| 1. | **Field of study** | **Materials Science and Engineering** |
|---|---|---|
| 2. | Academic year of entry | 2018/2019 (summer term) |
| 3. | Level of qualifications/degree | second-cycle studies |
| 4. | Degree profile | general academic |
| 5. | Mode of study | full-time |

**Module:** Monographic lecture 1. Nuclear techniques in materials testing

**Module code:** IM2A_WM1_TJB

**1. Number of the ECTS credits:** 2

**2. Learning outcomes of the module**

| code | description | learning outcomes of the programme | level of competence (scale 1-5) |
|---|---|---|---|
| IM2A_WM1_TJB_1 | Understanding the role and importance of nuclear spectroscopic techniques in materials testing. | IM2A_W13 | 5 |
| IM2A_WM1_TJB_2 | Knowledge of basic terms and definitions used in the description of nuclear spectroscopic methods. Understanding the terms used to describe phenomena being the basis of nuclear spectroscopic methods used in materials science with special emphasis on issues related to materials. | IM2A_W13 | 5 |
| IM2A_WM1_TJB_3 | Knowledge of basic instruments and principles of Moessbauer spectra and positron lifetime spectra measurement and the basis of numerical analysis of experimentally obtained data. | IM2A_W05 | 5 |
| IM2A_WM1_TJB_4 | The skill to analyse and interpret parameters obtained in the process of numerical processing of spectra and their application to describe selected properties of materials. | IM2A_U07 | 5 |
| IM2A_WM1_TJB_5 | The skill to describe and characterise nuclear spectroscopic methods using an understandable language, a free talk about obtained results and their interpretation. | IM2A_U01<br>IM2A_U04 | 5<br>5 |
| IM2A_WM1_TJB_6 | Development of the awareness of the importance of nuclear spectroscopic methods with particular emphasis on positron lifetime spectra and Moessbauer effect spectra in modern materials science and materials. | IM2A_K05<br>IM2A_K06 | 5<br>1 |

**3. Module description**

| | |
|---|---|
| **Description** | The module Nuclear techniques in materials testing shall enable students learning those nuclear physics issues, which constitute the basis for nuclear techniques applications in materials testing and also which are necessary to understand the way of analysis of obtained experimental results and nuclear research methods used in the materials science. Owing to that students shall understand the importance of nuclear techniques not only in the description of materials physio-chemical properties, but also in designing new engineering materials for technical and medical applications. The accomplishment of |

| | |
|---|---|
| | the above objectives will require learning a number of issues from the field of physics, solid state physics, chemistry, mathematics, numerical methods, and also of mathematical statistics. |
| **Prerequisites** | The knowledge of physics, chemistry, mathematics, numerical methods, and also of mathematical statistic obtained in the basic module of materials science is required. |

**4. Assessment of the learning outcomes of the module**

| code | type | description | learning outcomes of the module |
|---|---|---|---|
| IM2A_WM1_TJB_w_1 | Credits test | Verification of the knowledge based on the lectures content, recommended literature and attended classes. | IM2A_WM1_TJB_1, IM2A_WM1_TJB_2, IM2A_WM1_TJB_3, IM2A_WM1_TJB_4, IM2A_WM1_TJB_5, IM2A_WM1_TJB_6 |

**5. Forms of teaching**

| code | form of teaching | | | required hours of student's own work | | assessment of the learning outcomes of the module |
|---|---|---|---|---|---|---|
| | type | description (including teaching methods) | number of hours | description | number of hours | |
| IM2A_WM1_TJB_fs_1 | lecture | The lecture shall enable understanding of basic terms and definitions used in the description of nuclear spectroscopic methods. Understanding the terms used to describe phenomena being the basis of nuclear spectroscopic methods used in materials science with special emphasis on issues related to materials. The lecture is aimed at teaching nuclear physics issues, which constitute the basis for nuclear techniques applications in materials testing and also which are necessary to understand the way of analysis of obtained experimental results and nuclear research methods used in the materials science. The lecture is delivered with the use of multimedia based on a selected set of handbooks. | 30 | The work with the recommended literature comprising independent acquisition of knowledge related to issues presented during the lectures. | 35 | IM2A_WM1_TJB_w_1 |