

# AP<sup>®</sup> Calculus AB & BC Syllabus

2019–2020

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## 1 Course Description

**Prerequisite:** IGCSE Additional Mathematics or Trigonometry/Pre-Calculus

AP<sup>®</sup> Calculus AB is a one-year course that covers the first semester of college calculus. We will cover all topics covered in the AP Calculus AB exam, including limits, continuity, differentiation, integration, and major theorems and applications of calculus.

AP<sup>®</sup> Calculus BC covers the first two semesters of college calculus. We will cover all AB topics at an accelerated pace as well as BC-only topics, including parametric equations, polar coordinates, and infinite series.

## 2 Contact Information

Teacher: Mr. Li

Course Website: <https://ap-calculus.github.io>

Office Hours: <https://ap-calculus.github.io/#officehours>

- You are welcome to stop by anytime during scheduled office hours without an appointment.
- If I need to reschedule office hours, I will send an e-mail to the class.
- If you cannot make it to my office hours, please [schedule an appointment](#). If none of the time slots work for you, check with me after class so we can arrange a time to meet.

## 3 Course Objectives

1. Develop mastery in univariate calculus concepts.
2. Apply differentiation and integration to solve real-world problems.
3. Build connections between mathematical proofs and intuition.
4. Communicate mathematical ideas clearly in both written and oral form.
5. Exercise resilience in independent problem solving.
6. Collaborate with classmates in problems involving teamwork.

## 4 Resources

### 4.1 Course Textbook

Finney, R. L., Demana, F. D., Waits, B. K., & Kennedy, D. (2012). *Calculus: Graphical, Numerical, Algebraic (AP\* Edition)*. 4th ed. Boston, MA: Prentice Hall.

### 4.2 Graphing Calculator

Required: Choose one of the Texas Instruments TI-83/84 series (including TI-83 Plus, TI-84 Plus, TI-84 Silver Edition, TI-84 Plus CE)

I will be using **TI-84 Plus** for in-class demonstrations, but any one of the TI-83/84 models should be similar enough to follow along in class. Check this [link](#) to see the differences among the TI-83/84 models.

### 4.3 Khan Academy

[Khan Academy Website](#)

Instructions:

- [Create a Khan Academy account](#) with your e-mail address.

- Visit <https://www.khanacademy.org/join> and enter the class code given to you in class.

In traditional classroom formats, teachers lecture on concepts with basic examples and often do not have time to cover difficult problems. We will be using Khan Academy to flip our classroom. That is, most of your homework will involve progressing through Khan Academy modules and practice problems. In class, I will clarify concepts and delve into more challenging problems. Since I will be able to understand each student's individual progress in real time, I will adjust the format of the following day's lesson accordingly. If students are struggling in a unit, we will temporarily revert to the traditional format and review key concepts in class. In cases where students are all on track, we will have more time to engage in harder and nuanced problems as a class and in group work. In other units in which students' progress varies widely, I may use class time for individualized instruction. Based on your feedback and depending on the unit, we will make adjustments along the way.

## 4.4 AP Classroom

Visit <https://collegeboard.org/joinapclass> for instructions on joining the AP class section for this class.

- Log onto <https://myap.collegeboard.org> with your College Board account.
- Enter the join code that you will receive in class.

## 4.5 Recommended Reference

Bock, D., Donovan, D., & Hockett, S.O. (2017). *Barron's AP Calculus*. 4th ed. Hauppauge, NY: Barron's Educational Series, Inc.

If you would like more practice and preparation for the AP exam, the text above is an excellent reference. However, you are not required to purchase this text.

# 5 AP Exam

## 2020 AP Exam Schedule

- AP Calculus AB/BC: May 5, 2020 (8 a.m. local time)

## Exam Format

- Section 1 (50%): 45 multiple-choice questions (1 hour, 45 min.)
  - Non-Calculator Portion: 30 questions (1 hour)
  - Calculator Portion: 15 questions (45 min.)
- Section 2 (50%): 6 free-response questions
  - Calculator Portion: 2 questions (30 min.)
  - Non-Calculator Portion: 4 questions (60 min.)

## 6 Grades

Final grades for each semester will be calculated as follows:

- 20% Midterm
- 20% Final Exam
- 20% Homework
- 10% Participation
- 10% Free-Response Questions
- 10% First Monthly Exam
- 10% Second Monthly Exam

### 6.1 Course Exams

Each semester, the math department will administer two monthly exams, a midterm, and a final exam. Once the exam dates are finalized, they will be listed in the [Calendar](#) section of the course website.

### 6.2 Homework

Homework assignment for Calculus AB and BC will be listed in the [AB Schedule](#) and [AB Schedule](#) sections of the course website, respectively. Unless otherwise stated, assignments are due the following school day.

The schedules have three main assignment columns:

#### 6.2.1 Khan Academy

Since I can track your progress on Khan Academy, I will not ask you to turn in assignments from Khan Academy. However, I highly recommend that you work on Khan Academy questions on paper and keep your work organized for exam review.

#### 6.2.2 Other Homework

Other homework may include Khan Academy quizzes, AP Question Bank problems, AP Progress Check questions, and textbook problems.

For all non-Khan Academy assignments in this column, I expect the following:

- Write your name, date, and period on the top-right corner of the first page. For subsequent pages, place just your name (without date/period) on the top-right corner.
- On the first page, write down the assignment as the title. Example: Section 1.1 (pages 10-11, #1-36 odd)
- For short questions, copy down the entire problem. For longer questions, outline the problem with enough information so that you can understand the question without referring back to the textbook. The point of copying down short problems and outlining

longer problems is to allow you to reference your homework problems easily for review and exam preparation.

Any of the non-Khan Academy items under the “Other Homework” column may be collected on the following school day. You will receive full credit for all collected homework as long as you write your own homework solutions and make complete corrections with a pen when we go over solutions in class.

### **6.2.3 Classwork**

After you finish the required homework assignments in the “Khan Academy” and “Other Homework” columns, I highly recommend that you look through the problems listed in the “Classwork (next day)” column and work through as many of them as possible. These are the problems that I will focus on class the following day, so attempting these problems beforehand will give you time to absorb the material and ask questions in class.

While classwork will not be collected for grading, working through these problems in class will constitute the majority of your participation grade.

## **6.3 Participation**

During class, you will have the opportunity to solve problems on the board. This is not only good practice for verbal communication of mathematics but also a great way to solidify your understanding of concepts. After each time at the board, you will sign your name on a sheet so I can tally your participation frequency. As long as you maintain regular participation, you will receive full points in this area.

## **6.4 Free Response Questions**

In class, we will work on previous free response questions that relate to the concepts that we cover in each unit. To simulate the scoring process, I will ask students to exchange free response papers to grade as I go through the solutions and assignment of points. After you receive your scored free response paper, you should use a pen with a different color to correct your mistakes to receive full credit.

# **7 Policies**

## **7.1 Integrity**

Honesty is the best policy. We will conduct this course on an honor system. This means that we will trust each other to maintain integrity. Please do not cheat or aid others in cheating.

## **7.2 Collaboration Policy**

While I highly encourage students to help each other in this course, please observe the following guidelines:

- First try to work on problems on your own. Give yourself time to think through problems.
- If you require additional help, please feel free to work collaboratively with other students on a separate piece of paper. In the process of helping each other, please do not rush through the steps to reach a solution. Allow students struggling with the problem more time to think through each step with minor hints so that they can arrive at the final solution on their own.
- At the end of collaboration, you should still write your own homework solutions from start to finish. Do not short-change your own learning process by copying answers.

**Exception to the Collaboration Policy:** Please work independently on the AP progress check multiple-choice questions, which you will have to submit online via AP Classroom at the end of each unit. This is an opportunity for me to determine how much each student has learned at the end of each unit.

## 8 Timeline (Tentative Dates)

| Unit | Topic  | AB          | BC             |
|------|--|-------------|----------------|
| 1    | Limits & Continuity  | 9/2–9/18    | 9/2–9/13       |
| 2    | Differentiation: Basics  | 9/19–9/30   | 9/16–<br>9/20  |
| 3    | Differentiation: Composite, Implicit, & Inverse Functions          | 10/10–10/23 | 9/23–<br>10/8  |
| 5    | Differentiation: Analytical Applications                           | 10/24–11/20 | 10/9–<br>10/24 |
| 4    | Differentiation: Contextual Applications                           | 11/21–12/10 | 10/25–<br>11/8 |
| 6    | Integration  | 12/11–1/16  | 11/11–<br>12/5 |
| 7    | Differential Equations   | 2/9–2/28    | 12/6–<br>12/20 |
| 8    | Integration: Applications  | 3/1–3/27    | 12/23–<br>1/16 |
| 9    | Parametric Equations, Polar Coordinates, & Vector-Valued Functions | N/A         | 2/9–2/28       |
| 10   | Infinite Sequences and Series                                      | N/A         | 3/1–3/27       |
|      | Review   | 3/30–4/3    | 3/30–4/3       |
|      | Practice Exams & Free-Response Questions                           | 4/6–5/1     | 4/6–5/1        |
|      | AP Exam  | 5/5         | 5/5            |