



### COURSE SPECIFICATION

|                            |                                      |
|----------------------------|--------------------------------------|
| Course code                | <b>M#1- S1-ME-312</b>                |
| Course title in Polish     | <b>Podstawy obróbki plastycznej</b>  |
| Course title in English    | <b>Fundamentals of Metal Forming</b> |
| Valid from (academic year) | <b>2019/2020</b>                     |

### GENERAL INFORMATION

|                        |  |
|------------------------|--|
| Programme of study     | <b>MECHANICAL ENGINEERING</b>                                  |
| Level of qualification | <b>first-cycle</b>   |
| Type of education      | <b>academic</b>  |
| Mode of study          | <b>full-time</b>   |
| Specialism             | <b>all</b>   |
| Department responsible | <b>Department of Metal Science and Manufacturing Processes</b> |
| Course leader          | <b>dr inż. Piotr Thomas</b>                                    |
| Approved by            |  |

### COURSE OVERVIEW

|                               |  |
|-------------------------------|--|
| Course type                   | <b>basic</b>                                   |
| Course status                 | <b>compulsory</b>                              |
| Language of instruction       | English  |
| Semester of delivery          | <b>semester 3</b>                              |
| Pre-requisites                | <b>Fundamentals of Metal Forming - lecture</b> |
| Examination required (YES/NO) | NO   |
| ECTS value                    | <b>1</b>                                       |

| Mode of instruction       | lecture | class | laboratory | project | seminar |
|---------------------------|---------|-------|------------|---------|---------|
| No. of hours per semester |         |       | <b>15</b>  |         |         |

## LEARNING OUTCOMES

| Category of outcome | Out-come code | Course learning outcomes   | Corresponding programme outcome code |
|---------------------|---------------|--|--------------------------------------|
| Knowledge           | W01           | On completion of the course, students will have a fundamental knowledge of selected metal forming processes by using different machinery.  | MiBM_W10<br>MiBM1_W12<br>MiBM1_W15   |
| Skills              | U01           | At the end of the course, students will be able to use fundamental knowledge to select a type of metal forming technology in order to manufacture mechanical elements of a given shape.  | MiBM1_U04<br>MiBM1_U08<br>MiBM1_U20  |
|                     | U02           | On completion of the course, on the basis lecture and the results obtained from laboratory exercises, student will be able to simple analyse selected metal forming processes.   | MiBM1_U04<br>MiBM1_U08<br>MiBM1_U20  |
|                     | U03           | At the end of this course, on the basis of the results obtained from laboratory exercises, student will be able to assess the influence of technological parameters on the shape, dimensions accuracy and quality of manufactured products by using metal forming methods. | MiBM1_U04<br>MiBM1_U08<br>MiBM1_U20  |
|                     | U04           | By the end of the course, student will be able to prepare report to discuss of obtained results from metal forming laboratory exercises  | MiBM1_U04<br>MiBM1_U08<br>MiBM1_U20  |
| Competence          | K01           | On completion of the course, students will understand the need for and know the opportunities of gaining further professional qualifications, related to metal forming processes used in the manufacturing of various metal elements.                                      | MiBM1_K01<br>MiBM1_K04<br>MiBM1_K06  |
|                     | K02           | By the end of this course, students will be aware of the responsibility for their professional engagement and will be ready to comply with the principles of team work, taking the responsibility for tasks performed as a team.   | MiBM1_K01<br>MiBM1_K04<br>MiBM1_K06  |
|                     | K03           | On completion of the course, the student will be aware of the social role of a graduate of a technology-oriented university and understand the need to inform in a comprehensive way the general public about accomplishments in mechanical engineering.                   | MiBM1_K01<br>MiBM1_K04<br>MiBM1_K06  |

## COURSE CONTENT

| Type of instruction* | Topics covered  |
|----------------------|---|
| laboratory           | 1. Introduction to laboratory class, getting acquainted with the health and safety regulations in force in the metal forming laboratory, discussing of assessment criteria and the report template. |
|                      | 2. Deep drawing of cylindrical drawpieces without collar.   |
|                      | 3. Blanking.  |
|                      | 4. Bending of sheets.   |
|                      | 5. Bar drawing.   |
|                      | 6. Longitudinal rolling of flats  |
|                      | 7. Evaluation of laboratory class.  |

## ASSESSMENT METHODS

| Outcome code | Methods of assessment <i>(Mark with an X where applicable)</i> |                     |      |         |        |       |
|--------------|--|---------------------|------|---------|--------|-------|
|              | Oral examination   | Written examination | Test | Project | Report | Other |
|              |  |                     |      |         |        |       |

|     |  |  |   |  |   |   |
|-----|--|--|---|--|---|---|
| W01 |  |  | x |  |   |   |
| U01 |  |  | x |  | x |   |
| U02 |  |  | x |  | x |   |
| U03 |  |  |   |  | x |   |
| U04 |  |  |   |  | x |   |
| K01 |  |  |   |  |   | x |
| K02 |  |  |   |  |   | x |
| K03 |  |  |   |  |   | x |

### ASSESSMENT TYPE AND CRITERIA

| Mode of instruction* | Assessment type            | Assessment criteria   |
|----------------------|----------------------------|---|
| laboratory           | non-examination assessment | Regular class attendance. The pass mark is a minimum of 50% for each in-class post-lab test and each post-lab report. |

### OVERALL STUDENT WORKLOAD

| ECTS weighting |  |                  |   |     |   |   |      |
|----------------|--|------------------|---|-----|---|---|------|
|                | Activity type  | Student workload |   |     |   |   | Unit |
|                |  | L                | C | Lab | P | S |      |
| 1.             | Scheduled contact hours  |                  |   | 15  |   |   | h    |
| 2.             | Other contact hours (office hours, examination)  |                  |   | 2   |   |   | h    |
| 3.             | <b>Total number of contact hours</b>   | <b>17</b>        |   |     |   |   | h    |
| 4.             | <b>Number of ECTS credits for contact hours</b>  | <b>0,7</b>       |   |     |   |   | ECTS |
| 5.             | <b>Number of independent study hours</b>   | <b>8</b>         |   |     |   |   | h    |
| 6.             | <b>Number of ECTS credits for independent study hours</b>                              | <b>0,3</b>       |   |     |   |   | ECTS |
| 7.             | <b>Number of practical hours</b>   | <b>32</b>        |   |     |   |   | h    |
| 8.             | <b>Number of ECTS credits for practical hours</b>                                      | <b>1,3</b>       |   |     |   |   | ECTS |
| 9.             | <b>Total study time</b>  | <b>25</b>        |   |     |   |   | h    |
| 10.            | <b>ECTS credits for the course</b><br><i>1 ECTS credit = 25-30 hours of study time</i> | <b>1</b>         |   |     |   |   | ECTS |

### READING LIST

1. Instructions for laboratory exercises.
2. Miłek T.: Techniques of production. Kielce University of Technology, Kielce 2012 ([www.wmibm-moodle.tu.kielce.pl](http://www.wmibm-moodle.tu.kielce.pl))
3. Lange K: Handbook of metal forming, McGraw-Hill Book Company,
4. Pacanowski J.: Design of deep drawing process of axisymmetric drawpieces and design press-forming dies T1 Methods and directives for deep drawing of axisymmetric drawpieces, Kielce: Kielce University of Technology, 2018 (in Polish)
5. Gólatowski T.: Design of deep drawing process and press-forming dies Selected problems. Warsaw: Warsaw University of Technology, 1984 (in Polish)

6. Marciniak Z Limit strains in deep drawing process of sheet metals, Warsaw: WNT, 1971 (in Polish)
7. Erbel J i inni.: Encyclopedia of manufacturing techniques used in the engineering industry. T 1, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2001 (in Polish).
8. Sińczak J. i inni: Metal forming processes. Laboratory exercises. Wydawnictwo naukowe AKA-PIT, Kraków 2001 (in Polish)..
9. Richert J.: Innovative methods of metal forming processes. Wydawnictwa AGH 2010 (in Polish).
10. Żaba K., Mamala A.: Metal forming of non-ferrous metals. Laboratory exercises. Rolling and drawing. Wydawnictwa AGH, Kraków 2011 (in Polish).