SYLLABUS

1. Course title:

Strength of materials II

2. Code:

3. Cycle of study:

I

4. ECTS credits:

6

5. Type of course:

Mandatory

6. Prerequisites:

No

7. Class restrictions:

No

8. Duration / semester(s):

I IV

9. Weekly contact hours and student workload:

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)	
9.1. Lectures	3			Classes:	56,25
9.2. Seminars	2			Individual work:	119,4
9.3. Laboratory / Practice classes	0			In total:	175,7

10. Faculty:

Faculty of Mechanical Engineering

11. Department/study program:

Energy and thermo-fluid engineering, Production engineering, Mechatronics

12. Lecturer:

Dr. sc. Džemal Kovačević,Assistant professor

13. Course aims:

Acquiering theoretical knowledge for understanding stresses and deformations in the field of structural theory.
Acquaintance of students with strength and stiffness calculation methods for engineering structures basic elements.

Acquiring practical knowledge necessary for understanding minor technical problems related to dimensioning, to review the strength and stiffness of elements of engineering structures.

14. Learning outcomes:

Based on the knowledge acquired during the course, the student will be able to:
- Identify static indeterminacy and calculate simpler statically indeterminate systems.
- When calculating statically indeterminate beams, relate the application of balance equations, equations and methods for determining statically indeterminate quantities (reactions), equations and methods for determining elastic lines of beams, and internal forces and deformations calculation.
- Identify and analyze complex states of stress and strain in structures.
- Recognize, analyze and calculate supports exposed to loss of elastic stability.

15. Course content:

1. Introduction – deformable body, equations of equilibrium, pure bending, bending by forces, elastic line differential equation.
2. Deformations by flexion: method of direct integration of lastic line differential equation, Clebsch procedure.
3. Deformations by flexion: superposition method, fictive beam method.
4. Deformations during bending: deformation of variable cross-section beams, influence of temperature on beam deflection.
5. Statically indeterminate supports, external and internal static indeterminacy, integration method, superposition method, decomposition method.
6. Method of three moments – Clapeyron's equation, method of forces, method of minimum deformation work, method of deformations.
7. Eccentric tension and pressure.
8. Buckling, loss of elastic stability, critical force, special cases.
9. First partial test.
10. Energy methods: Clapeyron, Betti, Maxwell.
11. Energy methods: Castlian, Maxwell-Mohr, Vereschagin theorems.
12. Complex stresses, strength theory (hypotheses).
13. Elasto-plastic theory, dynamic stresses, thin-walled profiles.
14. Numerical methods for structural analysis, commercial FEM applications.
15. Second partial test.

16. Learning methods:

Lectures, auditory exercises, graphic works, consultations, interactive communication with course participants, company tour.

17. Assessment methods:

The concept of knowledge assessment is based on continuous work with students during the semester. Knowledge assessment methods include: knowledge assessment through partial exams during class, creation of graphic works as well as final exam in written and/or oral form. This allows all students who have different affinities one treatment (written and/or oral knowledge test)

18. Assessment components:

Evaluation will be based on the following activities:

Pre-examination requirements	
- Written partial test I	**20 points.**
- Written partial test II	**20 points.**
- Assignments, project paper / graphic works	**15 points.**
Total pre-exam requirements	**55 points.**
Final exam	**45 points.**
Total maximum	**100 points.**

Grading scale is as follows:

Grade	Descriptive	Letter	For the number of points achieved
5 (five)	"does not meet the minimum criteria"	"F,FX"	<54 points
6 (six)	"meets the minimum criteria"	"E"	54-64 points
7 (seven)	"generally good, but with significant shortcomings"	"D"	65-74 points
8 (eight)	"average, with noticeable errors"	"C"	75-84 points
9 (nine)	"above average, with some errors"	"B"	85-94 points
10 (ten)	"exceptional success with no errors or with minor errors"	"A"	95-100 points

19. Mandatory reading list:

1. Šimić V.: Otpornost materijala II – Školska knjiga, Zagreb 1992.
2. Doleček V.: Elastostatika II, Bihać 2004.
3. Mandić J.Đ.: Otpornost materijala, Naučna knjiga,Beograd 1992.

20. Additional reading list:

1. Mandić J., Tatić N.: Zbirka zadataka iz otpornosti materijala, Naučna knjiga, Beograd, 1976.
2. Alfirević I.: Nauka o čvrstoći II, Tehnička knjiga, Zagreb 1995.
3. Hibbeler R.C.: Mechanics of Materials, ninth edition, 2014.

21. Web sources:

1. https://vipulzblog.wordpress.com/wp-content/uploads/2018/08/strength-of-material-by-r-k-bansal-31.pdf
2. https://archive.nptel.ac.in/courses/112/107/112107146/

22. Applicable from the academic year:

2025/2026

23. Adopted in the Faculty/Academy session: