Department of Mathematics and Physics

Course Name:	**Pre-Calculus**
Course Code	**MAT 116**
Section No:	**17**
Semester:	**Spring 2023**

INSTRUCTOR & DEPARTMENT INFORMATION

Instructor Name:	Dr. Md. Rakib Hossain (MRHn)
Office Room:	SAC 1150
Office Hours:	RA 10:10am - 11:55 am
Office Phone:	
Email Address:	Rakib.hossain07@northsouth.edu
Department:	**Mathematics and Physics**
Links:	North South University Website: http://www.northsouth.edu Department Website: http://www.northsouth.edu/academic/seps/dmp.html

COURSE & SECTION INFORMATION

Class Time	RA 08:00am – 09:00am
Location	SAC 313
Course Credit Hours	3:0
Course Description	Behavior of functions in some depth including properties, graphs, inverse, transformations, compositions. This course pays particular attention to linear, quadratic, polynomial, rational, exponential and logarithmic functions. It covers trigonometric functions and inverse trigonometric functions as well.
Course Objectives	The course will help students to recognize various kinds of functions (including polynomial, rational, radical, exponential, trigonometric and logarithmic functions), analyze their behavior. Also, the students will be able to graph various functions and apply the acquired concept in higher studies and physical problems.
Student Learning Outcomes	Upon the successful completion of this course, a student will be able to: CO-1. Demonstrate the fundamental concept of mathematical functions and their properties (domain, range, composition, etc.). Perform function operations including composition, transposition, and finding inverse functions. CO-2. Plot different types of functions, apply various kinds of transformations to those functions including translations, reflections, stretches, and compressions

	CO-3. Analyze and interpret graphically the linear, polynomial, rational, exponential, logarithmic and trigonometric functions.
	CO-4. Solve linear, quadratic, polynomial, exponential, and logarithmic equations and inequalities involving polynomials and rational expressions apply them to model and analyze real world problems.
	CO-5. Develop the prerequisite knowledge and mathematical skills necessary to undertake higher level courses which have a quantitative focus.

Mapping of Course Outcomes

	Course Outcomes (CO)	Bloom's taxonomy domain/level (C: Cognitive P: Psychomotor A:Affective)	Delivery methods and activities	Assessment tools
CO-1	Demonstrate the fundamental concept of mathematical functions and their properties (domain, range, composition, etc.). Perform function operations including composition, transposition, and finding inverse functions.	C1 C2 P1	Lecture Discussion	Class work, Quiz, Mid term
CO-2	Plot different types of function and apply various kinds of transformations to those functions including translations, reflections, stretches, and compressions.	C3 C4 P1	Lecture, Classroom presentation, discussion	Midterm exam, Assignment
CO-3	Analyze and interpret graphically the linear, polynomial, rational, exponential, and logarithmic and trigonometric functions.	C4 P1		
CO-4	Solve linear, quadratic, polynomial, exponential, and logarithmic equations and inequalities involving polynomials and rational expressions, and apply them to model and analyze real world problems.	C3 C4	Lecture Discussion	Class work, Quiz, Assignment, Final Exam
CO-5	Develop the prerequisite knowledge and mathematical skills necessary to undertake higher level courses which have a quantitative focus.	C4 P1	Lecture Discussion	Assignment

	Text Book	**Reference Book**
Author	Michael Sullivan	
Title	"Pre-calculus"	
Edition & Year	10th Edition, 2016	

TEACHING STRATEGY

The class will be conducted through various activities including discussion of concepts and problem-solving, student initiative and active involvement as well as practice of quantitative problems. Students are expected to actively involve and to take initiative for their own learning experience

ASSESSMENT STRATEGY		**GRADING POLICY**		
Grading tool	**Points**	**Numerical Scores**	**Letter Grade**	**Grade Points**
Attendance	10%	93 +	A (Excellent)	4.0
Assignments	10%	90 - 92	A-	3.7
Quizzes	20%	87 - 89	B+	3.3
Midterm	20%	83 - 86	B (Good)	3.0
Final Exam	40%	80 - 82	B-	2.7
		77 - 79	C+	2.3
		73 - 76	C (Average)	2.0
		70 - 72	C-	1.7
		67 - 69	D+	1.3
		60 - 66	D (Poor)	1.0
		Below 60	F (Failure)	0.0

CLASSROOM RULES OF CONDUCT

1. Electronic devices e.g**. cell phone**, **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 POLICY

Five quizzes (at least) will be taken (best **Three** will be considered) for 20%. **NO makeup for quizzes will be taken under any circumstances.** If a student misses the Midterm exams **only** due to extreme emergencies (official material evidence is required), the instructor will take the decision for his/her makeup exams. There will have **one extra question** in the Midterm and Final exams, so that students should have an option to answer all the questions in the question paper.

Cell phones are **prohibited** in any 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. If a student misses more than two lectures, marks will be deducted for each day of absence. Absence due to extreme situations will be considered an exception, as per the instructor's decision. 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 class.

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.

COURSE CONTENTS & TENTATIVE LECTURE PLAN

Lecture No.	Topic	Learning Activities	Assessment tools	Learning Outcome	Chapter
1	Rectangular Coordinates, Plotting Points	Lecture & Discussion	Quiz 01 Midterm	CO-1	1.1
2	The Distance and Midpoint Formulas	Lecture & Discussion	Quiz 01 Midterm	CO-1	1.1
3	Triangles related problems using Distance and Midpoint Formulas	Lecture & Assignments	Quiz 01 Midterm	CO-1	1.1
4	Graphs by Plotting Points and Finding Intercepts	Lecture & Discussion	Quiz 01 Midterm	CO-2	1.2
5	Finding Intercepts, Test for Symmetry	Lecture & Assignments	Quiz 01 Midterm	CO-2	1.2
6	Slopes, Graph of a line using a point and slope, Different form of equations	Lecture & Discussion	Quiz 01 Midterm	CO-1	1.3
7	Find Equations of Horizontal, Vertical, Parallel and Perpendicular Lines	Lecture & Assignments	Quiz 01 Midterm	CO-2	1.3
8	Equations of circles, Graphing a circle	Lecture & Assignments	Quiz 01 Midterm	CO-1 CO-2	1.4
9	Functions, Variables, Values and domain of functions, different form of functions	Lecture & Assignments	Quiz 02 Midterm	CO-1	2.1
10	Graph of function, Identifying and obtaining information of a graph of function	Lecture & Assignments	Quiz 02 Midterm	CO-1	2.2
11	Properties of functions, Even, odd, constant, increasing, decreasing functions, Secant line	Lecture & Assignments	Quiz 02 Midterm	CO-1	2.3
12	Library of functions, Piecewise-defined functions	Lecture & Discussion	Quiz 02 Midterm	CO-1	2.4
13	Graphing Techniques, Transformations, Compressions and Stretches	Lecture & Assignments	Quiz 02 Midterm	CO-2	2.5
14	**Midterm Exam (Date will be Declared by the Respective Faculty Members)**				
15	Linear functions and their properties, Linear models	Lecture & Discussions	Quiz 03 Final Exam	CO-1	3.1
16	Quadratic functions and their properties, Graphs using transformation and properties	Lecture & Assignment	Quiz 03 Final Exam	CO-1	3.3
17	Quadratic models, Maximizing revenue & enclosed area, Motion of projectile, Bridge	Lecture & Assignment	Quiz 03 Final Exam	CO-3	3.4
18	Solution of quadratic inequalities and their graphs	Lecture & Assignment	Quiz 03 Final Exam	CO-2	3.5
19	Polynomial and power functions, Graphs using transformation, Properties of graphs	Lecture & Discussion	Quiz 03 Final Exam	CO-1	4.1
20	Properties and graph of rational functions, Asymptotes	Lecture & Discussion	Quiz 04 Final Exam	CO-2	4.2
21	Analyze the graph of rational function	Lecture & Discussion	Quiz 04 Final Exam	CO-2	4.3
22	Solutions of polynomial & rational inequalities with graphs	Lecture & Assignment	Quiz 04 Final Exam	CO-1	4.4
23	The real zero of a Polynomial functions, the Remainder and Factor theorem, Descartes rules of signs	Lecture & Discussion	Quiz 04 Final Exam	CO-1	4.5
24	Rational zeros theorem, Potential zeros, Finding real zeros of a polynomial functions	Lecture & Assignment	Quiz 04 Final Exam	CO-1	4.5
25	Complex zeros, Fundamental Theorem of Algebra, Conjugates pairs theorem, Find polynomial functions and complex zeros	Lecture & Assignment	Quiz 04 Final Exam	CO-1	4.6
26	Composite functions, Find composite function and its domain	Lecture & Assignment	Quiz 04 Final Exam	CO-1	5.1
Lecture No.	Topic	Learning Activities	Assessment tools	Learning Outcome	Chapter

27	Inverse functions, One-to-One function, Horizontal line test, Determine inverse, verification	Lecture & Assignment	Quiz 05 Final Exam	CO-1	5.2
28	Exponential functions, Graphs and properties of exponential functions, Graphs using transformation	Lecture & Discussion	Quiz 05 Final Exam	CO-1	5.3
29	Solutions of exponential equations, Applications	Lecture & Discussion	Quiz 05 Final Exam	CO-1	5.3
30	Logarithmic functions, Relating logarithms to exponential, Domain, Graphs, Solutions	Lecture & Discussion	Quiz 05 Final Exam	CO-1	5.4
31	Properties of Logarithms , Logarithms & Exponential equations	Lecture & Assignment	Quiz 05 Final Exam	CO-1	5.5 5.6
32	Angles & their measure, Linear speed, Trigonometric functions: Unit circle approach	Lecture & Assignment	Quiz 05 Final Exam	CO-1	6.1 6.2
33	Properties and graph of Trigonometric functions	Lecture & Discussion	Quiz 05 Final Exam	CO-1 CO-2	6.2 6.3
34	Properties and graph of Trigonometric functions, Amplitude, Period & Phase shift	Lecture & Discussion	Quiz 05 Final Exam	CO-1 CO-2	6.4 6.5
35	The inverse Sine, Cosine and Tangent functions,	Lecture & Assignment	Final Exam Assignment	CO-1	7.1
36	The inverse trigonometric functions	Lecture & Assignment	Final Exam Assignment	CO-1	7.2
Final Exam (Date will be Declared by the Controller of Examinations)					