NORTH SOUTH UNIVERSITY

Centre of Excellence in Higher Education

DEPARTMENT OF MATHEMATICS AND PHYSICS

School of Engineering and Physical Sciences

Course Title	Calculus and Analytical Geometry I
Course Code	MAT-120
Semester	Spring 2023
Course Coordinator	Dr. Preetom Nag (preetom.nag@northsouth.edu)

Instructor & Department Information

Instructor's Name	
Office Room	
Office Hours	
Office Phone	
Email Address	
Links	North South University (NSU) Website: http://www.northsouth.edu Department Website: http://www.northsouth.edu/academic/seps/mp.html

Course & Section Information

Prerequisites	None
Class Time	
Course Credit Hours	3.0
Text Book	Calculus, Early Transcendentals, Howard Anton, Irl Bivens, Stephen Davis, 10th edition, John Wiley & Sons, Inc., 2013, ISBN NO. 978-1-11809240-8
Reference Book	Calculus, James Stewart, 7th edition, Cengage learning, 2012, ISBN NO. 978-0-538-49781-7

Course Assessment System:

Category	*Weight*
Attendance	**10%**
Assignments (Minimum 4)	**10%**
Quizzes (Best 3 of 5)	**20%**
Mid-Term	**20%**
Final Exam	**40%**

Grading Policy:

Numerical Scores	Letter Grade	Grade Points
93 & above	A	4.0
90 - 92	A-	3.7
87 – 89	B+	3.3
83 – 86	B	3.0
80 – 82	B-	2.7
77 – 79	C+	2.3
73- 76	C	2.0
70 – 72	C-	1.7
67 - 69	D+	1.3
60 - 66	D	1.0

Course Short Description

This course is intended to develop practical skills in differential and integral calculus, including their applications to various technical problems. The basic differential rules will be introduced as well as the methods of differentiating algebraic and transcendental functions will be developed. The definite integrals and indefinite integrals, along with its applications in finding the area will be studied.

Course Objectives

1. To classify different types of functions, approximate their limits both numerically and graphically as well as their continuity at a point or determine the intervals of continuity.
2. To apply the concept of limits and continuity to understand the principles of differentiation and integration.
3. To differentiate all types of functions, including implicit and explicit type using different methods, and apply differentiation to determine the rate of change, maxima and minima of functions.
4. To integrate different types of functions either by using the integral table or substitution technique and apply the definite integral to obtain the area under curves.

Course Learning Outcomes

Upon successful completion of this course, students will be able to:

- **(CO-1)** Demonstrate the ability to identify the type of a given function, approximate its limit both numerically and graphically as well as its continuity at a given point or determine the intervals of continuity of the function.
- **(CO-2)** Determine the differentiability and integrability of functions using the concepts of limits and continuity. Determine the differentiability and integrability of functions using the concepts of limits and continuity.
- **(CO-3)** Differentiate various types of functions comprising both the implicit and explicit types using different methods and apply differentiation to determine the rate of change and maxima and minima of functions.
- **(CO-4)** Evaluate the Integrals associated with different types of functions either by using the integral table or substitution technique; interpret the geometric meaning of integral and apply this concept to solve geometric and physical problems, such as finding the area under curves.

Mapping of Course Outcomes

CLOs	Course Outcomes (CO)	Bloom's taxonomy domain/level *(C: Cognitive P: Psychomotor A: Affective)*	Delivery methods and activities	Assessment tools
CO-1	Demonstrate the ability to identify the type of a given function, approximate its limit both numerically and graphically as well as its continuity at a given point or determine the intervals of continuity of the function.	**C1, C2, C3**	Lectures, Notes	Quiz, Assignment, Discussions
CO-2	Determine the differentiability and integrability of functions using the concepts of limits and continuity.	**C3, C4**	Lecture, group discussion	Assignment, Class participation, Midterms
CO-3	Differentiate various types of functions comprising both the implicit and explicit types using different methods and apply differentiation to determine the rate of change and maxima and minima of functions.	**C1, C3, P2**	Lecture, group discussion	Assignment, Class participation, Midterms

CO-4	Evaluate the Integrals associated with different type of functions either by using the integral table or substitution technique; interpret the geometric meaning of integral and apply this concept to solve geometric and physical problems, such as finding the area under curves.	**C1, C3, P2**	Lecture, group discussion	Assignment, Class Participation, Final Exam

Lesson Plan

Lecture	Topics	Article no. in the textbook	Assessment tools	Learning Outcomes
1-4	Functions, Families of Functions, Inverse Functions, Inverse Trigonometric Functions, Exponential and Logarithmic Functions	0.2,0.3, 0.4, 0.5	Discussions, Quiz 1 Assignment I	CO-1
5-7	Limits, Computing Limits, End Behavior of Functions	1.1,1.2,1.3	Quiz 1, Midterm Assignment II	CO-1
8-9	Continuity, Continuity of Functions	1.5,1.6	Quiz 2, Midterm Assignment II	CO-1
10-11	Tangent lines, Rates of Change, The Derivative Function	2.1, 2.2	Quiz 2, Midterm Assignment II	CO-2, CO-3
12	Techniques of Differentiation, The Product and Quotient Rules	2.3, 2.4	Quiz 2, Midterm Assignment II	CO-3
13-14	Derivatives of Trigonometric Functions, The Chain Rule	2.5,2.6	Quiz 2, Midterm Assignment II	CO-3
15	Implicit Differentiation	3.1	Midterm Assignment II	CO-3
16	**Midterm**			
17-18	Derivatives of Logarithmic Functions, Derivatives of Exponential and Inverse Trigonometric Functions	3.2, 3.3	Quiz 3, Final Exam Assignment III	CO-3
19-20	Related Rates Problem	3.4	Quiz 3, Final Exam Assignment III	CO-3
21-22	L'Hopital's Rule; Indeterminate Forms	3.6	Quiz 3, Final Exam Assignment III	CO-2
23-24	Analysis of Functions: Increase, Decrease, Concavity	4.1	Quiz 4, Final Exam Assignment IV	CO-3
25-26	Relative Extrema, Absolute Maxima and Minima	4.2, 4.4	Quiz 4, Final Exam Assignment IV	CO-3
27-29	The Indefinite Integral and Integration by Substitution	5.2, 5.3	Quiz 4, Final Exam Assignment IV	CO-4
30-31	The Definition of Area as a Limit; Sigma Notation	5.4	Quiz 5, Final Exam Assignment V	CO-4
32-34	The Definite Integral and The Fundamental Theorem of Calculus	5.5, 5.6	Quiz 5, Final Exam Assignment V	CO-4
35	Evaluating Definite Integrals by Substitution	5.9	Final Exam	CO-4
36	Review and discussion about final exam			
Final Exam (Declared by the Controller of Examinations)				

Note: The instructor reserves the right to make changes to the syllabus if necessary.

Classroom Rules of Conduct

Please Refer to NSU Student Handbook, Sections: "Disciplinary Actions" and "Procedures and Guidelines".

Exams & Make-up Exam Policy

NO makeup for quizzes and NO Formative assessment will be retaken under any circumstances. If a student misses the Midterm exam and/or Final exam due to the circumstances beyond their control (official valid documents are required) and informed beforehand (if possible), reasonable arrangement may be considered. Please note the retake exam questions are generally a bit tricky and critical compare to the regular exam questions. **Students may get the opportunity to see/recheck their midterm and Final exam scripts. Cell phones are prohibited in exam sessions**.

Attendance Policy: As per NSU policy.