	Department of Sciences & Humanities	
	FAST National University of Computer & Emerging Science CFD Campus	
	Course Outline	

Course Code: **MT 119**
Course Title: **Calculus and Analytic Geometry**
Credit Hours: **03**
Contact Hours: **03**
Prerequisite: **None**
Mode of Teaching: **Three hours of lecture per week**
Course Instructor: **Miss Bushra Niaz**

Course Objectives

The primary aim of the course is to help students learn, understand, use, and be able to explain the ideas of calculus. In addition, students will improve their mathematical skills, further their understanding of mathematics and its applications, and increase both their intellectual curiosity and their desire to learn more about the value of mathematics in general and calculus in particular.

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student will demonstrate competency by being able to:

1. State a precise intuitive definition of the limit of a function.
2. Evaluate limits of functions using numerical, graphical and algebraic methods.
3. Understand, explain, and use average rate of change and instantaneous rate of change.
4. State the definition of the derivative of a function as the limit of a difference quotient.
5. Use the limit of difference quotient definition of derivative to find simple derivatives.
6. Find the derivative of any elementary function (algebraic, logarithmic or exponential) or combination thereof.
7. Find higher order derivatives.
8. Find the slope of the graph of a function.
9. Find the tangent line to the graph of a function.
10. Use derivatives to find marginal cost and marginal revenue functions.
11. Find relative extrema and points of inflection of a function.
12. Use derivative information to describe the graph of a function.
13. Determine relative and absolute extrema of a function.
14. Solve problems involving rectilinear motion, velocity and acceleration.
15. Use L'Hospital's Rule to determine indeterminate limits.
16. Write and apply the definition of an indefinite integral.
17. Determine general antiderivatives using basic integration formulas and rules.
18. Use an initial condition to find a particular solution to an integral equation.

19. Write and apply the definition of a definite integral.
20. State and apply the fundamental theorem of calculus.
21. Use recognition, substitution, and integration by parts to evaluate both definite and indefinite integrals.

Weekly Schedule

	Topic	CLO	PLO	Assessment Methodology	Learning Domain	Level of Learning
1	**Functions** Ways to represent a function. New functions from old. Families of functions, Inverse functions. Inverse trigonometric functions. Exponential and Logarithmic functions. Parametric equations.	1	All	OHTs/ ESE	Cognitive	All
2	**Limits** Limits (An intuitive approach), Computing limits.	2	All	OHTs/ ESE	Cognitive	All
3	**Limits** Limits at infinity. End behavior of a function.	2	All	OHTs/ ESE	Cognitive	All
4	**Continuity** Continuity of trigonometric and inverse functions.	3	All	OHTs/ ESE	Cognitive	All
5	**Derivatives** Tangent Lines, Velocity, and General Rates of Change, The Derivative Function, Techniques of Differentiation, The Product and Quotient Rules, Derivative of Trigonometric Functions, The Chain Rule, Related Rates, Local Linear Approximation; Differentials.	4	All	OHTs/ ESE	Cognitive	All
6	**Inverse/Transcendental functions** Implicit Differentiation.	5	All	OHTs/ ESE	Cognitive	All

7	**Inverse/Transcendental functions** Derivatives of Logarithmic Functions, Derivatives of Exponentials and Inverse Functions.	5	All	OHTs/ ESE	Cognitive	All
8	**Indeterminate forms** L'Hospital's Rule; Indterminate Forms.	6	All	OHTs/ ESE	Cognitive	All
9	**Applications of derivatives** Increase, Decrease, and Concavity, Relative Extrema, Graphing Polynomials, Curves with Cusps and Vertical Tangent Lines.	7	All	OHTs/ ESE	Cognitive	All
10	**Applications of derivatives** Absolute Maxima's and Minima, Applied Maximum and Minimum Problms, Rolle's Theorm; Mean Value Theoem, Rectilinear Motion.	7	All	OHTs/ ESE	Cognitive	All
11	**Definite integrals** An overview of the area Problem, The Indefinite Integral, Integration by Substitution.	8	All	OHTs/ ESE	Cognitive	All
12	**Definite integrals** Definition of Area as a limit; Sigma Notation, The Definite Integral, The Fundamental Theorem of Calculus.	8	All	OHTs/ ESE	Cognitive	All
13	**Applications of integrals** Area Between Two Curves, Volumes by Slicing; Disks and Washers.	8	All	OHTs/ ESE	Cognitive	All
14	**Applications of integrals** Length of a Plane Curve.	8	All	OHTs/ ESE	Cognitive	All
15	**Techniques of integration** An overview of Integration Methods. Integration by Parts.	8	All	OHTs/ ESE	Cognitive	All
16	**Improper Integrals**	9	All	OHTs/ ESE	Cognitive	All

Books

	Department of Sciences & Humanities **FAST National University of Computer & Emerging Science** **CFD Campus**	
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Text Book(s)

Title **Thomas' Calculus 13th edition**
Author **Thomas and Finney**
Publisher USA: Brooks Cole, 2011, 9th Edition, ISBN 9780538733519

Ref. Book(s)
Title Calculus
Author James Stewart

Assessment System

Assignments	10%
Quizzes	10%
Mid Terms (I+II)	30%
Final Term	50%

Assessment of Course Learning Objectives

	Assignments	Labs	Quizzes	OHT-1	OHT-2	Viva	Presentation	Individual Project	Group Project	Class Participation	Final Exam
CLOs	✔		✔	✔	✔						✔

Written By	Name with Sign	
	Date	
Reviewed By	Name with Sign	
	Date	
Approved By	Name with Sign	
	Date	