

## Syllabus

# Precalculus, Semester B

## Course Overview

Precalculus encompasses the rudiments of calculus, analytical geometry, and trigonometry. In Precalculus B, you will explore and build your knowledge of conic sections, matrices, sequences, induction, and probability and apply this knowledge to real-world situations. You will also study basic concepts of calculus, such as the limits of a function and area under the curve.

## Course Goals

This course will help you meet these goals:

- Understand the conic section while exploring parabolas, ellipses, hyperbolas, and circles and their graphs.
- Use Cavalieri's principle to derive formulas for spheres, cylinders, and other solid figures.
- Solve systems of linear equations with two or three variables using Gauss-Jordan elimination.
- Identify and perform addition, subtraction, and multiplication on matrices.
- Compute the determinant of a matrix.
- Solve systems of linear equations using an inverse matrix.
- Use matrices to transform vectors in a plane.
- Calculate the expected value of a random variable and interpret it as the mean of the probability distribution.
- Develop a probability distribution for a random variable defined for a sample space in which you can calculate probabilities empirically or theoretically and find the expected value.
- Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.
- Explore limits and techniques used to find the limit of a function.
- Explore tangent lines and area under curves.

## General Skills

To participate in this course, you should be able to do the following:

- Complete basic operations with word-processing software, such as Microsoft Word or Google Docs.
- Perform online research using various search engines and library databases.
- Communicate through email and participate in discussion boards.

*For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Plato Student Orientation document, found at the beginning of this course.*

## Credit Value

Precalculus B is a 0.5-credit course.

## Course Materials

- Notebook
- Computer with Internet connection and speakers or headphones
- Microsoft Word or equivalent
- Microsoft Excel or equivalent

## Course Pacing Guide

This course description and pacing guide is intended to help you stay on schedule with your work. Note that your course instructor may modify the schedule to meet the specific needs of your class.

## Unit 1: Conic Sections

### Summary

This unit introduces you to conic sections. You will explore ellipses and parabolas and their graphs. Using Cavalieri's principle, you will derive the formulas to find the volume of a sphere and other solid figures.

Day	Activity/Objective	Type
1 day: 1	<b>Syllabus and Plato Student Orientation</b> <i>Review the Plato Student Orientation and Course Syllabus at the beginning of this course.</i>	Course Orientation
3 days: 2–4	<b>Conic Sections and Parabolas</b> <i>Understand the conic section while exploring parabolas and their graphs.</i>	Lesson
3 days: 5–7	<b>Ellipses and Circles and Their Graphs</b> <i>Explore ellipses and circles and their graphs.</i>	Lesson
3 days: 8–10	<b>Defining Hyperbolas</b> <i>Define hyperbolas and identify their key features.</i>	Lesson
3 days: 11–13	<b>Hyperbolas and Their Graphs</b> <i>Use key features of hyperbolas to graph them.</i>	Lesson
3 days: 14–16	<b>Volume of a Sphere</b> <i>Use Cavalieri's Principle to derive formulas for spheres, cylinders, and other solid figures.</i>	Lesson

Day	Activity/Objective	Type
5 days: 17–21	<b>Unit Activity/Threaded Discussion—Unit 1</b>	Unit Activity
1 day: 22	<b>Posttest—Unit 1</b>	Assessment

## Unit 2: Matrices

### Summary

In this unit, you will focus on matrices and operations on matrices. You will use Gauss-Jordan elimination to solve linear equations with two or three variables. You will add, subtract, and multiply matrices and find the determinant of a matrix. At the end of the unit, you will use matrices to represent vectors in a plane.

Day	Activity/Objective	Type
3 days: 23–25	<b>Gauss-Jordan Elimination</b> <i>Solve systems of linear equations using Gauss-Jordan elimination, with two or three variables.</i>	Lesson
3 days: 26–28	<b>Matrices and Matrix Operations</b> <i>Identify when matrix addition and subtraction may occur and perform matrix addition and subtraction.</i>	Lesson
3 days: 29–31	<b>The Determinant of a Matrix</b> <i>Compute the determinant of a matrix.</i>	Lesson
3 days: 32–34	<b>Scalar Multiplication of Matrices</b> <i>Perform scalar multiplication on matrices.</i>	Lesson
3 days: 35–37	<b>Matrix Multiplication</b> <i>Identify when matrix multiplication may occur and perform matrix multiplication.</i>	Lesson
3 days: 38–40	<b>Solving Systems of Linear Equations with an Inverse Matrix</b> <i>Solve systems of linear equations using an inverse matrix.</i>	Lesson
3 days: 41–43	<b>Vectors and Matrices</b> <i>Use matrices to transform vectors in a plane.</i>	Lesson
5 days: 44–48	<b>Unit Activity/Threaded Discussion—Unit 2</b>	Unit Activity

Day	Activity/Objective	Type
1 day: 49	<b>Posttest—Unit 2</b>	Assessment

## Unit 3: Sequences, Induction, and Probability

### Summary

In this unit, you will calculate expected values and make predictions based on theoretically and empirically calculated probability.

Day	Activity/Objective	Type
3 days: 50–52	<b>Random Variables</b> <i>Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space and graph the corresponding probability distribution.</i>	Lesson
3 days: 53–55	<b>Expected Value of a Random Variable</b> <i>Calculate the expected value of a random variable and interpret it as the mean of the probability distribution.</i>	Lesson
3 days: 56–58	<b>Making Predictions Based on Probabilities</b> <i>Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated and find the expected value.</i>	Lesson
3 days: 59–61	<b>Making Predictions Based on Empirical Data</b> <i>Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically and find the expected value.</i>	Lesson
3 days: 62–64	<b>Ins and Outs of Expected Value</b> <i>Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.</i>	Lesson
5 days: 65–69	<b>Unit Activity/Threaded Discussion—Unit 3</b>	Unit Activity
1 day: 70	<b>Posttest—Unit 3</b>	Assessment

## Unit 4: Limits: Introduction to Calculus

### Summary

This unit introduces you to calculus. You will define and find the limit of a function. Additionally, you will explore tangent lines and the areas under curves and solve problems about them.

Day	Activity/Objective	Type
3 days: 71–73	<b>Limits of Functions</b> <i>Explore the definition of a limit.</i>	Lesson
3 days: 74–76	<b>Finding the Limit of a Function</b> <i>Examine techniques used to find the limit of a function.</i>	Lesson
3 days: 77–79	<b>The Tangent Line Problem</b> <i>Explore the tangent line problem.</i>	Lesson
3 days: 80–82	<b>The Area Under a Curve</b> <i>Explore the area under a curve.</i>	Lesson
5 days: 83–87	<b>Unit Activity/Threaded Discussion—Unit 4</b>	Unit Activity
1 day: 88	<b>Posttest—Unit 4</b>	Assessment
1 day: 89	<b>Semester Review</b>	
1 day: 90	<b>End-of-Semester Test</b>	Assessment