

Mathematics 10B Syllabus (May 2021)

1

Lecture schedule based on the OpenStax textbook *Calculus–Volumes 1 & 2*:

Volume 1: <https://openstax.org/details/books/calculus-volume-1>

Volume 2: <https://openstax.org/details/books/calculus-volume-2>

Section	Lectures	Topic
<i>Vol 1</i>		
4.10	2	Antiderivatives ¹
<i>Vol 2</i>		
1.1	2	Approximating Areas
1.2	1	The Definite Integral
1.3	1	The Fundamental Theorem of Calculus
1.4	1	Integration Formulas and the Net Change Theorem
1.5	1	Substitution
1.6	1	Integrals Involving Exponential and Logarithmic Functions
1.7	1	Integrals Resulting in Inverse Trigonometric Functions
2.1	1	Areas Between Curves
2.2	1	Determining Volumes by Slicing ²
2.8	1	Exponential Growth and Decay
3.1	1	Integration by Parts
3.2	1	Trigonometric Integrals
3.4	2	Partial Fractions
3.7	2	Improper Integrals
4.1	1	Basics of Differential Equations
4.2	1	Direction Fields and Numerical Methods ³
4.3	1	Separable Equations
5.1	1	Sequences
5.2	1	Geometric Series ⁴

Notes

- The standard number of days a class meets in a quarter is 28 (for Winter) or 29 (for Fall and Spring). Allowing for two midterm exams, this leaves 26 or 27 meeting times. The suggested lecture schedule given above includes 24 lecture periods.
- Traditionally, Math 10B starts with a section on antiderivatives. In the OpenStax Calculus textbooks, the section on antiderivatives is only in Volume 1. The chapters that are 1 and 2 in Volume 2 are also included in Volume 1; however, Chapters 3 and 4 in Volume 2 are not in Volume 1. Since the books are freely available online, this should not pose a problem.
- Note that Section 1.7 (Integrals Resulting in Inverse Trigonometric Functions) takes the place of the standard “Trigonometric Substitution” in Math 10B.

¹This section is in Volume 1. All of the other sections listed here are taken from Volume 2.

²Solids of revolution should be limited to regions rotated about the x -axis or the y -axis.

³Skip the “numerical methods” part of this section. This section is only included for the “direction fields” part.

⁴Section 5.2 is about series in general, but only geometric series should be discussed.

Math 10ABC Description

Mathematics 10A and 10B are single-variable differential and integral calculus courses intended for majors in life and social sciences. The most common majors are biology and economics. The sequence continues with multivariable calculus (10C) or elementary probability and statistics (11). The course meets three times a week in large sections conducted by the instructor. The students also meet in smaller (about 30-35 students) recitation sections once each week; these sections are conducted by teaching assistants. Throughout the year, the Teaching+Learning Commons provides drop-in tutoring for Math 10A, 10B, and 10C. Hours of availability and other information can be found here:

<https://aah.ucsd.edu/content-tutoring/index.html>

Math 10A in the Fall, Math 10B in the Winter, and Math 10C in the Spring are usually coordinated and follow a common calendar agreed upon by the instructors with common homework assignments, quizzes, midterms, and final examination.

The principal goal of Math 10ABC is for students to develop a solid understanding of the fundamental ideas of calculus. As a result, the emphasis is on developing a good understanding of why the ideas and procedures of calculus make sense. While a certain level of technical proficiency is essential for that understanding, more attention should be given to presenting rationales for underlying concepts and results and their applications than to proofs that may be too formal for the students or to intricate technical processes. Whenever possible, applications should be chosen from areas that are likely to be of interest to the students, with special emphases on biology and economics.

Please be aware that sometimes the text uses a level of formality that might be inappropriate for this class; this should be a caution to the faculty not to replicate that error (from our point of view), but rather to try to complement it with greater attention to informal motivating arguments when possible. Similarly, some of the problems in the text might be more intricate and technical than is suitable for the students in this course; consequently, some care should be taken in assigning homework to be sure that students develop needed technical competency along the way to acquiring solid understanding without being overwhelmed by inappropriate technical difficulties.