SYLLABUS

1. Course title:

Mathematics III

2. Code:

3. Cycle of study:

I

4. ECTS credits:

5

5. Type of course:

Mandatory

6. Prerequisites:

7. Class restrictions:

8. Duration / semester(s):

I   III

9. Weekly contact hours and student workload:

	Semester (1)		Semester (2)		(for two-semester courses)	Workload: (hours)	
9.1. Lectures	2				Classes:	45	
9.2. Seminars	2				Individual work:	90,1	
9.3. Laboratory / Practice classes	0				In total:	135,1	

10. Faculty:

Faculty of Mechanical Engineering

11. Department/study program:

Production engineering, Energy and thermo-fluid engineering, Mechatronics

12. Lecturer:

Dr.sci. Sanela Halilović, associate professor

13. Course aims:

- extending knowledge from the ordinary differential equations by passing on the systems of differential equations
- adopting the notions and issues from the basics of differential geometry
- adopting the notion of surface integrals and their applications

- gaining the knowledge from the theory of vector fields and applications
- gaining the basic knowledge on the functions of a complex variable
- qualifying the students for applying the knowledge from this teaching course on other courses
- develop the feeling for logic and visual comprehending of various phenomena, problems and figures in space

14. Learning outcomes:

At the end of semester, successful students should be able to:
- solving the system of differential equations
-calculating the arc length in 3D space, torsion and curvature, finding the principal normal vector , tangent vector and binormal vector to the curve
-calculating the area of surface, solving the surface integrals of the I and II kind
-using various kind of operators (gradient and curl of a vector field, Hamilton (nabla) operator, Laplace operator)
-finding the circulation and flux of vector field
- knowing the elementary facts about the functions of complex variable: finding the limit and derivatives of the functions of complex variable, as well as investigate differentiability and analiticity of these functions
- apply all these contents to other subjects where it is needed

15. Course content:

1. The systems of differential equations: basic notions, passing to the one differential equation of the higher order,
2. The first integrals of the system and the systems of linear differential equations
3. Systems of linear differential equations with constant coefficients
4. Vector-valued function and rectification of the curve
5. Natural trihedron of the curve, torsion and curvature of the curve
6. Line integrals. Orientation and area measure of surface
7. The surface integrals of the I kind with applications
8. Test 1
9. The surface integrals of the II kind, theorems of Ostrogradsky and Stokes
10. Scalar and vector field. Space derivative
11. Hamilton (nabla) operator and Laplace operator, gradient, divergence, curl.
12. Vector fields: potential field, solenoid field, Laplace field and compound vector field. Flux and circulation of a vector field.
13. Complex sequences. The limit value and continuity of the functions of a complex variable
14. Derivatives of the functions of a complex variable and elementary functions of a complex variable.
15. Test 2

16. Learning methods:

- Lectures and the technique of active studying with active participation and discussion of students.
- Exercise classes where students solve exercises problems with the help of a teaching assistant or independently.
- Consultations with the lecturer and assistants
- Observation and deliberation, creating abstract concepts and generalization.

17. Assessment methods:

After the first half of the semester students are taking Test 1 with calculation tasks and it carries a maximum of 25 points. At the end of the semester students are taking Test 2 with calculation tasks and it carries a maximum of 25 points. For continued activity on classes students may gain up to 5 points. Students take the final exam by answering theoretical questions.
The final exam carries a maximum of 45 points.
The condition for successfully passing the exam is to obtain a minimum of 40% out of 45 points in the final exam and minimum 40% out of 25 points for each test (Test1 -10 points minimum, Test 2- 10 points minimum, Final exam- 18 points minimum). Student must obtain at least 54 cumulative points for passing grades (Test 1+Test 2+ Activity + Final exam). A student, who does not make enough points, takes the makeup exam, at whom he/she can correct each of before mentioned parts of the exam (Test 1, Test 2, Final exam). The makeup exam is considered passed if the student wins at least 54 cumulative points.

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

18. Assessment components:

Test 1: 25 points
Test 2: 25 points.
Activity : 5 points.
Final exam: 45 points.
Total: 100 points.

19. Mandatory reading list:

S. Sadiković, S. Halilović: Matematika III za studente mašinstva, Univerzitetski udžbenik, OFF-SET, Tuzla, 2016.
(210 pages)
A. Crnkić, F. Kulenović, M.Haurdić, Š. Jusić: Inžinjerska matematika, Univerzitetski udžbenik, Grafičar Bihać, 2023.
(pages 95 -134)

20. Additional reading list:

M.P. Uščumlić, P.M. Miličić: Zbirka zadataka iz više matematike II, Naučna knjiga Beograd, 1981.
(pages 115-130, pages 140-168, pages 235-250, pages 293- 309; in total: 78 pages)

M.Tomić: Matematika, Svjetlost, Sarajevo, 1988.

21. Web sources:

22. Applicable from the academic year:

2025/2026.

23. Adopted in the Faculty/Academy session: