**BRONX COMMUNITY COLLEGE**

**of the City University of New York**

**DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE**

 **SYLLABUS: MTH 30 - Precalculus (4 Credits - 5 Hours per week)**

**Prerequisite: MTH 28 or equivalent**

**TEXT: Precalculus by Jay Abramson, OpenStax** <https://openstax.org/details/books/precalculus>

***Course Description:***

*The relation between a function and its graph, composition and inversion of functions, polynomial, rational, exponential, logarithmic, and trigonometric functions.*

***Pathways:*** *This course satisfies CUNY Pathways Required Core Area B (Mathematical and Quantitative Reasoning) and Pathways Flexible Core Area E (Scientific World).*

This course is a **Pathways Required Core B (Mathematical and Quantitative Reasoning) Course**:
This course meets the following learning outcomes. A student will:

1. Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables.
2. Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.
3. Represent quantitative problems expressed in natural language in a suitable mathematical format.
4. Effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form.
5. Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation.
6. Apply mathematical methods to problems in other fields of study.

This course is a **Pathways Flexible Core E (Scientific World) Course**:
This course meets the following learning outcomes. A student will:

1. Gather, interpret, and assess information from a variety of sources and points of view.
2. Evaluate evidence and arguments critically or analytically.
3. Produce well-reasoned written or oral arguments using evidence to support conclusions.
4. Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field exploring the scientific world, including, but not limited to: computer science, history of science, life and physical sciences, linguistics, logic, mathematics, psychology, statistics, and technology-related studies.
5. Demonstrate how tools of science, mathematics, technology, or formal analysis can be used to analyze problems and develop solutions.
6. Understand the scientific principles underlying matters of policy or public concern in which science plays a role.

**Student Learning Objectives:** Upon completion of this course, students will be able to:

1. Solve polynomials equations of 3rd degree in one real variable and 2nd degree rational equations in one real variable (b, c, e, B, C, D, E)
2. Graph polynomial, rational, exponential, logarithmic and trigonometric functions (b, d, e, f, A, B, D)
3. Verify trigonometric identities and solve trigonometric equations (b, d, B, C, D)
4. Employ transformations of functions algebraically and graphically as problem-solving tools (b, c, A, B, D, E)
5. Compute inverse functions and use their properties to obtain more precise algebraic information about the corresponding original functions (a, b, c, D, E)
6. Demonstrate fluency with function notation and operations on functions including composition (b, c, D)
7. Identify whether a given graph or algebraic relation represents a function and analyze it to determine its particular properties such as domain and range, end behavior, asymptotes, and periodicity (a, c, d, A, B, C, D, E)
8. Form models to apply them in the solution of real-world problems such as involving exponential growth and decay and optimization in finance, biology, chemistry, or physics (a, b, c, d, e, f, A, B, C, D, E, F)

**Academic Integrity:** Academic dishonesty (such as plagiarism and cheating) is prohibited at Bronx Community College and is punishable by penalties, including failing grades, dismissal and expulsion. For additional information and the full policy on Academic Integrity, please consult the BCC College Catalog.

**Accommodations/Disabilities:** Bronx Community College respects and welcomes students of all backgrounds and abilities. In the event you encounter any barrier(s) to full participation in this course due to the impact of a disability, please contact the disAbility Services Office as soon as possible this semester.  The disAbility Services specialists will meet with you to discuss the barriers you are experiencing and explain the eligibility process for establishing academic accommodations for this course. You can reach the disAbility Services Office at: disability.services@bcc.cuny.edu, Loew Hall, Room 211, (718) 289-5874.

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|  | **SECTION AND TOPICS** | **RECOMMENDED EXERCISES[[1]](#footnote-1)** |
| Week1 | 1.1 Functions and Function Notation  | 18/6-19, 27-33, 40-47, 52-75, 88-91  |
| 1.2 Domain and Range | 35/6-25, 27-37 |
| 1.3 Rates of Change and Behavior of Graphs | 48/5-21 |
| Week2 | 1.4 Composition of Functions | 60/5-17, 72-76 |
| 1.5 Transformation of Functions | 85/6-19, 24-26, 49-52 |
| 1.6 Absolute Value Functions | 98/20-34 |
| Week3 | 1.7 Inverse Functions | 110/7-12,16 |
| 2.1 Linear Functions | 139/20-37 |
| 2.2 Graphs of Linear Functions | 159/6-29, 44-58, 65-69 |
| 3.2 Quadratic Functions | 21/6-25, 53-64, 85-94 |
| Week4 | 3.3 Power Functions and Polynomial Functions | 236/17-30 |
| 3.4 Graphs of Polynomial Functions | 254/6-23, 30-47 |
| Week5 | 3.5 Dividing Polynomials | 264/14-26, 29-35, 38-43, 49-53  |
| 3.6 Zeros of Polynomial Functions | 276/22-32, 40-43, 46-49(No Descartes’ Rule) |
| Week6 | 3.7 Rational Functions | 295/6-29, 39-43 |
| **Midterm Review and Exam** |  |
| Week7 | 4.1 Exponential Functions  | 340/14-17, 56-68 |
| 4.2 Graphs of Exponential Functions | 352/11, 12, 26-28 |
| 4.3 Logarithmic Functions | 361/6-53 |
| Week8 | 4.4 Graphs of Logarithmic Functions | 377/6-15, 26-43 |
| 4.5 Logarithmic Properties  | 389/3-29 |
| 4.6 Exponential and Logarithmic Equations  | 399/4-50, 65-67, 79, 80 |
| Week9 | 5.1 Angles | 455/6-23, 26-45, 50-57 |
| 5.2 Unit Circle: Sine and Cosine Functions  | 470/6-53, 60-69 |
| Week10 | 5.3 The Other Trigonometric Functions | 484/6-41, 49-51  |
| 5.4 Right Triangle Trigonometry | 495/6-41, 52-56 |
| Week11 | 6.1 Graphs of the Sine and Cosine Functions | 520/6-14, 18,21 |
| 6.2 Graphs of the Other Trigonometric Functions | 538/19, 22-26 |
| Week12 | 6.3 Inverse Trigonometric Functions | 550/8-11, 24, 26, 28  |
| 7.1 Solving Trigonometric Equations with Identities | 568/16-18, 29-33, 40-42 |
| Week13 | 7.2 Sum and Difference Identities | 582/4-7, 10-13, 20, 21, 49-51 |
| 7.5 Solving Trigonometric Equations | 614/4-9, 13-25, 41, 42 |
| Week14 | **Final Review** |  |

Instructors: We encourage you to include the discussion of quadratic, polynomial and rational inequalities in Chapter 3.

YH/IP/AW 01/22 (EA 7/22 pathways clarification)
01/23 EA COVID – 07/23 removed

1. The instructor will provide additional details on assignments. [↑](#footnote-ref-1)