



Subject card

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|---|---|--|----------|-------------------------------------|--|------------|-----|
| Subject name and code | Nanotechnology, PG_00053338 | | | | | | |
| Field of study | Biomedical Engineering, Biomedical Engineering, Biomedical Engineering | | | | | | |
| Date of commencement of studies | October 2023 | Academic year of realisation of subject | | | 2023/2024 | | |
| Education level | second-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 | 1 | Language of instruction | | | Polish | | |
| Semester of study | 2 | ECTS credits | | | 5.0 | | |
| Learning profile | general academic profile | Assessment form | | | exam | | |
| Conducting unit | Department of Inorganic Chemistry -> Faculty of Chemistry | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | | | | | |
| | Teachers | | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 15.0 | 0.0 | 15.0 | 30.0 | 0.0 | 60 |
| | 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 | 60 | | 10.0 | | 55.0 | 125 |
| Subject objectives | The aim of the course is to acquaint students with the history, present state and future prospects of nanotechnology - an interdisciplinary field combining achievements in physics, chemistry, biology, material science, and many others. Awareness of technological capabilities at the nanoscale will give future graduates a chance to use them in their work. | | | | | | |
| Learning outcomes | Course outcome | Subject outcome | | | Method of verification | | |
| | [K7_U51] can conduct complex laboratory work connected with chemistry and biochemistry, specific to biomedical engineering | is able to synthesize nanostructures, i.e. quantum dots, carbon nanoparticles, magnetic nanoparticles and doped nanoparticles | | | [SU1] Assessment of task fulfilment | | |
| | [K7_W02] Knows and understands, to an increased extent, selected laws of physics and physical phenomena, as well as methods and theories explaining the complex relationships between them, constituting advanced general knowledge in the field of technical sciences related to the field of study | knows the history, current developments and prospects of nanotechnology mainly in the field of chemistry, but also other fields of knowledge | | | [SW1] Assessment of factual knowledge | | |
| | [K7_U52] can examine tissues, materials and biomaterials used in biomedical engineering | can study the properties of nanomaterials using spectroscopic and diffraction techniques | | | [SU4] Assessment of ability to use methods and tools | | |
| | [K7_K02] is ready to provide critical evaluation of received content and to acknowledge the importance of knowledge in solving cognitive and practical problems | is able to employ methods of molecular modeling and to use learned tools for designing nanodevices by himself | | | [SK2] Assessment of progress of work | | |

| Subject contents | <p>Lecture: Molecular modeling. History of nanotechnology. Nanolithography. Nanoelectronics. Computer data storage. Structural research. Coordination and supramolecular chemistry. Carbon nanostructures. Quantum effects in nanostructures. 0, 1 and 2D nanostructures. Calculation exercises.</p> <p>Project: students become acquainted with the basics of molecular modeling and design nanodevices by themselves.</p> <p>Laboratories: students synthesise selected nanostructures and examine their properties.</p> <p>A detailed program of the course as well as the project and seminar topics are regularly updated and posted on the "eNauczenie" platform.</p> | | | | | | | | | | | | | | |
|--|---|---|--|--------------------------|-------------------|-------------------------------|------------|-------|-------|------|-------|-------|---------|-------|-------|
| Prerequisites and co-requisites | Completed courses at the undergraduate level in the following subjects: mathematics, physics, general, inorganic, organic and physical chemistry. | | | | | | | | | | | | | | |
| Assessment methods and criteria | <table border="1" data-bbox="448 553 1487 692"> <thead> <tr> <th data-bbox="448 553 794 591">Subject passing criteria</th> <th data-bbox="794 553 1141 591">Passing threshold</th> <th data-bbox="1141 553 1487 591">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 591 794 622">Laboratory</td> <td data-bbox="794 591 1141 622">60.0%</td> <td data-bbox="1141 591 1487 622">25.0%</td> </tr> <tr> <td data-bbox="448 622 794 654">Exam</td> <td data-bbox="794 622 1141 654">60.0%</td> <td data-bbox="1141 622 1487 654">40.0%</td> </tr> <tr> <td data-bbox="448 654 794 692">Project</td> <td data-bbox="794 654 1141 692">60.0%</td> <td data-bbox="1141 654 1487 692">35.0%</td> </tr> </tbody> </table> | | | Subject passing criteria | Passing threshold | Percentage of the final grade | Laboratory | 60.0% | 25.0% | Exam | 60.0% | 40.0% | Project | 60.0% | 35.0% |
| Subject passing criteria | Passing threshold | Percentage of the final grade | | | | | | | | | | | | | |
| Laboratory | 60.0% | 25.0% | | | | | | | | | | | | | |
| Exam | 60.0% | 40.0% | | | | | | | | | | | | | |
| Project | 60.0% | 35.0% | | | | | | | | | | | | | |
| Recommended reading | Basic literature | <ul style="list-style-type: none"> • R. W. Kelsall, I. W. Hamley, M. Geoghegan: Nanotechnologie. <i>Wydawnictwo Naukowe PWN</i>, Warszawa 2008. • Ch. P. Poole Jr., F. J. Owens: Introduction to Nanotechnology. <i>Wiley-Interscience Hoboken</i>, New Jersey 2003. • B. Dręczewski, A. Herman, P. Wroczyński: Nanotechnologia stan obecny i perspektywy, <i>Wydawnictwo PG</i>, Gdańsk 1997. | | | | | | | | | | | | | |
| | Supplementary literature | <ul style="list-style-type: none"> • K. Żelechowska: Nanotechnologia w chemii i medycynie. <i>Wydawnictwo PG</i>, Gdańsk 2014. • E. Regis: Nanotechnologia. Narodziny nowej nauki, czyli świat cząsteczka po cząsteczce. <i>Prószyński i S-ka</i>, Warszawa 2001. | | | | | | | | | | | | | |
| | eResources addresses | Adresy na platformie eNauczenie: | | | | | | | | | | | | | |
| Example issues/ example questions/ tasks being completed | Available on the "eNauczenie" platform. | | | | | | | | | | | | | | |
| Work placement | Not applicable | | | | | | | | | | | | | | |