



# NORTH SOUTH UNIVERSITY

*Centre of Excellence in Higher Education*

## DEPARTMENT OF MATHEMATICS AND PHYSICS

*School of Engineering and Physical Sciences*

<b>Course Title</b>	Calculus and Analytical Geometry I
<b>Course Code</b>	MAT-120
<b>Semester</b>	Summer 2022
<b>Course Coordinator</b>	Dr. Preetom Nag (preetom.nag@northsouth.edu)

Instructor & Department Information	
<b>Instructor's Name</b>	
<b>Office Room</b>	
<b>Office Hours</b>	
<b>Office Phone</b>	
<b>Email Address</b>	
<b>Links</b>	North South University (NSU) Website: <a href="http://www.northsouth.edu">http://www.northsouth.edu</a> Department Website: <a href="http://www.northsouth.edu/academic/seps/mp.html">http://www.northsouth.edu/academic/seps/mp.html</a>

Course & Section Information	
<b>Prerequisites</b>	
<b>Class Time</b>	
<b>Course Credit Hours</b>	
<b>Text Book</b>	Calculus, Early Transcendentals, Howard Anton, Irl Bivens, Stephen Davis, 10 <sup>th</sup> edition, John Wiley & Sons, Inc., 2013, ISBN NO. 978-1-11809240-8
<b>Reference Book</b>	Calculus, James Stewart, 7 <sup>th</sup> edition, Cengage learning, 2012, ISBN NO. 978-0-538-49781-7

Course Assessment System:		Grading Policy:		
<b>Category</b>	<b>Weight</b>	Numerical Scores	Letter Grade	Grade Points
Attendance	10%	93 & above	A	4.0
Assignments (Minimum 3)	10%	90 - 92	A-	3.7
Quizzes (Best 3 of 4)	15%	87 - 89	B+	3.3
Mid-Term	30%	83 - 86	B	3.0
Final Exam	35%	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.	<b>C1, C2, C3</b>	Lectures, Notes	Quiz, Assignment, Discussions
CO-2	Determine the differentiability and integrability of functions using the concepts of limits and continuity.	<b>C3, C4</b>	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	<b>C1, C3, P2</b>	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 finding the area under curves.	<b>C1, C3, P2</b>	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	<b>Midterm</b>			
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			
<b>Final Exam (Declared by the Controller of Examinations)</b>				

**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

Three quizzes will be taken (best **Two** out of **Three** 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 **email**. 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.