

### DESCRIPTION OF A STUDY COURSE – SYLLABUS

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
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| <b>Title of a course</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Production processes and systems                                                                                                                                                                                                                  |                 |                                                                                                                                                                                                                                            |                     |   |
| <b>Head of course</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Erika Gržin, Lecturer                                                                                                                                                                                                                             |                 |                                                                                                                                                                                                                                            |                     |   |
| <b>Study programme</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Professional undergraduate study Occupational Safety                                                                                                                                                                                              |                 |                                                                                                                                                                                                                                            |                     |   |
| <b>Status of a course</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Obligatory                                                                                                                                                                                                                                        |                 |                                                                                                                                                                                                                                            |                     |   |
| <b>Year of study</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2.                                                                                                                                                                                                                                                | <b>Semester</b> | IV                                                                                                                                                                                                                                         | <b>ECTS credits</b> | 5 |
| <b>Teaching plan<br/>(L + E + S+ Pr)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 3+1+0+0                                                                                                                                                                                                                                           |                 |                                                                                                                                                                                                                                            |                     |   |
| <b>Goals of a course</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
| The aim of the course is to acquaint students with the various processes of material processing and design and the dangers that arise during such processes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
| <b>Conditions for enrolling course</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
| No conditions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
| <b>Learning outcomes on a level of a study programme which includes course</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
| Outcome 4: Evaluate protective measures with respect to danger encountered in the work process.<br>Outcome 12: Recommend solutions in the field of occupational ergonomics, security and safety in technological processes.<br>Outcome 15: Identify the basic characteristics of production processes, machines and materials.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
| <b>Expected learning outcomes on a level of a course</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
| <ol style="list-style-type: none"> <li>Describe the parts of a production system.</li> <li>Evaluate the production system as a set of multiple subsystems.</li> <li>Explain the technology of forming metal objects by casting.</li> <li>Explain the process of obtaining finished products by sintering.</li> <li>Distinguish metal processing by deformation, cutting and joining, as well as separation of particles.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
| <b>Content of a course</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
| Basic concepts and classification of production processes and systems. Machine less material processing. Casting: moulding, mould and core mould designing, melting furnace and cast refining. Sintering. Processing of materials by deformation: cutting, punching, bending, deep drawing and forging. Processing of materials by dividing and joining: electric arc, welding, soldering and pasting. Machine material processing. Theoretical basis: kinematics and elementary geometry of work-piece and tools, tool cutting-edge consumption and durability, cutting tools. Different types of machining: turning lathe, planning, drilling, milling, broaching, grinding and fine machining procedures. Thermal treatment of metals: metallographic presentation of structure, types of annealing, tempering, improving and cementing. Projecting of production processes: preliminary study, technological concept, definition of location and production resources, area calculations, material flow and arrangement of production resources. |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
| <b>Teaching modes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <input checked="" type="checkbox"/> lectures<br><input type="checkbox"/> auditory exercises<br><input checked="" type="checkbox"/> seminars and workshops<br><input type="checkbox"/> distance learning<br><input type="checkbox"/> field classes |                 | <input checked="" type="checkbox"/> individual assignments<br><input type="checkbox"/> multimedia and network<br><input type="checkbox"/> laboratory<br><input type="checkbox"/> supervisor's work<br><input type="checkbox"/> other _____ |                     |   |
| <b>Comments</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
| <b>Students' obligations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
| <b>Grading, evaluation and monitoring of students' work continuously during lectures and exams</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |
| Grading is based upon evaluation of course's learning outcomes' adoption. Grading is performed continuously during lectures and/or during exam, in compliance with the provisions of Regulation on the assessment of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                            |                     |   |

students.

**Continuous check-up:**

| Outcomes           | Pre-exam I | Pre-exam 2 | Test | Threshold | Max   |
|--------------------|------------|------------|------|-----------|-------|
| Outcome 1          | 20%        |            |      | 10%       | 20%   |
| Outcome 2          | 20%        |            |      | 10%       | 20%   |
| Outcome 3          |            | 15%        |      | 7,5%      | 15%   |
| Outcome 4          |            | 15%        |      | 7,5%      | 15%   |
| Outcome 5          |            | 20%        | 10%  | 15%       | 30%   |
| Percentage of ECTS | 2          | 2          | 1    |           |       |
| Total              | 40%        | 50%        | 10%  | 50 %      | 100 % |

A student has passed the exam if he has acquired a percentage of credits for each learning outcome higher or equal to defined threshold.

**Exam term:**

| Outcomes           | Written exam | Oral exam | Max   |
|--------------------|--------------|-----------|-------|
| Outcome 1          | 20%          |           | 20%   |
| Outcome 2          | 20%          |           | 20%   |
| Outcome 3          | 15%          |           | 15%   |
| Outcome 4          | 15%          |           | 15%   |
| Outcome 5          |              | 30%       | 30%   |
| Percentage of ECTS | 3.5          | 1.5       |       |
| Total              | 70%          | 30%       | 100 % |

A student has passed the exam if he has acquired a percentage of credits for each learning outcome higher or equal to defined threshold.

**Grading:**

A student has passed the exam if he has acquired at least 50% of anticipated credits of a specific learning outcome.

If a student has passed learning outcomes of all courses, the accomplished credits (percentages) of all passed learning outcomes are being added, while the final grade is defined upon following table:

| Range of credits (percentages) | Numerical grade  | ECTS grade |
|--------------------------------|------------------|------------|
| 90,00 – 100,00                 | Excellent (5)    | A          |
| 75,00 – 89,99                  | Very good (4)    | B          |
| 60,00 – 74,99                  | Good (3)         | C          |
| 50,00 – 59,99                  | Sufficient (2)   | D          |
| 0,00 – 49,99                   | Insufficient (1) | F          |

**Obligatory literature**

1. Mikac, T., Blažević, D.: Planiranje i upravljanje proizvodnjom, Tehnički fakultet Rijeka, 2007.
2. Gačnik, V., Vodenik, F.: Projektiranje tehnoloških procesa, Tehnička knjiga Zagreb, 1990.
3. Katavić, I.: Ljevarstvo, Tehnički fakultet Rijeka, 2001.[]
4. Šavar, Š.: Obrada metala odvajanjem čestica, I i II dio, Školska knjiga Zagreb, 1990.
5. Smoljan, B.: Osnove toplinske obrade čelika, Sveučilište u Rijeci, Rijeka, 1997.

**Additional literature**

1. Kraut, B.: Strojarski priručnik, Algoritam, Zagreb, 1997.
2. Inženjerski priručnik IP1, Školska knjiga, Zagreb, 1996.
3. Inženjerski priručnik IP4, Prvi svezak, Školska knjiga, Zagreb, 2002.
4. Inženjerski priručnik IP4, Treći svezak, Školska knjiga, Zagreb, 2002.



