

## SYLLABUS

**1. Course title:**

Processing Technologies of Non-Metallic Materials

**2. Code:**

**3. Cycle of study:**

**4. ECTS credits:**

**5. Type of course:**

**6. Prerequisites:**

**7. Class restrictions:**

**8. Duration / semester(s):**



**9. Weekly contact hours and student workload:**

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)
9.1. Lectures	<input style="width: 40px; height: 20px;" type="text" value="5"/>	<input style="width: 40px; height: 20px;" type="text"/>		Classes: <input style="width: 40px; height: 20px;" type="text" value="33,75"/>
9.2. Seminars	<input style="width: 40px; height: 20px;" type="text" value="2"/>	<input style="width: 40px; height: 20px;" type="text"/>		Individual work: <input style="width: 40px; height: 20px;" type="text" value="56"/>
9.3. Laboratory / Practice classes	<input style="width: 40px; height: 20px;" type="text" value="1"/>	<input style="width: 40px; height: 20px;" type="text"/>		In total: <input style="width: 40px; height: 20px;" type="text" value="89,75"/>

**10. Faculty:**

Faculty of Mechanical Engineering

**11. Department/study program:**

Manufacturing Engineering, Mechanical Production Engineering

**12. Lecturer:**

**13. Course aims:**

The primary objective of teaching the course "Processing Technologies of Non-Metallic Materials" is to enable students to acquire fundamental knowledge in the field of processing this group of materials, as well as to understand the justification for their application in production, particularly in the mechanical, food, and automotive industries.

#### 14. Learning outcomes:

Upon successful completion of this course, the student will be able to:

- Recognize and define fundamental concepts in the field of processing and manufacturing of non-metallic materials;
- Propose and select the most suitable material for an appropriate processing method;
- Design an appropriate processing procedure for a specific production problem based on acquired knowledge;
- Manage the entire processing operation by selecting the most favorable processing parameters.

#### 15. Course content:

1. Introductory lectures, familiarization of students with the course, syllabus, teaching methods, grading system, etc.
2. Overview of structural non-metallic materials
3. Current research status in the field of production and application of non-metallic materials
4. Classification of technologies for processing non-metallic materials
5. Extrusion technologies and continuous extrusion
6. Injection molding technologies
7. Indirect pressing
8. Partial knowledge assessment
9. Rotational (centrifugal) casting technology
10. Joining technologies (welding and brazing of non-metallic materials)
11. Plastic forming technologies for non-metallic materials
12. Innovation of existing and application potential of newly developed processing methods
13. Waste management and recycling possibilities
14. Public defense of project assignments/seminar papers through presentations
15. Partial knowledge assessment

#### 16. Learning methods:

In order of successful learning within the subject the following activities are planned:

- Lectures - theoretical lectures, active two-way communication student - teacher, the obligatory presence of students; segment of active participation in the teaching of students will include and deal with a given topic by the student and public defense of the same.
- Exercises;
- Tests of the theory and problems - solving tests and problems;
- Seminar work - independent work of students in solving the above problem,
- Consultations.

#### 17. Assessment methods:

At mid-semester, students take the first written midterm exam, which covers the material studied up to that point. The midterm consists of theoretical questions and tasks, and students can earn a maximum of 20 points.

At the end of the semester, students take the second written midterm exam, covering all material studied during the semester. This exam also includes theoretical questions and tasks, with a maximum of 20 points.

The midterm exams are prepared by the course professor to ensure that students can answer questions related to the studied content within the allotted time. Both tests are taken simultaneously by all students, ensuring a consistent knowledge assessment level and uniform testing conditions.

As part of pre-exam requirements, students must prepare an individual seminar paper on a topic from the course content. The seminar paper is submitted in written form to the course instructor for review and evaluation, followed by an oral presentation and discussion on the presented topic.

During auditory exercises, students solve problems and calculation examples related to lecture content. In seminar/theoretic exercises, students complete a semester project based on the course topic.

A presented and approved seminar paper can earn up to 10 points. Mandatory attendance and participation in lectures and exercises can earn up to 5 points. The final and retake exams are oral, and students can earn up to 45 points.

Student knowledge assessments are recognized as a cumulative exam if the student scores at least 50% of the possible points in each individual assessment component.

To pass the course, a student must accumulate a minimum of 54 points in total.

Grading System: (5) + (10) + (40) + (45) = 100 points

Grade	Description	Letter Grade	Points Achieved
5 (five)	"unsatisfactory"	"F,FX"	< 54 points
6 (six)	"sufficient"	"E"	54-64 points
7 (seven)	"good"	"D"	65-74 points
8 (eight)	"very good"	"C"	75-84 points
9 (nine)	"excellent"	"B"	85-94 points
10 (ten)	"outstanding"	"A"	95-100 points

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## 18. Assessment components:

Grading will be based on the following activities:

- Attendance in lectures = 5 points
  - Seminar paper + classroom participation = 10 points
  - Tests = 40 points
  - Pre-exam obligations = 55 points
  - Final exam = 45 points
- Total = 100 points

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## 19. Mandatory reading list:

1. Tim A. Osswald: "Understanding Polymer Processing - Processes and Governing Equations", Carl Hanser Verlag, 2017.
2. Emi Govorčin Bajsić: "Prerada polimera", Sveučilište u Zagrebu, Fakultet kemijskog inženjerstva i tehnologije, Zagreb, 2017.

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## 20. Additional reading list:

1. Rainer Dangel: "Alati za injekciono brizganje plastike", Hanser Verlag, 2016.
2. Helmut Schüle, Peter Eyerer: "Polymer Engineering 2 - Verarbeitung, Oberflächentechnologije, Gestaltung", II Edition, Springer Verlag, 2020.

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## 21. Web sources:

<https://link.springer.com/book/10.1007/978-3-662-59841-2>  
<https://www.hanser-elibrary.com/doi/book/10.3139/9783446446038>  
[https://www.fkit.unizg.hr/\\_download/repository/Prerada\\_polimera.pdf](https://www.fkit.unizg.hr/_download/repository/Prerada_polimera.pdf)

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## 22. Applicable from the academic year:

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## 23. Adopted in the Faculty/Academy session: