NATIONAL UNIVERSITY OF COMPUTER AND EMERGING SCIENCES
LAHORE CAMPUS

Calculus and Analytical Geometry Course Outline according to OBE
FALL-2021

Course Moderator:

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Department	Department of Computer Science	**Dept. Code**	CS
Course Title	Calculus and Analytical Geometry	**Course Code**	MT 101
Pre-requisite(s)	-	**Credit Hrs.**	3
Moderator			
Course Instructors	Dr. Saeeda Zia, Dr. Uzma Bashir, Muhammad Rizwan, Dr. M. Farasat Shamir, Ms. Quresha Hanif, Mr. Abdul Hafeez Sheikh, Ms.		

	Aisha Rashid, Mr. Muzamil Hanif, Ms. Maryam Khalid
Note:	It is a tentative schedule of the course. It may vary (if required).

Course Objective	The course is aimed at acquiring the basic techniques of differentiation and integration of functions of single variable. Stress will be given on the concepts of limit continuity and graphing of functions using derivatives. Students will be encouraged to go through the proofs of important theorems and solve some life problems as well.

No.	Assigned Program Learning Outcome (PLO)	Level	Tool
01			

I = Introduction, R = Reinforcement, E = Evaluation.
A = Assignment, Q = Quiz, M = Midterm, F = Final, L = Lab, P = Project, W = Written Report.

No.	Course Learning Outcome (CLO) Statements	Tools
01	• Solve algebraic equations and inequalities by using properties of absolute values.	Q1, M1
02	• Analyze the function and sketching the curve by using properties horizontal/ vertical and compressing / stretching	Q1, A1, M1
03	• Investigation of continuity through limits analytically / graphically.	A1, M1, F
04	• Apply the concept of differentiation in real life problem	A2, M2, F
05	• Curve sketching using extrema theory	Q2, M2, F
06	• Riemann sum, evaluation of definite & indefinite integral and their applications to compute lengths of curves / area of regions / volume of solids.	Q3,A3,F

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Text Book(s)	**Title**	Thomas Calculus
	Author	G. B. Thomas
	Edition	14th Edition
Ref. Book(s)	**Title**	Calculus and Analytic Geometry Kenneth W. Thomas.
	Author	Kenneth W. Thomas.
	Edition	Latest Edition
	Title	Calculus
	Author	William E. Boyce & Richard C. DiPrima
	Edition	Latest Edition
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Week	Section	Course Contents	Chapter	CLO
01	A-1	**Inequalities** Rules for inequalities, solving inequalities	Appendices	1
02	1.1 1.2	**Functions** Functions and their graphs: Combining functions; Shifting and Scaling graphs	1	2
03	2.1 2.2 2.4	**Limits and Continuity** Rates of Change and tangents to curves Limit of a function and limit laws One sided Limit	2	3
04	2.5 2.6	Continuity Limits involving Infinity; Asymptotes of Graphs	2	3
05	3.1 3.2 3.3 3.4 3.5 3.6	**Derivatives** Tangents and derivatives at a point The derivatives as a function Differentiation Rules The derivative as a rate of change Derivatives of trigonometric functions The chain rule	3	4

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1

	3.7 3.8	Implicit differentiation Related rates		
06		**MID-TERM-I**		
07	4.1 4.2 4.3	**Application of Derivatives** Extreme values of functions The Mean value theorem Monotonic functions and the first derivative test	4	5
08	4.4 4.5	Concavity and Curve sketching Applied optimization	4	5
09	5.1 5.3	**Integrals** Area and estimating with finite sums The definite integral	5	6
10	5.4 5.5 5.6	The Fundamental theorem of calculus Indefinite integrals and the substitution method Definite integral Substitutions and area between the curves	5	6
11	6.1 6.2 6.3	**Application of Definite Integrals** Volumes using cross sections Volumes using Cylindrical Shell Arc length	6	6
12		**MID-TERM-II**		
13	7.1 7.2 7.5	**Integrals and Transcendental Functions** Inverse Functions and Their Derivatives Natural Logarithms Indeterminate forms and L'Hopital's Rule	7	6
14	8.1 8.2 8.3 8.4	**Techniques of Integration** Using basic Integration formulas Integration by parts Trigonometric integrals Trigonometric substitution	8	6
15	8.5 8.6 8.8	Integration of rational functions by Partial fractions Reduction formulas Improper integrals	8	6
		FINAL EXAM		

Evaluation Procedure & Marks Distribution:

Assessment Tools	Total No. of	Weightage
Quizzes	3	10%

Assignments	3	8 %
Home work	Every week	7%
Mid Term Exam	2 (I+II)	25%
Final Exam	1	50%

Note: No homework/ assignment submission after due date.