| 1. | **Field of study** | **Materials Science and Engineering** |
|---|---|---|
| 2. | Faculty | Faculty of Science and Technology |
| 3. | Academic year of entry | 2019/2020 (summer term), 2020/2021 (summer term), 2021/2022 (summer term), 2022/2023 (summer term), 2023/2024 (summer term), 2024/2025 (summer term) |
| 4. | Level of qualifications/degree | second-cycle studies |
| 5. | Degree profile | general academic |
| 6. | Mode of study | full-time |

## Module: Specialised subject 1. Shape memory alloys

**Module code:** IM2A_PS1_SMA

**1. Number of the ECTS credits:** 3

**2. Learning outcomes of the module**

| code | description | learning outcomes of the programme | level of competence (scale 1-5) |
|---|---|---|---|
| IM2A_PS1_SMA_1 | Understanding of the nature of reversible martensitic transformation and phenomena classified as the shape memory effect occurring in metals, their alloys and polymers; learning the group of materials featuring shape memory effects. | IM2A_W06<br>IM2A_W07<br>IM2A_W10 | 2<br>2<br>5 |
| IM2A_PS1_SMA_2 | The skill to design material properties on account of shape memory effects occurrence. | IM2A_K05<br>IM2A_U03<br>IM2A_U15 | 1<br>1<br>5 |
| IM2A_PS1_SMA_3 | Understanding ethical, economic and ecological aspects of designing materials with shape memory effects for applications in medicine. | IM2A_K02<br>IM2A_W18 | 2<br>5 |

**3. Module description**

| | |
|---|---|
| **Description** | The module Shape memory alloys shall enable students learning the nature of phenomena classified as the shape memory effect and factors having a decisive influence on martensitic transformation reversibility and on the shape memory effect inducing in alloys. This knowledge is necessary to obtain the skill to design alloys for specific applications, including medical applications. |
| **Prerequisites** | The achievement of effects of education in modules related to rudiments of materials science, materials science and modules related to engineering materials groups. |

| 4. Assessment of the learning outcomes of the module | | | |
|---|---|---|---|
| **code** | **type** | **description** | **learning outcomes of the module** |
| IM2A_PS1_SMA_w_1 | Credits test | Verification of the knowledge based on the lectures content, recommended literature and attended classes | IM2A_PS1_SMA_1, IM2A_PS1_SMA_2, IM2A_PS1_SMA_3 |
| IM2A_PS1_SMA_w_2 | Written test | Checking the knowledge of and the skill to interpret phenomena of shape memory effect and of reversible martensitic transformation. | IM2A_PS1_SMA_1, IM2A_PS1_SMA_2, IM2A_PS1_SMA_3 |
| IM2A_PS1_SMA_w_3 | Test | Assessment of mastering the basic knowledge necessary for individual performance of a practical exercise. | IM2A_PS1_SMA_1, IM2A_PS1_SMA_2, IM2A_PS1_SMA_3 |
| IM2A_PS1_SMA_w_4 | Report | Assessment of the skill to design properties of materials related to shape memory effects. | IM2A_PS1_SMA_2 |

| 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_PS1_SMA_fs_1 | lecture | The lecture shall enable understanding of issues related to the nature of factors conditioning the occurrence of shape memory effects as well as basics enabling designing of engineering materials featuring the shape memory effect. The lecture is delivered with the use of multimedia. | 30 | The work with the recommended literature comprising independent acquisition of knowledge related to basic issues. | 25 | IM2A_PS1_SMA_w_1 |
| IM2A_PS1_SMA_fs_2 | laboratory classes | Application of the acquired theoretical knowledge in practical designing of materials and shaping properties on account of the shape memory effect<br>Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories. | 15 | Preparation to classes through independent studying of recommended issues. | 20 | IM2A_PS1_SMA_w_2, IM2A_PS1_SMA_w_3 |