SYLLABUS

1. Course title:

Materials II

2. Code:

3. Cycle of study:

I

4. ECTS credits:

5

5. Type of course:

Mandatory

6. Prerequisites:

No

7. Class restrictions:

Students of the first year of study at the Faculty of Mechanical Engineering (I cycle of studies)

8. Duration / semester(s):

I II

9. Weekly contact hours and student workload:

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)	
9.1. Lectures	3			Classes:	45
9.2. Seminars	0			Individual work:	95.3
9.3. Laboratory / Practice classes	1			In total:	140.3

10. Faculty:

Faculty of Mechanical Engineering

11. Department/study program:

Production engineering, Energy and thermo-fluid engineering, Mechatronics

12. Lecturer:

Dr. Sc. Jasmin Halilović, assistant professor

13. Course aims:

The objectives of the course are that students, after completing theoretical classes in Materials II, as well as maximum engagement in practical classes (through laboratory exercises), become competent in the field of testing the properties and defects of mechanical materials and acquire appropriate academic skills, as well as develop creative abilities and

master specific skills necessary for performing the profession (analysis and interpretation of results obtained after testing materials).

14. Learning outcomes:

Upon successful completion of this course, students should be able to: • Apply information on elastic and plastic deformations to predict loads or deformations that lead to yielding, strength, or fracture of materials. Distinguish between stress-strain characteristics of metals, ceramics, crystals, amorphous materials, and polymers.
• Perform experiments (standard destructive testing methods), from which they will analyze and interpret the obtained results of testing mechanical properties (hardness, plasticity, toughness, resistance properties, and deformation) on standard apparatus and devices (hardness measuring devices under static and dynamic load, indenters, Charpy pendulum, extensometers, ...). • Select the type of material for a given system, component, or process, in order to meet the load and functionality requirements, from the aspect of construction, properties, technology, and process. • Recognize the types of damage to engineering materials, their application and behavior in exploitation (fatigue and creep), classification and specificity of individual groups and types of modern materials, which are used in mechanical engineering. • Apply the concepts of crack propagation and brittle fracture, as well as the effects of the ductile-brittle fracture transition with the aim of predicting the fracture of brittle materials. • Perform experiments (standard non-destructive testing methods), from which they will analyze and interpret the obtained results - defects in materials.

15. Course content:

1. Introductory lectures on the function, importance and load testing methodologies
2. Examination of the mechanical properties of materials under different types of loads
3. Tensile Test (Tensile Strength), Hook Diagram
4. Shear, bending and twisting strength testing
5. Testing the hardness of the material
6. Testing the toughness of the material, material fracture and fracture testing
7. Test I
8. Material fatigue, Dynamic strength, Wőhler curve, Smith diagram
9. Long-term static load testing, creep of the material
10. Measurement of deformations and stresses, tensometry
11. Testing by non-destructive methods
12. Testing by non-destructive methods
13. Corrosion and wear of metal
14. Criteria for material selection and expert systems for material selection
15. Test II

16. Learning methods:

Lectures, laboratory exercises and consultations.
- Lectures using multimedia tools, active learning techniques and with active participation and discussions of students;
- Laboratory exercises, experimental performance of various methods of testing materials with constant activity through analysis and interpretation of the obtained results.
- Consultations (five hours per week);

17. Assessment methods:

The methods of knowledge assessment are: tests, laboratory reports and final exams.
• Task tests are a form of continuous assessment in which students solve tasks in certain areas. During the semester, students solve 2 tests. For each test, a student can earn up to 20 points, which makes a total of a maximum of 40 points. In order to successfully pass the test, a student must earn a minimum of 10 points from each test.
• During the semester, students prepare a report after each laboratory exercise, which is submitted to the subject assistant at the end of the semester. The student can earn a maximum of 10 points on the laboratory exercise report.
• The student takes the final exam in writing/oral form after previously meeting the requirements related to regular attendance and activity in classes and auditory exercises, where he can earn a maximum of 45 points. The final exam consists of theoretical questions. In order to successfully pass the final exam, a student must earn a minimum of 23 points. In order to pass the course, a student must earn a minimum of 54 cumulative points.

18. Assessment components:

The grade on the exam is based on the total number of points that the student earned by fulfilling pre-exam obligations and passing the exam, as follows:

Pre-examination requirements
Attendance at classes and exercises 5
Report on laboratory exercises 10
Test I 20
Test II 20

Total pre-exam requirements	**55**
Final exam	**45**

Total maximum points	**100**

Grading scale is as follows:

Grade	Description	Letter/Points
5 (five)	**Does not meet minimum criteria**	**F <54**
6 (six)	**Meets minimum criteria**	**E 54-64**
7 (seven)	**Generally good, but with significant shortcomings**	**D 65-74**
8 (eight)	**Average, with noticeable errors**	**C 75-84**
9 (nine)	**Above average, with some errors**	**B 85-94**
10 (ten)	**Exceptional with no or minor errors**	**A 95-100**

19. Mandatory reading list:

1. Dž. Kudumović.: ''Materijali II'', Mašinski fakultet, Tuzla 2010.
2. M. Oruč.: ''Ispitivanje metalnih materijala'', Univerzitet u Zenici, Zenica, 2006.
3. M. F. Ashby.: ''Materials selection in mechanical design'', third edition, 2005.

20. Additional reading list:

1. M. Oruč, R. Sunulahpašić.: ''Lomovi i osnovi mehanike loma'', Univerzitet u Zenici, Zenica, 2009.
2. T. Matković, P. Matković, Lj, Slokar.: ''Znanost o metalima - zbirka riješenih zadataka'', Sisak, 2010.

21. Web sources:

22. Applicable from the academic year:

2025/2026

23. Adopted in the Faculty/Academy session: