

MATH0541111: Differential and Integral Calculus

Part A: Course Information

1. **Course Code:** MATH0541111
2. **Course Title:** Differential and Integral Calculus
3. **Course Type** (GED/Core Course/Electives): Interdisciplinary Course
4. **Year/Level/Semester/Term:** 1st Semester
5. **Academic Session:** Autumn 2025
6. **Course Teacher:** Tasnim Tahseen
7. **Prerequisite (If any):** No Need
8. **Credit Value:** 3.0
9. **Contact Hours:** 3.00 hours/week
10. **Total Marks:** 100
11. **Rationale of the Course:**

The Differential calculus splits up an area into small parts to calculate the rate of change. The Integral calculus joins small parts to calculate the area or volume and in short, is the method of reasoning or calculation. Together, these disciplines help you to figure out rate of change, which is an important ingredient in many algorithms and programs.

12. Course Objectives:

- a. Developing the students' understanding of the concepts of calculus and providing experience with its methods and applications.
- b. Define function, limits, continuity and differentiable.
- c. Find the successive differentiation of various types of function.
- d. Evaluate the forms of Leibnitz's Theorem; Rolle's Theorem, Mean value theorem,
- e. Determine the maximum and minimum value of functions..
- f. Define integrals and its properties.
- g. Evaluate the solution of Beta and Gamma function.
- h. Estimate the solution of integrals of different rules..

Part B: Skill Mapping

13. Course Learning Outcome (CLOs)

No.	CLOs	BT	CP	CA	KP	AA
CLO1	Analyze the basic concepts and principles of differential and integral calculus of real functions and sequences and series.	C			2	CT, MT, FE, A
CLO2	Understand Interpret the geometric meaning of differential and integral calculus.	C			2	CT, MT, FE, A

CLO3	Apply the concept and principles of differential and integral calculus to solve geometric and physical problems	C
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1,2,3	FE, A
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*CLOs- Course Learning Outcome; BT- Bloom's Taxonomy; C- Cognitive Domain; CP- Complex Problems; CA- Complex Activities; AA- Assessment Approach; KP- Knowledge Profile; FE- Final Exam; CT- Class Test, MT- Mid Term, A- Assignment, Q- Quiz.

14. Mapping of CLOs with Program Learning Outcomes(PLOs)

Course Learning Outcomes (CLO) (3-5)	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO1 0	PLO1 1	PLO1 2
CLO 1	√											
CLO 2		√										
CLO 3			√									

Part C: Teaching Learning Approach

15. Academic Engagements

Knowledge Delivery Methods	Contact hours
Interactive Learning Sessions	
Classroom Lectures	42
Hands-on Sessions / Tutorials / Workshops	-
Learner-Centered Activities	-
Self-Guided Learning	
Self-Study Modules	42
Revision	21
Test Preparation	21

Formal Assessment	
Classroom-Based Assessment	1
Progress Monitoring	2
Comprehensive Final Exam	3
Total	131

16. Course plan specifying content, CLOs, co-curricular activities (if any), teaching learning and assessment strategy mapped with CLOs.

Week	Topic	Teaching-Learning Strategy	Assessment Strategy	Corresponding CLOs
1	Differential Calculus: Limits, continuity and differentiable	Lecture and Discussion	Midterm	CLO1
2	Differentiation of explicit and implicit functions and parametric equations.	Lecture and Discussion	Midterm	CLO1
3	Successive differentiation of various types of functions, Leibnitz's Theorem	Lectures and Discussion	Midterm	CLO1
4	Rolle's Theorem, Mean value theorem in finite and infinite forms	Lecture and Discussion	Midterm, Class Test 01	CLO2
5	Lagrange's form of remainders; Cauchy's form of remainder.	Lecture and Discussion	Final Exam	CLO2
6	Evaluation of indeterminate forms by L'Hospital's rule, Partial differentiation; Euler's Theorem	Lecture and Discussion	Final Exam	CLO2
7	Maximum and minimum values of functions of single variable	Lecture and Discussion	Final Exam, Assignment 01	CLO2
8	Integral Calculus: Definition of integration; Integration by the method of substitutions; Integration by parts;	Lecture and Discussion	Final Exam	CLO3

9	Standard integrals; Integration by the method of successive reduction	Lecture and Discussion	Final Exam	CLO3
10	Definite integrals and its properties and use in summing series;	Lecture and Discussion	Final Exam, Class Test 02	CLO3
11	Wallis' formula, improper integrals. Beta function and Gamma function	Lecture and Discussion	Final Exam	CLO3
12	Trapezoidal rule, Simpson's rule, Jacobian	Lecture and Discussion	Final Exam	CLO3
14	Multiple integrals and its application	Lecture and Discussion	Final Exam and Assignment 02	CLO3
15	Revision of the whole syllabus	Group Discussion	Class Performance	

Part D: Assessment Approach

17. Assessment and Evaluation

Assessment components		Marks Distribution	CLOs	Bloom's Taxonomy
Continuous Assessment (50%)	Class Attendance/Class Performance	10%	-	-
	Class Test/Assignment/Quiz/Surprise Test	20%	CLO1	C
	Mid Term	20%	CLO1, CLO2	C
Comprehensive Final Exam		50%	CLO1	C
			CLO2	C
			CLO3	C
Total Marks		100%		

*CLOs-Course Learning Outcome; C- Cognitive Domain; P- Psychomotor Domain, A- Affective Domain

18. Make-up Exam Procedures

Missed Midterm Examination: Students may apply for make-up midterm examinations in a maximum of two courses during the midterm period. Make-up exams are strictly granted for valid and documented reasons such as illness or emergencies. Students must collect and submit the Makeup Examination Application Form from the department office on the last day of the midterm or the next working day. In emergencies where the form cannot be collected on time, the student must immediately notify the respective course teacher and provide valid proof. Without the course teacher's permission, the student will not be allowed to attend the make-up exam. Students are fully responsible for tracking the make-up exam schedule and ensuring timely form submission.

Missed Final Term Examination: Students missing the final term exam must follow the university's procedure as outlined in the Examination Policy for Undergraduate Programs. No separate make-up arrangements outside the university system will be considered.

Part E: Learning Materials

- 1) Recommended Readings: Calculus by Howard Anton; et al., 10th Edition, (2015).
- 2) Supplementary Readings: Differential Calculus, by Das & Mukherjee (2005).
- 3) Others.....(as applicable for the discipline/academic program)