AP Precalculus

2025–2026 Academic Year

Instructor Information

Instructor: Jan C. Bierowiec (Mr. B.)
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Office Hours:

- Monday 3:00 – 3:30
- Tuesday 3:00 – 3:30
- Thursday 3:00 – 3:30
- Friday 3:00 – 4:00

Course Description

AP Precalculus centers on functions modeling dynamic phenomena. This research-based exploration of functions is designed to better prepare students for college-level calculus and provide foundational skills for other mathematics and science courses.

Throughout this course, students develop and hone symbolic manipulation skills. Functions and their compositions, inverses, and transformations are understood through graphical, numerical, analytical, and verbal representations. These representations reveal different attributes of functions and are useful for solving problems in mathematical and applied contexts. Students will communicate a deep understanding of mathematical phenomena.

Learning Goals

Students will:

1. Develop mathematical reasoning, problem-solving, modeling, and communication skills.
2. Understand the concept of a **function** and analyze functions using equations, tables, graphs, and verbal descriptions.
3. Analyze **polynomial and rational functions**, including zeros, intercepts, end behavior, asymptotes, transformations, and rates of change.
4. Analyze **exponential and logarithmic functions**, including growth and decay, inverse relationships, logarithmic properties, and real-world applications.
5. Analyze **trigonometric functions**, including sine, cosine, and tangent, using the unit circle, graphs, equations, and real-world models.
6. Understand and apply **function transformations**, including translations, reflections, stretches, compressions, and combinations of transformations.
7. Determine and interpret **average and instantaneous rates of change** and connect rates of change to graphical and contextual behavior.
8. Analyze **function composition and inverse functions** and explain the relationships between functions and their inverses.
9. Construct mathematical models using **linear, polynomial, rational, exponential, logarithmic, and trigonometric functions**.
10. Select appropriate function models and use them to **describe, predict, and interpret real-world phenomena**.

11. Analyze functions using important characteristics such as **domain, range, intercepts, extrema, intervals of increase and decrease, concavity, and end behavior**.
12. Work with **sequences and recursively defined functions** and connect discrete patterns to function behavior.
13. Analyze **parametric and polar functions** and connect alternative representations to Cartesian graphs.
14. Use **graphing technology** appropriately to explore functions, test conjectures, solve equations, and analyze mathematical models.
15. Connect **algebraic, graphical, numerical, and verbal representations** of mathematical relationships.
16. Build the mathematical foundation necessary for future study in **calculus and other advanced mathematics courses**.

Class Policies

1. Be responsible.
2. Be respectful.
3. Communicate.
4. Your work must be your own.

Required Materials

- Graphing calculator
- Pencil (or erasable pen)
- Binder (notebook or blank pages recommended)

Course Structure

Daily Quizzes: Every class begins with a brief 5-minute quiz reviewing the previous lesson.

Notes: Class slides/class notes will be posted prior to each test for review (not after each class period). If absent, you must obtain notes from a classmate or schedule a meeting with me during office hours.

Homework: Regular assignments reinforce learning. Success depends on consistent effort.

Grading Breakdown

Tests	40%
Daily Quizzes	30%
Homework	20%
Classwork	10%

Late Work Policy

All work is due at the start of the class period for which it is assigned. Missing or incomplete work will be penalized 10% per day unsubmitted. Assignments more than one week late will result in a grade of zero.

Major Topics

- Polynomial & Rational Functions:
  - Change in Tandem
  - Rates of Change
  - Rates of Change in Linear and Quadratic Functions
  - Polynomial Functions and Rates of Change
  - Polynomial Functions and Complex Zeros
  - Polynomial Functions and End Behavior
  - Rational Functions and End Behavior
  - Rational Functions and Zeros
  - Rational Functions and Vertical Asymptotes
  - Rational Functions and Holes
  - Equivalent Representations of Polynomial and Rational Functions
  - Transformations of Functions
  - Function Model Selection and Assumption Articulation
  - Function Model Construction and Application
- Exponential & Logarithmic Functions:
  - Change in Arithmetic and Geometric Sequences
  - Change in Linear and Exponential Functions
  - Exponential Functions
  - Exponential Function Manipulation
  - Exponential Function Context and Data Modeling
  - Competing Function Model Validation
  - Composition of Functions
  - Inverse Functions
  - Logarithmic Expressions
  - Inverses of Logarithmic Functions
  - Logarithmic Functions
  - Logarithmic Function Manipulation
  - Exponential and Logarithmic Equations and Inequalities
  - Logarithmic Function Context and Data Modeling
  - Semi-log Plots
- Trigonometric and Polar Functions:
  - Periodic Phenomena
  - Sine, Cosine, and Tangent
  - Sine and Cosine Function Values
  - Sine and Cosine Function Graphs
  - Sinusoidal Functions
  - Sinusoidal Function Transformations
  - Sinusoidal Function Context and Data Modeling
  - The Tangent Function
  - Inverse Trigonometric Functions

- Trigonometric Equations and Inequalities
- The Secant, Cosecant, and Cotangent Functions
- Equivalent Representations of Trigonometric Functions
- Trigonometry and Polar Coordinates
- Polar Function Graphs
- Rates of Change in Polar Functions

Communication Expectations

Students are responsible for:

- Checking myLS regularly
- Obtaining notes if absent
- Communicating early regarding academic concerns