic Press, London.* 2. *Hansen C., Snyder S., (1997), Active control of noise and vibration, E&FN Spon, London.* 3. *Fuller C. R., Elliot S. J., Nelson P. A., (1996), Active Control Vibration, Academic Press, London.* |

Approved by the Head of the Department or an authorised person