



## Subject card

|   |  |   |          |                                     |  |            |     |
|---|--|---|----------|-------------------------------------|--|------------|-----|
| Subject name and code                       | Superconductivity and superconducting compounds, PG_00053757   |   |          |                                     |  |            |     |
| Field of study                              | Nanotechnology   |   |          |                                     |  |            |     |
| 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<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                           | 2  | ECTS credits  |          |                                     | 2.0  |            |     |
| Learning profile                            | general academic profile   | Assessment form   |          |                                     | assessment   |            |     |
| Conducting unit                             | Department of Solid State Physics -> Faculty of Applied Physics and Mathematics  |   |          |                                     |  |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor   | dr inż. Michał Winiarski  |          |                                     |  |            |     |
|   | Teachers   | dr inż. Michał Winiarski  |          |                                     |  |            |     |
| Lesson types and methods of instruction     | Lesson type  | Lecture   | Tutorial | Laboratory                          | Project  | Seminar    | SUM |
|   | Number of study hours  | 30.0  | 0.0      | 0.0                                 | 0.0  | 0.0        | 30  |
|   | 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  | 30  |          | 0.0                                 |  | 0.0        | 30  |
| Subject objectives                          | The aim of the course is to acquaint students with the basic issues of superconductivity. In particular, with materials showing the phenomenon of superconductivity.   |   |          |                                     |  |            |     |
| Learning outcomes                           | Course outcome   | Subject outcome   |          |                                     | Method of verification   |            |     |
|   | K7_W02   | Student knows the possibilities for application of superconductors in nanotechnology.   |          |                                     | [SW1] Assessment of factual knowledge  |            |     |
|   | K7_W09   | Student correctly uses the terminology concerning superconductivity.                    |          |                                     | [SW1] Assessment of factual knowledge  |            |     |
|   | K7_U10   | Student is able to provide a comprehensive response to a question on superconductivity. |          |                                     | [SU1] Assessment of task fulfilment  |            |     |
|   | K7_W03   | Student knows the current state of knowledge of superconducting materials.              |          |                                     | [SW1] Assessment of factual knowledge  |            |     |
| Subject contents                            | Historical introduction<br><br>Metallic state - band structure. Differences between metallic and superconducting state<br><br>Measurements of superconducting state properties<br><br>Selected families of superconducting materials<br><br>Practical applications of superconductors<br><br>Superconducting nanodevices |   |          |                                     |  |            |     |

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|--|--|---|-------------------------------|
| Prerequisites and co-requisites                          | Basic knowledge of synthesis methods in solid state chemistry. basic knowledge of crystallography.     |   |                               |
| Assessment methods and criteria                          | Subject passing criteria   | Passing threshold   | Percentage of the final grade |
|  | final test   | 51.0%   | 100.0%                        |
| Recommended reading                                      | Basic literature   | A.C. Rose-Innes, E.H. Rhoderick: <i>Introduction to Superconductivity</i> . Pergamon, 2015  |                               |
|  | Supplementary literature   | Ch. Kittel "Introduction to solid state physics" 8th ed., Wiley, 2005   |                               |
|  | eResources addresses   | Podstawowe<br><a href="http://hyperphysics.phy-astr.gsu.edu/hbase/Solids/scdis.html#c1">http://hyperphysics.phy-astr.gsu.edu/hbase/Solids/scdis.html#c1</a> - Superconductivity in HyperPhysics textbook<br>Adresy na platformie eNauczenie:<br>Superconductivity and Superconducting Materials - 23/24 - Moodle ID: 37953<br><a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=37953">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=37953</a> |                               |
| Example issues/ example questions/ tasks being completed | What is the superconducting critical temperature for YBa <sub>2</sub> Cu <sub>3</sub> O <sub>7</sub> . |   |                               |
| Work placement   | Not applicable   |   |                               |