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
Section	11
Semester	Spring 2022
Course Coordinator	Dr. Preetom Nag (preetom.nag@northsouth.edu)

Instructor & Department Information

Instructor's Name	Dr. Md. Rezaul Karim (ReK)
Office Room	SAC-1137
Office Hours	07:00 PM – 08:00 PM (RA)
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Links	North South University (NSU) Website: http://www.northsouth.edu Department Website: http://www.northsouth.edu/academic/seps/mp.html

Course & Section Information

Prerequisites	MAT 116
Class Time & Location	RA: 11:20 AM – 12:50 PM SAC – 204
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

Marks Distribution:

Category	*Percentage*
Continuous Assessment	5%
Attendance	10 %
Assignments	10%
Quizzes	20%
Mid-Term	25%
Final Exam	30%

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	**C1, C3, P2**	Lecture, group discussion	Assignment, Class participation, Midterms

		the rate of change and maxima and minima of functions.			
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 findingthe 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	Introduction, Functions, Families of Functions	0.1,0.2,0.3	Discussions, Quiz 1 Assignment I	CO-1
2	Inverse Functions, Inverse Trigonometric Functions	0.4	Discussions, Quiz 1 Assignment I	CO-1
3	Exponential and Logarithmic Functions	0.5	Discussions, Quiz 1 Assignment I	CO-1
4	Limits, Computing Limits, End Behavior of Functions	1.1,1.2,1.3	Quiz 2, Midterm Assignment II	CO-1
5	Continuity, Continuity of Functions	1.5,1.6	Quiz 2, Midterm Assignment II	CO-1
6	Tangent lines, Rates of Change, The Derivative Function	2.1, 2.2	Quiz 2, Midterm Assignment II	CO-2, CO-3
7	Techniques of Differentiation, The Product and Quotient Rules	2.3, 2.4	Midterm, Assignment I	CO-3
8	Derivatives of Trigonometric Functions, The Chain Rule	2.5,2.6	Midterm, Assignment III	CO-3
9	Implicit Differentiation	3.1	Midterm Assignment III	CO-3
10	Derivatives of Logarithmic Functions	3.2	Midterm Assignment III	CO-3
11	Derivatives of Exponential and Inverse Trigonometric Functions	3.3	Midterm Assignment III	CO-3
12	**Midterm**			
13	Related Rates	3.4	Quiz 3, Final Exam Assignment IV	CO-3
14	L'Hopital's Rule; Indeterminate Forms	3.6	Quiz 3, Final Exam Assignment IV	CO-2
15	L'Hopital's Rule; Indeterminate Forms	3.6	Quiz 3, Final Exam Assignment IV	CO-2
16	Analysis of Functions: Increase, Decrease, Concavity	4.1	Quiz 4, Final Exam Assignment V	CO-3

17	Relative Extrema, Absolute Maxima and Minima	4.2, 4.4	Quiz 4, Final Exam Assignment V	CO-3
18	The Indefinite Integral	5.2	Final Exam Assignment V	CO-4
19	Integration by Substitution	5.3	Final Exam Assignment VI	CO-4
20	The Definition of Area as a Limit; Sigma Notation	5.4	Final Exam, Assignment VI	CO-4
21	The Definite Integral	5.5	Final Exam Assignment VI	CO-4
22	The Fundamental Theorem of Calculus	5.6	Discussions	CO-4
23	Evaluating Definite Integrals by Substitution	5.9	Final Exam	CO-4
24	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

1. Electronic devices e.g**., cell phone**, **laptop, notepad, iPad, iPod, mp3, etc.** are strictly prohibited in the class.

2. It is imperative that the students maintain absolute discipline in class. Students are also expected to arrive on time for the class, as frequent late attendance will not be accepted.

3. **Academic Integrity Policy:** Department of Mathematics and Physics does not tolerate academic dishonesty by its students. At minimum, students must not be involved in cheating, copyright infringement, submitting the same work in multiple courses, significant collaboration with other individuals outside of sanctioned group activities, and fabrications.

   Students are advised that violations of the Student Integrity Code will be treated seriously, with special attention given to repeated offences.

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

Exams &Make-up Exam Policy

Five/four quizzes will be taken (best **Three** out of **five/four** will be considered). **No make-up quizzes or midterms will be taken under any circumstances.** If a student misses any of the Midterm exams due to the circumstances beyond their control (official valid documents are required) and informed beforehand (if possible), reasonable arrangement may be considered. There will be **no extra question** in the Midterm and Final exams, so that students should have to answer all the questions given in the exam script.
Cell phones are **prohibited** in exam sessions.

Attendance Policy

Students are required and expected to attend all classes regularly and on time and participate in class discussions. North South University mandates to fail students who are absent 25% or more from their classes, even if such absences are excusable. It is the responsibility of the student to become aware of other course-related announcements missed during an absence.

Please Refer to NSU Student Handbook, Section: "Study Principles and Policies".

Communication Policy

All communications should take place using the instructor's **e-mail**. Announcements in class will override any statement made here or in any other handouts. It is the student's responsibility to be aware of any announcements made in classes.

Appropriate Use Policy

All members of the North South University community must use electronic communications in a responsible manner. The University may restrict the use of its computers and network systems for electronic communications subject to violations of university policies/codes or local laws or national laws. Also, the University reserves the right to limit access to its networks through university-owned or other computers, and to remove or limit access to material posted on university-owned computers.

Students Complaints Policy

Students at North South University have the right to pursue complaints related to faculty, staff, and other students. The nature of the complaints may be either academic or non-academic. For more information about the policy and processes related to this policy, you may refer to the students' handbook.

Students with Special Needs

North South University will provide educational opportunities that ensure fair, appropriate and reasonable accommodation to students who have disabilities/special needs that may affect their ability to participate in course activities or meet course requirements. Students with disabilities are encouraged to contact their instructors to ensure that their needs are met. The University through its Special Need section will exert all efforts to accommodate special needs.

Special Needs Section
Telephones: +88-02-**5566 8200 ext-1220**
Location: **Room # 413/A, Admin Building (**4th floor).

Please Refer to NSU Student Handbook, Section: "Special Needs Services"