

Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering
Mechanical Engineering Department
 2025-2026 Spring Semester

Syllabus	
Code/Name	MCE 108 / Mathematics II
Type	Required
Credit/ECTS	4/5
Hour per Week	4 (4+0+0)
Level/Year	Undergraduate/1
Semester	Spring
Classroom	Wednesday A003 - Thursday A004
Content	Improper Integrals. Applications of integrals. Sequences and their properties. Convergence of Sequences. Series. Convergence of series. Geometric series. Harmonic series. Alternating series. Convergence and divergence tests for infinite series. Power series. Radius of convergence of a power series. Derivatives and integrals of power series. Representation of functions using power series. Taylor and Maclaurin series. Some applications of Taylor and Maclaurin series.
Prerequisites	None
Textbooks	<p>Primary Lecture Notes.</p> <p>Supplementary</p> <ul style="list-style-type: none"> • G. B. Thomas, M. D. Weir, J. Hass, F. R. Giordano, Thomas' Calculus, 11th Ed., Pearson Addison-Wesley, 2004, ISBN-13: 978-0321226426. • J. Stewart, Calculus: Concepts and Contexts, 2nd Ed., Brooks/Cole, 2001. • D. G. Zill, W. S. Wright, Calculus: Early Transcendentals, 4th Ed., Jones & Bartlett Learning, 2009. • F. Ayres, E. Mendelson, Schaum's Outline Series, 6th Edition, McGraw-Hill Education, 2012.
Objectives	<ul style="list-style-type: none"> • To give an ability to explain the concept of improper integral and to classify the improper integrals according to their types • To give an ability to apply integration rules to problems such as calculating the area between two curves, calculating volume, calculating arc length, calculating center of mass and moments, and calculating surface area • To give an ability to define sequences and series and explain their properties • To give an ability to explain the concept of sequence convergence • To give an ability to define the concepts of bounded sequence, monotonic sequence, infinite series, geometric series, harmonic series and alternating series • To give an ability to determine the convergence or divergence of series with the help of Ratio test, Integral test, Comparison test and other convergence tests • To give an ability to explain the concepts of absolute convergence, Power series, Power series representation of functions, Taylor and Maclaurin series.
Course Outcomes	<p>In this course you will be able to:</p> <p>C01 The ability to evaluate the improper integrals</p> <p>C02 The ability to apply definite integral for calculating the area between curves, volume, arc length, moment and centroid, and surface area</p> <p>C03 The ability to define sequences and investigate some of their properties (monotonicity, convergency, and etc.)</p> <p>C04 The ability to find the sum of the series and determine their convergency</p> <p>C05 The ability to find the Taylor/Maclaurin Series for a function</p>

Weekly Schedule of Topics

W	Topic
1	Improper integrals and their types.
2	Calculation of Improper integrals. Convergency tests for Improper Integrals.
3	Application of definite integrals: Areas between two curves.
4	Application of definite integrals: Volume.
5	Application of definite integrals: Arc length.
6	Application of definite integrals: Center of mass and moments.
7	Application of definite integrals: Area of surfaces of revolution.
8	Application of definite integrals: Average value of a function.
9	Sequences. Subsequences. Convergence in sequences. Boundedness in sequences. Monotonicity in sequences. Arithmetic sequence. Geometric sequence. Limits of a sequence.
10	Series and Sum of a series.
11	Some special series. Geometric series. Harmonic series. Alternating series. Convergence and Divergence Tests for Infinite Series. Absolute and Conditional Convergence.
12	Power series. Radius of convergence. Term by term differentiation and integration of power series.
13	Power series representation of functions, Taylor and Maclaurin series.
14	Some applications of Taylor and Maclaurin series.

Professional Contribution Ability to use integral, sequences and series to solve a real-life problem and to analyze a mathematically expressed problem by these concepts.

Contribution to Program Outcomes*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	5	3	0	1	0	0	0	1	0	0	0
CO2	5	3	0	1	0	0	0	1	0	0	0
CO3	5	3	0	1	0	0	0	1	0	0	0
CO4	5	3	0	1	0	0	0	1	0	0	0
CO5	5	3	0	1	0	0	0	1	0	0	0

* Contribution Level | 0: None | 1: Very Low | 2: Low | 3: Medium | 4: High | 5: Very High

Special Conditions None

Requirements Basic knowledge of basic mathematical concepts as single variable functions and their properties, inverse and composition of functions, and some special functions and their properties

Course Policy

- Be in the class on time.
- English should always be used to communicate with one another.
- According to ALKU Undergraduate Education - Teaching and Examination Regulation; **70% attendance** in theoretical courses is **mandatory**. Therefore, students who cannot meet these conditions cannot take the end-of-term exam (final exam) and are given a letter grade of **DZ**.

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Cheating & Plagiarism	● According to ALKU Undergraduate Education - Teaching and Examination Regulation; the exam of a student who attempts to cheat, cheats or assists in cheating, has someone else take the exam instead of him/herself, or takes the exam in someone else's place is considered invalid and necessary legal action is taken against him/her.		
Evaluation	Midterm		40%
	Final Exam		60%
	Total		100%
Rubric	According to ALKU Undergraduate Education - Teaching and Examination Regulation; Success grade evaluation is carried out according to the relative evaluation system by considering the distribution of grades and the class average, together with the raw success grade, and the general success level of the class. Students who do not take the end-of-term exam (final exam) are given a grade of FF.		
Instructor			
Name/Surname	İrem Küçüköğlü	Email	irem.kucukoglu@alanya.edu.tr
Room	420	Office Hours	Thursday 11:00 – 12:00

Prepared by İrem Küçüköğlü on February 5th, 2026.