



UNDERGRADUATE STUDY: **TRANSPORT and LOGISTICS**

SEMESTER (I)

Syllabus

Academic year 2025/2026

Course: Mathematics 1						
Head of course: Asst. Prof. Tomislav Fratrović , Ph. D.						
Co-lecturers: Marijana Greblički , Ph. D. Radomir Lončarević , mag. educ. math. et phys. Asst. Prof. Jelena Rupčić , Ph.D. Diana Hunjak , Ph. D.						
Semester: W	Course code: 271989 272748	Lectures: 45	Auditory exercises: 45	Laboratory exercises: 0	Seminars: 0	ECTS credits: 7
Group for lectures: 150 students			Group for auditory and laboratory exercises: 50 students			

Objective of the course:

- Introduce students to the basics of linear algebra, differential and integral calculus of functions of one variable with emphasis on their applications.

Course enrolment requirements:

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Learning outcomes:

After completing the course, students will be able to:

1. Distinguish the concepts of scalars and vectors and combine algebraic operations in the complex plane as well as in 2D and 3D Euclidean space.
2. Formulate the equations of a line and plane in a three-dimensional coordinate system.
3. Classify the elementary functions of one variable, distinguish their properties, and sketch their graphs.
4. Use basic derivatives and derivation rules (chain rule, product and quotient of functions) when deriving elementary functions.
5. Apply limits and derivatives to find tangents, local extrema, inflection points and to analyze function flow.
6. Distinguish the concepts of definite and indefinite integrals and use the Newton-Leibniz formula for basic integrals.



7. Solve the integral by the substitution method or by partial integration.
8. Establish the connection of a definite integral and the area between two curves in the Cartesian coordinate system.



LECTURES, EXERCISES and SEMINARS

Week	Syllabus	Form of classes	Performed by	Lessons	Remark
1.	▪ Sets of numbers. Real and complex numbers. Complex plane. Trigonometric notation of a complex number.	L	Marijana Greblički	3	
	▪ Device on the set of real numbers. Arithmetic operations with complex numbers.	AE	Marijana Greblički	3	
2.	▪ Definition of vectors. Coordination. Vector algebra.	L	Marijana Greblički	3	
	▪ Calculation operations with vectors and their application. Scalar product. Vector product.	AE	Marijana Greblički	3	
3.	▪ Definition of function. Domain, graph, composition, inverse function. Properties of elementary functions.	L	Marijana Greblički	3	
	▪ Mixed product. Practicing mixed tasks.	AE	Marijana Greblički	3	
4.	▪ Polynomials. Rational functions. Exponential and logarithmic functions.	L	Marijana Greblički	3	
	▪ Determination of natural domains of elementary functions. Division into partial fractions.	AE	Marijana Greblički	3	
5.	▪ General potency. Trigonometric and cyclometric functions.	L	Marijana Greblički	3	



	Drawing graphs of trigonometric functions. Determination of inverse function and composition of functions.	AE	Marijana Greblički	3	
6.	The concept of function lines. Asymptotic behavior of the function. Definition of derivation.	L	Marijana Greblički	3	
	Mixed tasks: determining the natural domain and calculating the limes of the function.	AE	Marijana Greblički	3	
7.	Derivation of some tabular derivations. Rules of derivation. The tangent problem.	L	Marijana Greblički	3	
	Determination of derivatives of elementary functions. Derivation of a complex function. Higher order derivatives.	AE	Marijana Greblički	3	
8.	Implicitly default functions. Parametric default curves. Examples. Logarithmic derivation.	L	Marijana Greblički	3	
	Tasks with tangent and normal. Derivation of an implicitly given function.	AE	Marijana Greblički	3	
9.	Application of derivations. Examining the function flow.	L	Marijana Greblički	3	
	Growth and decline of function. Extremes. Convexity and concavity. Points of inflection.	AE	Marijana Greblički	3	
10.	Order of functions. Application of derivatives in the Taylor series.	L	Marijana Greblički	3	
	Application of derivations. L'Hospital's rule. Asymptotes.	AE	Marijana Greblički	3	



11.	▪ Definite integral. Indefinite integral. Direct integration.	L	Marijana Greblički	3	
	▪ Application of integral tables and integration rules.	AE	Marijana Greblički	3	
12.	▪ Method of substitution. Partial integration.	L	Marijana Greblički	3	
	▪ Partial integration and substitution for indefinite and definite integral.	AE	Marijana Greblički	3	
13.	▪ Integrals of some trigonometric functions.	L	Marijana Greblički	3	
	▪ Integrals of rational functions	AE	Marijana Greblički	3	
14.	▪ Calculation of areas.	L	Marijana Greblički	3	
	▪ Application of integrals to the calculation of areas.	AE	Marijana Greblički	3	
15.	▪ Application of integrals in geometry and mechanics.	L	Marijana Greblički	3	
	▪ Mixed problems with the application of integrals.	AE	Marijana Greblički	3	

L = Lectures; AE = Auditory Exercises; LE = Laboratory Exercises; S = Seminars



STUDENT OBLIGATIONS AND EXAMS

Conditions for obtaining signatures:

A student can take the exam if status of completed subject is obtained (10 + 10 + 10):

- 10 attended lectures
- 10 attended exercises
- 10 points from homework checks (out of a total of 20 points!)

Written Examination:

In addition to homework checks, students also write two colloquia for exemption from the written part of the exam. A bonus in the amount of 10% of the total number of points from homework checks (max. 2 points!) is added to the number of points from the colloquia (max. 20 points from two colloquia). To be exempted from the written part of the exam, a minimum of 10 points (50%) must be obtained. The exemption from the written exam is valid for the first application of the exam.

If the written part is not passed through the colloquium, the student must take the written part of the exam during the exam period, which consists of 5 tasks. Then, to pass the exam at least 5 points must be obtained out of a total of 10 (50%).

Colloquium scoring:

POINTS	GRADE
10 - 12,99	sufficient (2)
13 - 15,99	good (3)
16 - 17,99	very good (4)
18 - 20	excellent (5)

Written exam scoring:

POINTS	GRADE
0 - 4,99	insufficient (1)
5 - 6,49	sufficient (2)
6,5 - 7,99	good (3)
8 - 8,99	very good (4)
9 - 10	excellent (5)

Oral examination:



After successfully passing the written part of the exam, students also solve tasks and/or answer questions in the oral part. Depending on the answers, the grade achieved in the written part can be raised or lowered in the final oral exam, and the student can be directed to retake the exam.

LITERATURE

a) Obligatory literature:

1. S. Marušić: Matematika 1, udžbenik s riješenim primjerima, Fakultet prometnih znanosti, Zagreb, 2007

b) Recommended literature:

2. V.P. Minorski: Zbirka zadataka iz više matematike, Tehnička knjiga, Zagreb, 1971.
3. B.P. Demidovič i suradnici: Zadaci i riješeni primjeri iz matematičke analize za tehničke fakultete, DANJAR d.o.o., Zagreb, 1995.



METHODOLOGY OF THE IMPLEMENTATION OF THE COURSE PLAN

1. LECTURES

Ex cathedra

2. AUDITORY EXERCISES

Ex cathedra

3. LABORATORY EXERCISES

4. SEMINAR

Note: Individual and/or group viewing negative written test



5. DOCUMENTATION

6. SCORING SYSTEM

Table 1 The scoring system for the monitoring of students and explained credit values in ECTS credits

no	Segment:		Required credits to be achieved:		Remark:	ECTS credits
			Min.	Max.		
1.	Presence at the lectures		0	2	Independent work	2
2.	Presence at the exercises (auditory and laboratory)		0	2		2
3.	Seminar					
4.	First colloquium	= Written exam	0	1		1
5.	Second colloquium		0	1		1
6.	Oral exam		0	1		1
Σ	Overall points:			7	Overall ECTS points:	7

*During the course the student is evaluated based on the sum of the internal points earned through participating in class (lectures and exercises) and grading the seminar work. The student, in order to realize the condition "courses requirements achieved", must achieve a minimum of 30 points.



Table 2 - Explanation of the credit values in evaluations

CREDITS:	Estimate based on attendance, seminar paper and two colloquies (or written exam) - [4 ECTS]*:	The final score [7 ECTS]*:
	Sufficient (2)	
	Good (3)	
	Very good (4)	
	Excellent (5)	

Information for students (scoring system, implementation plan, learning outcomes, syllabus, literature, consulting teachers, announcement of results of examinations or colloquium, and all other information):

- <https://moodle.srce.hr/2025-2026/> (<https://merlin.srce.hr>)
- <http://www.fpz.unizg.hr/isvu/2025-en/>