Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering
Department of Genetic and Bioengineering
2024-2025 Fall Semester

Syllabus	
Code/Name	GBM 105 / Mathematics I
Type	Required
Credit/ECTS	5/5
Hour per Week	4 (4+0+0)
Level/Year	Undergraduate/1
Semester	Fall
Classroom	WWF | A003
Content	Introduction to general mathematics with basic mathematical concepts. Definition of the Single variable functions, their properties and some special functions. Definition of the Limit and Continuity and their properties. Definition of Derivative and derivatives of some special functions. Maximum/Minimum problems and some applications of the Derivative. Curve Sketching. Indeterminate Forms and L'Hospital's Rule. Indefinite integral. Integration rules.
Prerequisites	None
Textbooks	***Primary*** Class Notes ***Supplementary*** G. B. Thomas, M. D. Weir, J. Hass, F. R. Giordano, Thomas' Calculus, 11th Ed., Pearson Addison-Wesley, 2004, ISBN-13: 978-0321226426. 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. J. Stewart, Calculus: Concepts and Contexts, 2nd Ed., Brooks/Cole, 2001.
Objectives	● To be able to explain the concept of limit and to calculate the limit via the definition of limit ● To be able to define the concept of Continuity of functions ● To be able to take derivatives of trigonometric and inverse trigonometric functions, exponential and logarithmic functions, hyperbolic and inverse hyperbolic functions ● To be able to take higher-order derivatives, to define the derivatives of functions given by parametric equations and to explain the Implicit Differentiation ● To be able to explain the concepts of Indefinite and Definite integral, to calculate the integrals by applying the integration rules
Course Outcomes	In this course you will be able to: CO1 Recognize the indeterminate forms and evaluate the limits CO2 Take first and higher order explicit and implicit derivatives CO3 Calculate maximum and minimum values of the functions CO4 Sketch the graph of a function CO5 Evaluate the Indefinite and Definite integrals

Weekly Schedule of Topics

W	Topic
1	Rates of Change and Limits. Calculation of the Limit by using Limit laws.
2	One-Sided Limits, Limits at Infinity, Infinite Limits. Horizontal and Vertical asymptotes.
3	Continuity at a point. Continuity of Functions. Properties of continuous functions. Discontinuity and its types.

4	Tangents and Derivatives. Finding the slope of a curve at a specific point. Finding the equation for the tangent line to a curve at a specific point.
5	Differentiation. The derivative as a function. Formal definition of the derivative and finding the derivative of a function by using the formal definition. Differentiation rules. Derivative of a composite function by the Chain Rule. Parametric Differentiation. Implicit Differentiation.
6	Indeterminate Forms. The calculation of the limit of the indeterminate forms by aid of L'Hospital's rule. Extreme Values of Functions. Local Extrema and Critical Points. The First Derivative Theorem for Local Extreme Values. The Mean Value Theorem.
7	The First Derivative Test for Monotonic Functions. Concavity. The Second Derivative Test for Concavity. Points of Inflection. Second Derivative Test for Local Extrema. Curve sketching strategies and sketching the graph of a function.
8	Antiderivatives. Indefinite integral and integrand. Integration.
9	Integration by parts
10	Substitution Rules for Indefinite Integrals.
11	Substitution Rules for Indefinite Integrals.
12	Substitution Rules for Indefinite Integrals.
13	Formal definition of the Definite Integral as a Limit of Riemann Sums. Properties of the Definite Integral.
14	The Mean Value Theorem for Definite Integrals. The Fundamental Theorem of Calculus. Indefinite Integrals and the Substitution Rule.

Professional Contribution	Ability to compute limits, derivatives and definite/indefinite integrals.

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. ● At least 70% attendance is required, otherwise a grade of **DZ** will be assigned.
Cheating & Plagiarism	● Copying or letting someone copy your work on exams, assignments, or reports is cheating. ● Cutting and pasting text, figures and tables from web sources or any other electronic source is plagiarism. ● The consequence of academic dishonesty is to receive a grade of **FF** for the course.
Evaluation	Quizzes (2×10 pts.) 0% Midterm 50% Presentation 0% Final Exam 50%

	Total	100%

Instructor

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Room	421	Office Hours	T 10.30-12.30 |

Prepared by Ibrahim Tekin on October 17th, 2024.