**SYLLABUS**

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

1. Basic Course/Module Information

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| --- | --- |
| Course/Module title | LASER TECHNOLOGY |
| 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 | II year, III 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

- 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

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| BASIC KNOWLEDGE OF OPTICS AND SOLID STATE PHYSICS |

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

3.1. Course/Module objectives

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| --- | --- |
| O1 | to familiarize students with the principles of operation and applications of different types of lasers, |
| O2 | to learn the basic properties of matrices and activators, |
| O3 | use of basic laws and phenomena of wave and geometric optics in measurements using laser light. |
| O4 | to familiarize students with the effects of laser radiation with matter. |

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 ordered knowledge of the basics of atomic physics and solids | IM\_W02 |
| LO\_02 | has knowledge of the development directions of laser technologies | IM\_W08 |
| LO\_03 | has knowledge of the use of lasers in the industry | IM\_W09 |
| LO\_04 | can carry out basic research and measurements of physical properties of laser materials | IM\_U08 |
| LO\_05 | is able to use the norms and standards associated with the laser technique when making measurements | IM\_U10 |
| LO\_06 | is able to perform measurements using the laser according to the given specification | IM\_U15 |
| LO\_07 | understands the need to improve their qualifications | IM\_K01 |

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

1. Lectures

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| Content outline |
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1. Classes, tutorials/seminars, colloquia, laboratories, practical classes

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| Content outline |
| 1. Introduction to the safe work and servicing of lasers. (2hours) |
| 1. Testing properties of He-Ne laser radiation. (4h) |
| 1. Testing coherence of He-Ne laser light. (4h) |
| 1. Testing shape of emission line caused by semiconductor laser.(4h) |
| 1. Parting impulse in fiber optics.(4h) |
| 1. Measurement of light velocity.(4h) |
| 1. Semiconductor laser and its property.(4h) |
| 1. Testing of optoelectronic components.(4h) |

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: performing experiments, designing experiments

4. Assessment techniques and criteria

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 | *Observation during classes / project* | classes |
| LO-02 | *Observation during classes / project* | classes |
| LO-03 | *Observation during classes / project* | classes |
| LO-04 | *Observation during classes / project* | classes |
| LO-05 | *Observation during classes / project* | classes |
| LO-06 | *Observation during classes / project* | classes |
| LO-07 | *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 monitored on an ongoing basis 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 take 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. The verification of social competences will take place through active participation in classes and participation in discussions  Laboratory: Form of credit: credit with grade  The condition of passing the course is: obtaining a grade from knowledge and substantive preparation for the exercises, and colloquia.  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.WILLIAM T. SILFVAST , LASER FUNDAMENTALS, University of Central Florida  2.B. Ziętek, Optoelektronika, Wydawnictwo UMK, Toruń 2004.  3. I. Stefaniuk, technologie laserowe, 2014 |
| Complementary literature:  1. Csele, Mark (2004). Fundamentals of Light Sources and Lasers, Wiley. ISBN 0-471-47660-9  2. Koechner, Walter (1992). Solid-State Laser Engineering, 3rd ed., Springer-Verlag. ISBN 0-387-53756-2  3. Siegman, Anthony E. (1986). Lasers, University Science Books  4. scientific articles |

Approved by the Head of the Department or an authorised person