



Subject card

|   |  |  |                                     |            |   |         |     |
|---|--|--|-------------------------------------|------------|---|---------|-----|
| Subject name and code                       | Experimental Nanotechnology , PG_00057511  |  |                                     |            |   |         |     |
| Field of study                              | Nanotechnology   |  |                                     |            |   |         |     |
| Date of commencement of studies             | February 2023  | Academic year of realisation of subject  |                                     |            | 2022/2023   |         |     |
| Education level                             | second-cycle studies   | Subject group  |                                     |            | Optional subject group<br>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                               | 1  | Language of instruction  |                                     |            | English   |         |     |
| Semester of study                           | 1  | ECTS credits   |                                     |            | 3.0   |         |     |
| Learning profile                            | general academic profile   | Assessment form  |                                     |            | assessment  |         |     |
| Conducting unit                             | Zakład fizyki nanomateriałów -> Instytut Nanotechnologii i Inżynierii Materiałowej -> Faculty of Applied Physics and Mathematics |  |                                     |            |   |         |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor   | dr inż. Marcin Łapiński  |                                     |            |   |         |     |
|   | Teachers   | dr inż. Marcin Łapiński  |                                     |            |   |         |     |
| Lesson types and methods of instruction     | Lesson type  | Lecture  | Tutorial                            | Laboratory | Project   | Seminar | SUM |
|   | Number of study hours  | 15.0   | 0.0                                 | 30.0       | 0.0   | 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   | 2.0                                 |            | 28.0  | 75      |     |
| Subject objectives                          | Overview of selected experimental methods used in nanotechnology in the field of synthesis and research properties .             |  |                                     |            |   |         |     |
| Learning outcomes                           | Course outcome   | Subject outcome  |                                     |            | Method of verification  |         |     |
|   | K7_W04   | Student is able to describe the physical and chemical methods of the nanomaterials manufacturing.          |                                     |            | [SW1] Assessment of factual knowledge   |         |     |
|   | K7_U05   | Student is able to list and describe the chemical and physical methods of the production of nanomaterials. |                                     |            | [SU2] Assessment of ability to analyse information<br>[SU3] Assessment of ability to use knowledge gained from the subject  |         |     |
|   | K7_W07   | The student is able to plan and safety perform experiment  |                                     |            | [SW1] Assessment of factual knowledge   |         |     |
|   | K7_K09   | The student is able to plan the process of manufacturing nanomaterials.                                    |                                     |            | [SK2] Assessment of progress of work  |         |     |
|   | K7_U02   | The student is able to plan and perform out experiment   |                                     |            | [SU1] Assessment of task fulfilment<br>[SU2] Assessment of ability to analyse information<br>[SU3] Assessment of ability to use knowledge gained from the subject |         |     |

| Subject contents   | <p>The properties of nanomaterials and structure sizes.</p> <p>Methods of preparation :</p> <ul style="list-style-type: none"> <li>- Methods of bottom-up , top-down,</li> <li>- Methods of preparation of 0D, 1D, 2D, 3D structures ,</li> </ul> <p>Methods of study:</p> <ul style="list-style-type: none"> <li>- Microscopic methods ,</li> <li>- Methods of structure studies,</li> <li>- Spectroscopic methods, especially luminescence measurements.</li> </ul>   |   |  |                          |                   |                               |                            |       |       |                       |       |       |
|--|---|---|--|--------------------------|-------------------|-------------------------------|----------------------------|-------|-------|-----------------------|-------|-------|
| Prerequisites and co-requisites                                | <p>The physical basis of nanotechnology - NAN1B007</p> <p>Physical chemistry of surfaces - NAN1B016</p>   |   |  |                          |                   |                               |                            |       |       |                       |       |       |
| Assessment methods and criteria                                | <table border="1" data-bbox="448 1032 1477 1137"> <thead> <tr> <th data-bbox="448 1032 794 1070">Subject passing criteria</th> <th data-bbox="794 1032 1141 1070">Passing threshold</th> <th data-bbox="1141 1032 1477 1070">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 1070 794 1099">Examination of the lecture</td> <td data-bbox="794 1070 1141 1099">60.0%</td> <td data-bbox="1141 1070 1477 1099">60.0%</td> </tr> <tr> <td data-bbox="448 1099 794 1137">laboratory assessment</td> <td data-bbox="794 1099 1141 1137">80.0%</td> <td data-bbox="1141 1099 1477 1137">40.0%</td> </tr> </tbody> </table> |   |  | Subject passing criteria | Passing threshold | Percentage of the final grade | Examination of the lecture | 60.0% | 60.0% | laboratory assessment | 80.0% | 40.0% |
| Subject passing criteria                                       | Passing threshold   | Percentage of the final grade   |  |                          |                   |                               |                            |       |       |                       |       |       |
| Examination of the lecture                                     | 60.0%   | 60.0%   |  |                          |                   |                               |                            |       |       |                       |       |       |
| laboratory assessment  | 80.0%   | 40.0%   |  |                          |                   |                               |                            |       |       |                       |       |       |
| Recommended reading  | <p>Basic literature</p> <p>Supplementary literature</p> <p>eResources addresses</p>   | <p>Nanostructures and Nanomaterials. Synthesis, Properties and Applications. Imperial College Press. Guozhong Gao. 2004.</p> <p>Introduction to Nanotechnology. Ch. P. Poole Jr., F. J. Owens. Wiley. 2003.</p> <p>Nanoelectronics and Information Technology. Adv.Electronic Materials and Novel Devices. Reiner Waser (Ed.) Wiley-VCH. 2003.</p> <p>Introduction to Nanotechnology. Ch. P. Poole Jr., F. J. Owens. Wiley. 2003.</p> <p>Nanoelectronics and Information Technology. Adv.Electronic Materials and Novel Devices. Reiner Waser (Ed.) Wiley-VCH. 2003.</p> <p>Adresy na platformie eNauczanie:<br/>Experimental nanotechnology / Nanotechnologia Eksperymentalna - Moodle ID: 30184<br/><a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30184">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30184</a></p> |  |                          |                   |                               |                            |       |       |                       |       |       |
| Example issues/<br>example questions/<br>tasks being completed | <p>Methods of synthesis of luminescence thin films.</p> <p>Methods of test properties of glasses and oxide thin films.</p>  |   |  |                          |                   |                               |                            |       |       |                       |       |       |
| Work placement   | Not applicable  |   |  |                          |                   |                               |                            |       |       |                       |       |       |