

## SYLLABUS

**1. Course title:**

NUMERICAL METHODS IN MECHANICAL ENGINEERING

**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:<br>(hours)  |
|------------------------------------|---|---|----------------------------|---|
|                                    | <input style="width: 50px; height: 20px;" type="text" value="1"/> | <input style="width: 50px; height: 20px;" type="text"/> |                            |   |
| 9.1. Lectures                      | <input style="width: 50px; height: 20px;" type="text" value="2"/> | <input style="width: 50px; height: 20px;" type="text"/> | Classes:                   | <input style="width: 50px; height: 20px;" type="text" value="33.75"/> |
| 9.2. Seminars                      | <input style="width: 50px; height: 20px;" type="text" value="0"/> | <input style="width: 50px; height: 20px;" type="text"/> | Individual work:           | <input style="width: 50px; height: 20px;" type="text" value="54.67"/> |
| 9.3. Laboratory / Practice classes | <input style="width: 50px; height: 20px;" type="text" value="1"/> | <input style="width: 50px; height: 20px;" type="text"/> | In total:                  | <input style="width: 50px; height: 20px;" type="text" value="88.42"/> |

**10. Faculty:**

**11. Department/study program:**

**12. Lecturer:**

**13. Course aims:**

---

#### 14. Learning outcomes:

A student who successfully completes the course content will be able to independently analyze, model, and programmatically implement basic numerical algorithms encountered in engineering calculations, and to apply them to problems from everyday engineering practice using software tools (MATLAB).

---

#### 15. Course content:

1. Introduction to numerical methods, modeling and simulation, types of models, basic software tools
  2. Error calculus, types and propagation of errors
  3. Linear systems, significance, formulation, direct methods
  4. LU decomposition, iterative methods
  5. nonlinear equations, basic methods
  6. systems of nonlinear equations, basic methods, examples in technology (MATLAB)
  7. interpolation, polynomials, SPLINE interpolation (CAD)
  8. TEST No. 1
  9. approximation, regression, fitting (MATLAB)
  10. numerical differentiation, CDM
  11. numerical integration, basic methods - algorithms
  12. numerical integration ODE, basic algorithms, examples in Engineering, MATLAB
  13. multistep methods, ODE systems, examples
  14. numerical methods in material resistance, dynamics, CDM
  15. TEST No. 2
- 

#### 16. Learning methods:

Lectures and presentations with analysis of examples, problems for independent practice, exercises with program tasks, consultations with the teacher and assistant.

---

#### 17. Assessment methods:

Partial knowledge tests are conducted in the middle and at the end of the semester and include a practical part (program assignments) and a theory test. A student who has achieved at least 54% of points has passed the partial knowledge test. At the final exam, the student is exempted from the part of the exam that was passed through partial tests. In order to enter a grade, it is necessary to pass both the practical and theoretical parts of the exam.

##### Rating:

- 5 (five, F,FX) <54, does not meet minimum criteria,
  - 6 (six, E) 54 - 64, meets minimum criteria
  - 7 (seven, D) 65 - 74, generally good, but with significant flaws,
  - 8 (eight, C) 75-84, average, with noticeable flaws
  - 9 (nine, B) 85 - 94, above average, with a few errors,
  - 10 (ten, A) 95 - 100, outstanding achievement without errors or with minor errors
- 

#### 18. Assessment components:

The exam grade is based on the total number of points the student has earned by completing the pre-exam requirements and taking the exam, as follows:

##### Pre-exam requirements:

Partial Test I, tasks + theory:  $15 + 15 = 30$

Partial Test2, tasks + theory:  $15 + 15 = 30$

-----

Total pre-exam requirements: 60

Final exam: 40

Total maximum: 100

---

#### 19. Mandatory reading list:

1. Amos Gilat: "Numerical Methods for Engineers and Scientists" Wiley 2014
- 

#### 20. Additional reading list:

- I.Demirdžić: "Numerička matematika", Svjetlost Sarajevo, Sarajevo 1995 god.
- 

#### 21. Web sources:

---

---

---

**22. Applicable from the academic year:**

2025/2026

---

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

---