## Department of Mathematics and Physics

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| **Course Name:** | **Pre-Calculus** |
| **Course Code** | **MAT 116** |
| **Section No:** | |
| **Semester:** | |

**INSTRUCTOR & DEPARTMENT INFORMATION**

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| **Instructor Name:** | Sharmin Sultana (SSU) |
| **Office Room:** | SAC 1063(B) |
| **Office Hours:** | |
| **Office Phone:** | |
| **Email Address:** | Sharmin.sultana02@northsouth.edu |
| **Department:** | **Mathematics and Physics** |
| **Links:** | North South University Website: http://www.northsouth.edu<br>Department Website: http://www.northsouth.edu/academic/seps/dmp.html |

**COURSE & SECTION INFORMATION**

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| **Class Time** | |
| **Location** | |
| **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:<br><br>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, and 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 | **C3, C4** | Lecture Discussion | Class work, Quiz, Assignment, Final Exam |

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| | problems. | | | |
| CO-5 | Develop the prerequisite knowledge and mathematical skills necessary to undertake higher level courses which have a quantitative focus. | C1,C4,P1 | Lecture Discussion | Assignment |

## LEARNING RESOURCES AND TEXTBOOK(S)

| | Text Book | Reference Book |
|---|---|---|
| **Author** | Michael Sullivan | |
| **Title** | "Pre-calculus", | |
| **Edition & Year** | 9th Edition | |

## TEACHING STRATEGY

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

| ASSESSMENT STRATEGY AND GRADING SCHEME | |
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| **Grading tool** | **Points** |
| Attendance | 05% |
| Assignment | 05% |
| Quiz | 15% |
| Midterm I | 20% |
| Midterm II | 20% |
| Final Exam | 35% |

Please Refer to NSU Student Handbook, Section: "Grading Policy"

## 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, withspecial attention given to repeated offences.

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

## EXAMS & MAKE UP POLICY

Four quizzes will be taken (best **Three** out of**Four** will be considered). **NO makeup for quizzes will be taken under any circumstances.** If a student misses any of 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 be **no extra question** in the Midterm and Final exams, so that students should have to answer all of the questions given in the question paper.

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. 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. Students not missing any course lectures and exams will receive an attendance bonus of 2% of total marks.

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.

## 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"

## 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.

## COURSE CONTENTS &SCHEDULE

| Lecture No. | Topic | Learning Activities | Assessment tools | Learning Outcome | Chapter |
|---|---|---|---|---|---|
| 1 | The Distance and Midpoint Formulas | Lecture | Discussion Midterm I | CO-1 | 1.1 |
| 2 | Graphs of Equations in Two Variables: Intercepts; Symmetry | Lecture Assignments | Problem solving, Quiz,Midterm I | CO-2 | 1.2 |
| 3 | Lines, Circles | Lecture Discussion | Quiz, Midterm I | CO-1, CO-2 | 1.3, 1,4 |
| 4 | Functions, The graph of a functions | Lecture Assignments | Midterm I , Quiz | CO-1 | 2.1, 2.2 |
| 5 | Properties of functions, Library of functions | Lecture Assignments | Midterm I Assignment | CO-1 | 2.2, 2.3 |
| 6 | Piecewise-defined functions, Graphing Techniques, Transformation | Lecture Discussion | Midterm I, Quiz | CO-1,CO-2 | 2.4, 2.5 |

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| 7 | Linear functions and their properties | Lecture Assignments | Midterm I | CO-1 | 3.1 |
| 8 | *Midterm I* | | | | |
| 9 | Quadratic functions and Models, Inequalities involving quadratic functions | Lecture | Midterm II | CO-1, CO-3 | 3.3, 3.4 |
| 10 | Polynomial functions | Lecture Discussion | Midterm II Quiz | CO-1, CO-2 | 4.1 |
| 11 | Properties of Rational Functions | Lecture Assignments | Midterm II Assignment | CO-1 | 4.2 |
| 12 | The Graph of a Rational Function | Lecture Discussion | Midterm II | CO-2 | 4.3 |
| 13 | Polynomial & Rational Inequalities | Lecture | Midterm II | CO-1 | 4.4 |
| 14 | The real zero of a Polynomial functions | Lecture Assignment | Midterm II Assignment | CO-1 | 4.5 |
| 15 | Complex zeros, Fundamental Theorem of Algebra | Lecture | Midterm II Quiz | CO-1 | 4.6 |
| 16 | *Midterm II* | | | | |
| 17 | Composite functions, Inverse functions | Lecture Assignment | Final Assignment | CO-1 | 5.1, 5.2 |
| 18 | Exponential functions, Logarithmic functions | Lecture Discussion | Final Quiz | CO-1 | 5.3, 5.4 |
| 19 | Properties of Logarithms , Logarithms & Exponential equations | Lecture Assignment | Final Assignment | CO-1 | 5.5, 5.6 |
| 20 | Angles & their measure, Trigonometric functions: Unit circle approach | Lecture Assignment | Final | CO-1 | 6.1, 6.2 |
| 21 | Properties of Trigonometric functions | Lecture | Final | CO-1 | 6.3 |
| 22 | Graphs of the Sine & Cosine functions Graphs of the Tangent, Cotangent and Secant functions | Lecture | Final | CO-2 | 6.4, 6.5 |
| 23 | The inverse Sine, Cosine and Tangent functions, | Lecture Assignment | Final Quiz | CO-1 | 7.1 |
| 24 | The inverse trigonometric functions | Lecture Discussion | Final Discussion | CO-1 | 7.2 |
| *Final Exam (Declared by the Controller of Examinations)* | | | | | |

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