

Math 112: Calculus of Functions of One Variable I

YALE UNIVERSITY
SUMMER 2022 COURSE SYLLABUS

Course Instructor

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Course Information

Class Meetings

- Time: Mondays/Wednesdays/Fridays: 1:00pm–3:15pm
- Location: TBD

Textbooks

Our official class text is: Stewart, Calculus, Early Transcendentals, 8th edition.

This book is available both in print and electronically via the bookstore. It is a **recommended (but not required) text**. We will be focusing on chapters 2-5 and 9.

Course Format

Class meetings will be very interactive! Each class will have lecturing components, in which we cover new material, together with worksheet problem-solving sessions, where you will get a chance to work through examples to solidify your understanding. There will also be short pre-class activities for you to do to prepare for the coming day's class.

Course Description

Calculus is the mathematical discipline that is concerned with quantifying how a change in one quantity relates to the change in other quantities. In this class we learn how to compute the rate of change of one quantity in terms of another, the rate at which one quantity accumulates with respect to another, and the relationships between these two ideas.

Calculus has widespread applications in science, engineering, and economics. For instance, it can be used to precisely describe certain features of motion and space. In particular, calculus allows us to resolve certain paradoxes that arise when we attempt to divide by zero or to sum infinitely many numbers.

Prerequisites

A good grasp of pre-calculus and algebra. No prior knowledge of calculus is assumed.

Topics We Plan to Cover & Learning Objectives

- Limits and continuity:
 - Determine whether limits of functions exist at points and asymptotically and compute them when they do.
 - Describe the connection between continuity and limits and demonstrate when functions are and are not continuous.
- The derivative of a function:
 - Compute derivatives of functions both from the definition and using various derivative rules.
 - Interpret the derivative in context.
- Applying the derivative:
 - Relate quantities to find rates of change (related rates).
 - Use the linear approximation to a function to approximate values.
 - Find local and global extrema of functions and use this in context to find optimal solutions to problems.
 - Sketch accurate graphs of a function by examining it and its derivatives.
- The integral:
 - Explain how we can use Riemann sums to approximate the area below a curve.
 - Explain how we can use antiderivatives to exactly find the area below a curve (fundamental theorem of calculus).
- Differential equations:
 - Use the language of differential equations to model problems.
 - Use geometric and numerical methods to give approximate solutions to differential equations.
 - Use separation of variables to solve separable differential equations.

Calculator Policy

Using a calculator or a computer to check or investigate problems for homework is encouraged, but be sure that you can solve the problems without one. **Calculators will not be allowed on the tests.** Having said that, the problems on the tests will require only a moderate amount of calculation.

Assessment

Assignments

There will be a written assignments (roughly two each week) due on Tuesdays and Fridays. These assignments assess your ability to use the material that we learned in class to solve problems. You are encouraged to work on the problems together with your peers, so long as you write up your solutions independently. You will submit your written homework assignments online via Gradescope. Assignments may be submitted up to two days after the deadline with a 10% deduction for each day late. For example, if your raw score on an assignment is 95% but you submit late by one day, your actual grade for that assignment will be 85%; submitting two days late would result in a grade of 75%.

Tests

There will be three in-class tests. The very tentative dates for these are:

- Test 1: Friday, June 10, 2022 during class time
- Test 2: Monday, June 20, 2022 during class time
- Test 3: Friday, July 1, 2022 during class time

Grading Scheme

Your final numerical grade will be determined by:

- 5% Preclass Activities + 15% Assignments + 35% Test A + 25% Test B + 20% Test C ,

where:

- Assignments is the average of all but your lowest assignment grade.
- Test A is the highest of your three test scores;
- Test B is the second-highest of your three test scores;
- Test C is the lowest of your three test scores.

Final course (letter) grades will then be determined by your numerical grade via the following scale:

- $90 \leq A-, A \leq 100$
- $80 \leq B-, B, B+ < 90$
- $65 \leq C-, C, C+ < 80$
- $50 \leq D-, D, D+ < 65$
- $F < 50$