



REPUBLIKA E SHQIPËRISË

“ISMAIL QEMALI” UNIVERSITY
FACULTY OF TECHNICAL AND NATURAL SCIENCES
COMPUTER SCIENCE DEPARTMENT

SYLLABUS CALCULUS 2

Curriculum Developer		Assoc. Prof. Rozana Liko <i>Mathematician (DIND)</i> <i>Ph.D. in Applied Mathematics</i>							
Credits and hours	Credits	Hour in the classroom						Individual study	Total
	6 ECTS	Lectures	Seminars	Labs	Practice	Course project	Total		
	6 ECTS	45	30	0	0	0	75	75	150
Course Typology		A - Basic subject							
Academic year /semester		2025-2026/ First year, second semester							
Nature and requirement of the course		Mandatory course							
Study program		Bachelor in Computer Engineering							
Course Code		MAT 155E							
Email of curriculum developer/lecturer		rozana.liko@univlora.edu.al							

SUMMARY AND LEARNING OUTCOMES

Course Description	The course aims to cover the basic knowledge of mathematical analysis. During it, a complete study of: integration techniques, applications of integrals, polar coordinates and polar lines, parametric lines, complex numbers, and numerical series.
Course Objectives	▪ Mastering integration techniques. ▪ Calculating improper integrals ▪ Introducing parametric equations ▪ Knowledge of polar equations ▪ Knowledge of numerical series
Expected Outcomes	At the end of the course, students will be able to recognize the basic concepts in these areas: ☐ Knowledge of the techniques of integration of functions with one variable ☐ Knowledge of how integrals are applied in real life ☐ Knowledge of analyzing lines with parametric equations ☐ Recognition and analysis of polar functions ☐ Study of the convergence of numerical series ☐ Representation of a function in series form



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FUNDAMENTAL CONCEPTS

- Applications of the integral
- Integration techniques
- Parametric lines
- Polar lines
- Series

Week	COURSE TOPICS	Reference Literature	Teaching Methodology
I.	Topic 1 – Presentation of the MAT155E Syllabus. Presentation of the organization of the Calculus 2 course. Introduction to the objectives and basic concepts of this course. Topic 2 – Areas Between Curves Topic 3 – Volumes Seminar - Exercises for topics 2 and 3.	Syllabys MAT 155E [1] page. 422-440	Lecture 1 hour Lecture 1 hour Lecture 1 hour Seminars 2 hours
II.	Topic 4 – Volumes by Cylindrical Shells Topic 5 –Work Topic 6 –Average Value of a Function Seminar - Exercises for topics 4, 5, and 6.	[1] page. 441-454	Lecture 1 hour Lecture 1 hour Lecture 1 hour Seminars 2 hours
III.	Topic 7 –Integration by Parts Topic 8 –Trigonometric Integrals Topic 9 –Trigonometric Substitution Seminar - Exercises for topics 7, 8, and 9.	[1] page. 464-483	Leksion 1 orë Leksion 1 orë Leksion 1 orë Seminars 2 hours
IV.	Topic 10–Integration of Rational Functions by Partial Fractions (case 1&2) Topic 11–Integration of Rational Functions by Partial Fractions(case 3&4) Topic 12 –Strategy for Integration Seminar - Exercises for topics 10, 11, and 12.	[1] page.484-499	Lecture 1 hour Lecture 1 hour Lecture 1 hour Seminars 2 hours
V.	Topic 13–Integration Using Tables and Computer Algebra Systems Topic 14 – Approximate Integration Topic 15 –Improper Integrals Seminar –Exercises for topics 13, 14, and 15.	[1] page.500-525	Lecture 1 hour Lecture 1 hour Lecture 1 hour Seminars 2 hours
VI.	Topic 16 –A Comparison Test for Improper Integrals Topic 17 –Arc Length Topic 18 – Area of a Surface of Revolution Seminar - Exercises for topics 16, 17, and 18.	[1] page. 525-550	Lecture 1 hour Lecture 1 hour Lecture 1 hour Seminars 2 hours



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Week	COURSE TOPICS	Reference Literature	Teaching Methodology
VII.	Topic 19 – Applications to Physics and Engineering Topic 20 – Moments and Centers of Mass Topic 21 – Probability Seminar - Exercises for topics 19, 20, and 21.	[1] page.551-574	Lecture 1 hour Lecture 1 hour Lecture 1 hour Seminars 2 hours
VIII.	Topic 22 – Partial Exam Topic 23 – Curves Defined by Parametric Equations Topic 24 – Calculus with Parametric Curves Seminar - Exercises for topics 22, 23, and 24.	[1] page. 636-652	Lecture 1 hour Lecture 1 hour Lecture 1 hour Seminars 2 hours
IX.	Topic 25 – Polar Coordinates Topic 26 – Tangents to Polar Curves Topic 27 – Graphing Polar Curves with Graphing Devices Seminar - Exercises for topics 25, 26, and 27.	[1] page.654-669	Lecture 1 hour Lecture 1 hour Lecture 1 hour Seminars 2 hours
X.	Topic 28 – Areas and Lengths in Polar Coordinates Topic 29 – Conic Sections (Parabolas, Ellipses) Topic 30 – Hyperbolas, Shifted Conics Seminar - Exercises for topics 28, 29, and 30.	[1] page.665-677	Lecture 1 hour Lecture 1 hour Lecture 1 hour Seminars 2 hours
XI.	Topic 31 – Conic Sections in Polar Coordinates Topic 32 – Sequences Topic 33 – Series Seminar -Exercises for topics 31, 32, and 33.	[1] page.678-685 [1]page.690-713	Lecture 1 hour Lecture 1 hour Lecture 1 hour Seminars 2 hours
XII.	Topic 34 – The Integral Test Topic 35 – Estimates of Sums Topic 36 –The Comparison Tests Seminar – Exercises for topics 34, 35, and 36.	[1] page.714-726	Lecture 1 hour Lecture 1 hour Lecture 1 hour Seminars 2 hours
XIII.	Topic 37 – Alternating Series Topic 38 – Absolute Convergence and the Ratio and Root Tests Topic 39 – Strategy for Testing Series Seminar – Exercises for topics 37, 38, and 39.	[1] page.727-740	Lecture 1 hour Lecture 1 hour Lecture 1 hour Seminars 2 hours
XIV.	Topic 40 –Power Series Topic 41 – Representations of Functions as Power Series Topic 42 – Differentiation and Integration of Power Series Seminar – Exercises for topics 40, 41, and 42.	[1] page.741-752	Lecture 1 hour Lecture 1 hour Lecture 1 hour Seminars 2 hours



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Week	COURSE TOPICS	Reference Literature	Teaching Methodology
XV.	Topic 43 –Taylor and Maclaurin Series Topic 44 – Multiplication and Division of Power Series Topic 45 – Applications of Taylor Polynomials Seminar – Exercises for topics 43, 44, and 45.	[1] page.753-776	Lecture 1 hour Lecture 1 hour Lecture 1 hour Seminars 2 hours

KNOWLEDGE ASSESSMENT							
ATTENDANCE		Attendance for lectures and seminars is mandatory at 75%. Otherwise, the student loses the right to take the exam. Absences are the personal responsibility of the student, as are any missed assignments or tests. A student who has less than 75% attendance for the period relevant to any partial exam, during which they will be tested, will not be allowed to take the corresponding exam and will be graded with an M (Missing). If the student has attended the course but does not show up for the next exam, they will be graded NP (Not Present).					
CONTINUOUS ASSESSMENT	Assessment Method	Assessment Time	Learning Topics to be Assessed	Maximum Points	Knowledge Testing Method	Test Content	
	Partial Exam	Week 7-8	1-15	25 points	Written exam	Concepts and exercises	
	Final Exam	End of the semester	16-45	60 points	Written exam	Concepts and exercises	
	Continuous Assessment* (Course Assignment*)	During the semester	-	15 points	Written report and oral presentation	Project or exercises	
	* Continuous Assessment – The student will realize a project, that will start at the beginning of the semester.						
	The conversion of points to the final grade is as follows:						
	0 - 40 points	41 - 50 points	51 - 60 points	61 - 70 points	71 - 80 points	81 - 90 points	91 - 100 points
	4	5	6	7	8	9	10
LITERATURE							
Primary literature		[1] J. Stewart, Single variable calculus: Early transcendentals, 7th Edition, Brooks/Cole, Cengage Learning, 2012					



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Recommended literature	1. Thomas' Calculus, Including second Order Differential Equations, 13th edition.
FINAL REMARKS FROM THE COURSE INSTRUCTOR	
Provisions	Students are expected to develop values and an ethics that reflect their interests and behavior from a professional perspective. Students must respect individual differences, be cooperative, and in accordance with ethical rules, they should respect ethnic differences and assist individuals with disabilities with inclusive and supportive attitudes.
Delays	Delays in lectures and seminars will not be tolerated.
Academic integrity and copyright	Each test or written work must be completely individual and original. Plagiarism (mixed combinations) or theft of information through various means will not be allowed.

HEAD OF DEPARTMENT OF COMPUTER SCIENCES
Dr. Alketa HYSO