



Subject card

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|---|--|--|--|-------------------------------------|--|------------|-----|
| Subject name and code | , PG_00052090 | | | | | | |
| Field of study | Nanotechnology | | | | | | |
| Date of commencement of studies | October 2021 | | Academic year of realisation of subject | | 2023/2024 | | |
| Education level | first-cycle studies | | Subject group | | Optional subject group Subject group related to scientific research in the field of study | | |
| Mode of study | Full-time studies | | Mode of delivery | | at the university | | |
| Year of study | 3 | | Language of instruction | | Polish | | |
| Semester of study | 6 | | ECTS credits | | 4.0 | | |
| Learning profile | general academic profile | | Assessment form | | assessment | | |
| Conducting unit | Zakład nowych materiałów funkcjonalnych do konwersji energii -> Instytut Nanotechnologii i Inżynierii Materiałowej -> Faculty of Applied Physics and Mathematics | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr hab. inż. Jakub Karczewski | | | | |
| | Teachers | | Patrik Błaszczak dr hab. inż. Jakub Karczewski | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 15.0 | 0.0 | 15.0 | 15.0 | 0.0 | 45 |
| | E-learning hours included: 0.0 | | | | | | |
| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | | Participation in consultation hours | | Self-study | SUM |
| | Number of study hours | 45 | | 6.0 | | 49.0 | 100 |
| Subject objectives | Learning about modern methods of imaging nanostructures. | | | | | | |
| Learning outcomes | Course outcome | | Subject outcome | | Method of verification | | |
| | K6_W09 | | The student knows and understands the principles of operation, is able to perform measurements using SEM, AFM, STM microscopy. | | [SW1] Assessment of factual knowledge | | |
| | K6_K04 | | The student, in cooperation with others, is able to prepare, perform and interpret an experiment in the field of modern imaging methods. | | [SK1] Assessment of group work skills | | |
| | K6_W10 | | The student is able to prepare, perform and interpret an experiment in the field of modern imaging methods. | | [SW1] Assessment of factual knowledge | | |
| | K6_U04 | | The student is able to prepare, perform and interpret an experiment in the field of modern imaging methods. | | [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools | | |
| Subject contents | <ul style="list-style-type: none">• optical microscopy• tunnel microscopy• atomic force microscopy• scanning electron microscopy• transmission electron microscopy | | | | | | |

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| Prerequisites and co-requisites | basic knowledge of physics | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | lecture exam | 50.0% | 50.0% |
| | presentation of the results of laboratory work | 50.0% | 50.0% |
| Recommended reading | Basic literature | Weilie Zhou Zhong Lin Wang "Scanning Microscopy for Nanotechnology Techniques and Applications"V. L. Mironov "Fundamentals of Scanning Probe Microscopy" | |
| | Supplementary literature | Nanosurf easyScan 2 - operating instruction | |
| | eResources addresses | Adresy na platformie eNauczanie: metody mikroskopowe w nanotechnologii - Moodle ID: 38485 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38485 | |
| Example issues/ example questions/ tasks being completed | | | |
| Work placement | Not applicable | | |