LAGUARDIA COMMUNITY
COLLEGE CITY UNIVERSITY OF
NEW YORK
MATHEMATICS, ENGINEERING & COMPUTER SCIENCE DEPARTMENT

MAT 200: PRECALCULUS

4 credits, 5 hours
4 classroom hours, 1 lab hour

Catalog Description

4 credits, 5 hours (4 classroom hours, 1 lab hour)
Prerequisite: MAT 115 or MAT117

This course is intended as a preparation for the study of calculus. Functions and their graphs are analyzed theoretically within a framework that emphasizes their roles in applied settings. Particular attention will be paid to polynomial, exponential, logarithmic, and trigonometric models. Use of graphing utilities (computer algebra systems, scientific/non-graphing calculators, etc.) as analytical tools will be emphasized; the online learning platform Lumen will be used.

Instructional Objectives

During the semester, the instructor will endeavor to:

1.) Reinforce and further explore functional patterns as a naturally occurring phenomena.
2.) Investigate verbal, numerical, graphical, and symbolic representations of functions.
3.) Enable students to critically analyze linear, power, and exponential models both algebraically and graphically.
4.) Examine rigid and non-rigid transformations both experimentally and analytically.
5.) Introduce and explore the inverse function concept and to relate inverse functions to the corresponding original functions.
6.) Introduce logarithmic functions as inverses of the exponential functions and to analyze the theoretical consequences of this inverse relationship.
7.) Introduce the trigonometric functions and their inverses, present a comprehensive treatment of the sine and cosine functions, and explore applications of them.
8.) Facilitate the students' use of graphing utilities as analytical tools.
9.) Promote the development of written analyses of mathematical concepts.
10.) Enable students to gather and analyze evidence and make conclusion.

Performance Objectives

At the conclusion of this course, students will be able to:

1.) Interpret functional patterns and create functions describing them.

2.) Convert one representation of a function to another.

3.) Derive linear, power, and exponential functions and apply them in the solution of real-world problems.

4.) Employ rigid and non-rigid transformations algebraically and graphically in problem solving.

5.) Compute inverse functions and use their properties to obtain more precise algebraic and graphical information about the corresponding original functions.

6.) Solve exponential and logarithmic equations and graph exponential and logarithmic functions both in the abstract and within the framework of physical applications.

7.) Perform computations involving trigonometric functions and their inverses in both theoretical and applied settings and graph the sine and cosine functions.

8.) Use graphing utilities in analytical problem-solving

9.) Complete written assignments on various topics in the precalculus subject area

10.) student will be able to demonstrate gathering and analyzing evidence and making conclusion. Student will be able to present it in digital form

Course Materials:

Textbook: PRECALCULUS by Jay Abramson (Senior contributing author), Arizona State University, Openstax https://openstax.org .

Lumen Learning OHM website: https://ohm.lumenlearning.com/
Online access is required for tutorials, homework and quizzes. Students must purchase the access code for the online LUMEN platform. The cost is currently $20 via online on LUMEN or $25 at the college's bookstore.

Grading:

Instructor's Tests (3)	45%
Inquiry Learning Projects	10%
Online Quizzes	5%
Online Homework	5%
Final (Departmental)	35%

Suggested Plan of Lessons

Lesson	Topics	Suggested Work on Lumen
Lessons 1 – 4	Review of Algebra	Unit 0
	Functions and function notation. Tabular, graphical, and algebraic representation of functions. One-to-one functions Library of functions (Toolkit functions)	Unit 1.1
	Domain and range of the function	Unit 1.2
	Rate of change and behavior of graphs. Increasing/Decreasing property. Local and absolute extrema.	Unit 1.3
Lesson 5	Lab (short introductory session about Maple).	
Lessons 6 – 9	Operations on functions. Composition of functions	Unit 1.4
	Transformations of functions. Even and odd functions.	Unit 1.5
	Equations and inequalities involving absolute value functions.	Unit 1.6
	Inverse function	Unit 1.7
Lesson 10	Lab	
Lessons 11 – 14	Linear functions. Graph of linear functions. Modeling with linear function	Units 2.1, 2.1
	Quadratic equations. (Completing the square, quadratic formulas)	Review
	Quadratic function. Graph and standard equation of quadratic function. Properties.	Unit 3.2
Lesson 15	Lab	
Lessons 16 – 19	Applications of Quadratic function. Quadratic inequalities.	Units 3.2
	Review for Exam 1	
	Exam 1	
Lesson 20	Lab	
Lessons 20 – 24	Polynomial functions and their graphs	Unit 3.3, 3.4
	Rational functions. Domain. Asymptotes	Unit 3.7
	Exponential function its graph and properties.	Units 4.1, 4.2
Lesson 25	Lab	
Lessons 26 – 29	Logarithms. Logarithmic function its graph, and properties.	Units 4.3, 4.4
	Properties of logarithms	Unit 4.5
	Exponential and logarithmic equations	Unit 4.6
Lesson 30	Lab	

Lessons 31 – 34	Financial applications of exponential functions. Exponential growth and decay.	Units 4.1, 4.7
	Circle	Unit 5.1
	Review for Exam 2	
	Exam 2	
Lesson 35	Lab	
Lessons 36 – 39	Unit circle and angles	Unit 5.2
	Sine and Cosine functions (Unit circle approach)	Unit 5.3
	Other trigonometric functions. Fundamental identities. Periodic property	Unit 5.4
	Graphs of Sine and Cosine functions	Unit 5.5
Lesson 40	Lab	
Lessons 41 – 44	Graphs of other trigonometric functions	Unit 5.6
	Inverse trigonometric functions	Unit 6.1
	Trigonometric identities	Unit 6.2
Lesson 45	Lab	
Lessons 46 – 49	Sum and difference identities	Unit 6.3
	Double-angle and Half-angle formulas	Unit 6.4
	Trigonometric equations	Unit 6.5
Lesson 50	Lab	
Lessons 51 – 54	Review for Exam 3	
	Exam 3	
	Right triangle trigonometry	Unit 7.1
	Laws of Sines and Cosines	Unit 7.2
Lesson 55	Lab	
Lessons 56 – 58	Selected topics: Conics, parabola, ellipse	Unit 8
Lessons 59 – 60	Final Review	
	Final Exam (Cumulative)	

Remarks About Evaluation

1.) Several homework/laboratory writing assignments will be collected during the semester. Each assignment should be submitted by its due date. Assignments turned in late may not receive full credit. In addition, quizzes on homework/lab material may be given at various times during the term.
2.) All homework, quizzes, and exams will be conducted online via Lumen. To have access to all classwork, including assessment, students must have registered on https://ohm.lumenlearning.com/ .
3.) In certain instances, at the discretion of the instructor, a student may be asked to demonstrate the ability to conceptually understanding the work he/she submitted. In such instances, the instructor may ask any student for a written or oral (live video session) clarification or explanation of solutions to any assignment, including homework, quizzes, exams, final exam, etc.

General Comments

1.) The specific topics listed in the suggested lesson plan and the principles of evaluation listed above are both subject to minor modification by the instructor.
2.) The instructor will assign homework relevant to the topics in the course. Each student is strongly encouraged to complete these assignments to the best of his or her ability consistently throughout the semester. Generally speaking, the student that follows this recommendation will maximize his or her understanding of the subject matter and achieve optimal performance on examinations.