

**AP<sup>®</sup> Precalculus (MATH 1045)**  
Collegiate School of Medicine and Bioscience<sup>1</sup>  
2024-2025

**Instructor**

Nathan Klosterman

**Contact Information**

Email: [Nathan.Klosterman@slps.org](mailto:Nathan.Klosterman@slps.org) (Primary Instructor)

**Note:** All emails should go to Mr. Klosterman including notifications about absences, tardies, extensions, rescheduling assessments, etc.

**Instructional Material**

Textbook: *Precalculus: Graphical, Numerical, Algebraic 11e* by Demana, Waits, Foley, Kennedy, Bock

Calculator (at school, but can be checked out): TI-84+ CE graphing calculator

**Other Materials**

Binder (recommended) & paper (college ruled and graph) OR notebook, folder, pencils/pens, a good eraser

**You will often refer to work we have done previously, so you should keep all notes and assignments. Make sure everything legible and ORGANIZED!**

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<sup>1</sup> Subject to revision based on changes in curriculum or school policy.

## Internet/Computer Access

You will need to rely on AP Classroom and other online resources for AP Precalculus. If you will have issues with internet and/or computer access, let me know immediately so we can figure out a solution.

## Very Important Websites

- <https://office.com>  
You can access all your Microsoft Products here including Teams.
- <https://sis.slps.org/SLPS/>  
Check your grades here!
- <https://edulastic.com/>  
You will take any virtual or remote quizzes and unit exams here.
- <https://myap.collegeboard.org/>  
AP Videos and progress checks
- <http://www.Khanacademy.org>  
Videos for a variety of topics.
- <https://www.desmos.com/calculator> & <http://www.mathsisfun.com/data/function-grapher.php>  
Online graphing calculators

## General Expectations

AP Precalculus is a difficult course that requires a lot of work. If you work hard in and out of class and do everything that is expected, you should pass the course and be in a good position going into college calculus courses. However, earning an A and/or scoring well on the AP Exam requires particular dedication. I say this not to scare you out of the class, but to let you know that this content is difficult, and the expectations are very high.

The pace of the course will be quick and there is less wiggle room than in other math courses. This means it is especially important to ask questions when you have them and to advocate for yourself when you need help so that you do not fall behind. **You can ask questions in class when appropriate, during mentor time, and via email or Teams.** I encourage you to communicate with me outside of class if you have any questions. I may be able to quickly clear up a question or schedule a one-on-one meeting with you if it requires more discussion. I am more than willing to put in extra time if it helps you.

## **Course Overview**

### **Unit 1: Polynomial and Rational Functions**

In Unit 1, students develop understanding of two key function concepts while exploring polynomial and rational functions.

1. The first concept is covariation, or how output values change in tandem with changing input values.
2. The second concept is rates of change, including average rate of change, rate of change at a point, and changing rates of change.

The central idea of a function as a rule for relating two simultaneously changing sets of values provides students with a vital tool that has many applications, in nature, human society, and business and industry. For example, the idea of crop yield increasing but at a decreasing rate or the efficacy of a medicine decreasing but at an increasing rate are important understandings that inform critical decisions.

### **Unit 2: Exponential and Logarithmic Functions**

In Unit 2, students build an understanding of exponential and logarithmic functions. Exponential and logarithmic function models are widespread in the natural and social sciences. When an aspect of a phenomenon changes proportionally to the existing amount, exponential and logarithmic models are employed to harness the information. Exponential functions are key to modeling population growth, radioactive decay, interest rates, and the amount of medication in a patient. Logarithmic functions are useful in modeling sound intensity and frequency, the magnitude of earthquakes, the pH scale in chemistry, and the working memory in humans. The study of these two function-types touches careers in business, medicine, chemistry, physics, education, and human geography, among others.

### **Unit 3: Trigonometric and Polar Functions**

In Unit 3, students explore trigonometric functions and their relation to the angles and arcs of a circle. Since their output values repeat with every full revolution around the circle, trigonometric functions are ideal for modeling periodic, or repeated pattern phenomena, such as: the highs and lows of a wave, the blood pressure produced by a heart, and the angle from the North Pole to the Sun year to year.

Furthermore, periodicity is found in human inventions and social phenomena. For example, moving parts of an analog clock are modeled by a trigonometric function with respect to each other or with respect to time; traffic flow at an intersection over the course of a week demonstrates daily periodicity; and demand for a particular product over the course of a year falls into an annually repeating pattern.

Polar functions, which are also explored in this unit, have deep ties to trigonometric functions as they are both based on the circle. Polar functions are defined on the polar coordinate system that uses the circular concepts of radii and angles to describe location instead of rectangular concepts of left-right and up-down, which students have worked with previously. Trigonometry serves as the bridge between the two systems.

### **Unit 4: Functions involving Parameters, Vectors, and Matrices**

In Unit 4, students explore function types that expand their understanding of the function concept. Parametric functions have multiple dependent variables' values paired with a single input variable or parameter. Modeling scenarios with parametric functions allows students to explore change in terms of components. This component-based understanding is important not only in calculus but in all fields of the natural and social sciences where we seek to understand one aspect of a phenomenon independent of other confounding aspects. Another major function type in this unit involves matrices mapping a set of input vectors to output vectors. The capacity to map large quantities of vectors instantaneously is the basis for vector-based computer graphics. While students may see their favorite video game character trip and fall or seemingly move closer or farther, matrices implement a rotation on a set of vectors or a dilation on a set of vectors. The power of matrices to map vectors is not limited to graphics but to any system that can be expressed in terms of components of vectors such as electrical systems, network connections, and regional population distribution changes over time. Vectors and matrices are also powerful tools of data science as they can be used to model aspects of complex scientific and social science phenomena.

## **Unit 5: AP Test Review**

Once students have learned all the material, we will review for the AP Exam (**given on Tuesday, May 13 at 8:00 a.m.**). This review will include a practice exam to be used as the final exam for the course.

**Course Timeline/Pacing:** (for 80-minute classes that alternate meeting 2 and 3 times a week)

### **Semester 1**

- **Unit 1: Polynomial and Rational Functions (15-20 class periods)**
  - Unit 1 (halfway) Exam occurring after section 1.6
  - Unit 1 (summative) Exam occurring after section 1.14
  
- **Unit 2: Exponential and Logarithmic Functions (15-22 class periods)**
  - Unit 2 (halfway) Exam occurring after section 2.8
  - Unit 2 (summative) Exam occurring after section 2.15

### **Semester 2**

- **Unit 3: Trigonometric and Polar Functions (17-25 class periods)**
  - Unit 3 (halfway) Exam occurring after section 3.7
  - Unit 3 (summative) Exam occurring after section 3.15
  
- **Unit 4: Functions involving Parameters, Vectors, and Matrices (17-18 class periods)**
  - Unit 4 (halfway) Exam occurring after section 4.7
  - Unit 4 (summative) Exam occurring after section 4.14
  
- **Unit 5: AP Review (all remaining class periods until AP Exam)**
  - Mock AP Exam – graded as spring semester final exam

## Important Dates

- Mock AP Exam: TBD  
Location: CSMB
- AP Precalculus Exam: Tuesday, May 13 at 8:00 a.m.  
Location: CSMB

## Grading Formula (per semester, NOT quarter)

Unit Exams, Quizzes, and Take-Home Projects: 65%
Homework, HW Quizzes, In-Class Work: 15%
Final Exam: 20%

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	Less than 60%

## UMSL ACP Dual Credit Information

This course will be offered as a Dual Credit course through UMSL. You will receive a Math 1045 credit upon completion of the course with a C or higher. Listed below is the course description for Math 1045:

This course covers topics including factoring, simplifying rational functions, functions and their graphs, solving linear and nonlinear equations, polynomial functions, inverse functions, the binomial theorem, logarithms, exponentials, solutions to systems of equations using matrices, solutions to nonlinear systems of equations, and sequences. Students will also study trigonometric and inverse trigonometric functions with emphasis on trigonometric identities and equations. This course is intended for students planning to take MATH 1800.

Use the website listed here (<http://umsl.edu/acp>) to sign up for the ACP Dual Credit.

## Assessments

Students will have at least two quizzes and two exams per unit to assess their knowledge. I will announce assessments well in advance (and generally, you can find the dates from the syllabus). **Please let me know at least two days in advance if there is a conflict that would prevent you from taking an assessment in the scheduled time.** I will not offer retakes of any kind during this course.

**The AP Exam:** The AP Exam for Precalculus will have the following format:

### Section I: Multiple Choice

**40 Questions | 2 Hours | 62.5% of Exam Score**

- Part A: 28 questions; 80 minutes; 43.75% of exam score (calculator not permitted)
- Part B: 12 questions; 40 minutes; 18.75% of exam score (graphing calculator required)

### Section II: Free Response

**4 Questions | 1 Hour | 37.5% of Exam Score**

- Part A: 2 questions; 30 minutes; 18.75% of exam score (graphing calculator required)
  - Free-Response Question 1: Function Concepts
  - Free-Response Question 2: Modeling a Non-Periodic Context
- Part B: 2 questions; 30 minutes; 18.75% of exam score (calculator not permitted)
  - Free-Response Question 3: Modeling a Periodic Context
  - Free-Response Question 4: Symbolic Manipulations

**Unit Exams:** Our unit exams will mirror the AP Precalculus exam as much as possible. Each exam will be a combination of multiple choice and multi-part free response questions. Each of these two sections will be further divided into a “with calculator” and a “without calculator” section (just like the AP Exam). The multiple-choice questions will make up 60% of your exam grades while the free response questions will make up 40%.

**Section 1:** 13 Multiple Choice – (Without calculator)

Each problem is worth 1 point.

**Section 2:** 1 Free Response – (Without calculator)

Each problem is worth 6 points.

**Section 3:** 5 Multiple Choice – (With calculator)

Each problem is worth 1 point.

**Section 4:** 1 Free Response – (With calculator)

Each problem is worth 6 points.

The multiple-choice points you receive may be multiplied to maintain the 60-40 split. There is no penalty for guessing on the Multiple-Choice sections. You **may not** retake any unit exams due to poor performance.

**Final Exams:** The first semester exam will be cumulative for the first semester topics, and the final exam at the end of the year will be an AP practice test and will be administered before the AP Exam (thus, it will cover topics from the entire school year). The results of the final exam as well as the AP Mock exam can be used to review and prepare for the AP test.

**Note:** There will **not be** dedicated review days or review packets for quizzes and unit exams. You will be expected to prepare for assessments outside of class using notes, materials, and homework assignments from the unit.



## Homework

**Expect to have homework after every class, usually due the following class period.**

Each class students will work on assignments and activities. Some of these will be completed in class, while others may be completed at home as asynchronous classwork/homework. Many assignments will involve analysis, Rule of Four, and other higher order thinking skills required for success on an AP test or in college. **Any worksheets, activities, or HW problems that are expected to be turned in will be posted with due dates as a Microsoft Teams assignment. These assignments will generally be graded for accuracy, although answer keys will be made available on the Microsoft Teams assignment so students can check their work.**

In addition, some assignments may be suggested problems that do not need to be submitted for credit. This distinction will be made clear on Microsoft Teams (**suggested assignments will be labeled as such, still have due dates, but be worth 0 points**). If an assignment is not mandatory, the due date represents when that material should be mastered and/or when an assessment will be given over that content.

Homework quizzes may be given periodically over assigned work. These quizzes are graded for accuracy and count as homework grades.

## If Absent

If you miss a class, it is **your responsibility** to find out if there is any in-class work you need to make up. Most assignments and lessons can be found on Microsoft Teams. Email or ask me before or after class if you have any additional questions. You will be able to turn in missed assignments the class after you have returned to school without penalty. If you have been absent for an extended period of time and/or need additional time to get caught up, it is your responsibility to explain why you need more time and ask for an extension immediately, preferably by email. **Assessments (including homework quizzes) must be made up within a week of your return to school.**

## **Tutoring**

After school tutoring will occur once per week (non-AP Precalculus specific). AP Precalculus tutoring will be offered as needed, particularly before assessments. Tutoring will be offered on Tuesday afternoons. You may sign up in Mr. Sabor's room before noon each Tuesday.

I am also more than willing to work with you during the school day if you need help. You can schedule time with me during mentor or stop by during senior study hall. I am also very responsive to email, so please send me any questions you have when you are not at school. If you are having trouble and need extra help, please let me know!

## **Late Work**

**Late work will be accepted for one week after its due date for 80% of your earned score (20% penalty). If there are exceptional circumstances, I may grant you an extension if you make the request and explain the circumstances BEFORE THE DAY IT IS DUE. Such requests should be made through email if possible.**

## **Academic Dishonesty**

All of a student's work is expected to be his or her own. Cheating, in any form, will not be tolerated. **If a student is caught cheating, they will receive a zero on the assignment and parents/guardians will be contacted.**

Skipping class is also unacceptable. If you are at school, but skip class, you will receive a 0 on all classwork for the day, receive late credit for any work that was due the period you skipped, and receive a 0 on assessments given that day.

## Collegiate Core Values/Classroom Expectations

1. Practice **Integrity**: Always turn in your own work.
2. Practice **Self-Discipline**: Much of the class is self-directed. It is up to you to make the most of your time and stay focused on assigned problems or the activity you are working on rather than socializing.
3. **Be Respectful**: This applies to your teacher and fellow students. Being respectful means showing up to class on time and starting your “do now” immediately, paying attention in class, staying awake and on task, raising your hand and NOT interrupting me, being helpful during group work, asking questions, using respectful language, and respecting the classroom (not throwing things or leaving trash around, etc.).
4. **Strong Academic Habits**: You will succeed in my course if you work hard from the very beginning. In math, concepts build on one another, so it is imperative that you practice and understand each new topic. Be ready to review old concepts at the beginning of the year and if they come up later in the semester. It is your responsibility to catch up if you miss an assignment. You need to be responsible and prepared for every class. Your homework should be completed on time. Your notebook should be organized and labeled accurately. You should always come to class with the required materials.
5. **Intellectual Curiosity**: Don't be afraid to ask questions, even deeper questions that go beyond clarification. If you want to know why, ask!
6. **Compassion and Ethics**: Do not tell other students the answers to problems in group work or if they ask while you work on homework problems; explain the process to them so they can learn how to find the answer themselves.