

SCS NOONAN SCHOLARS

CALCULUS WITH ALGEBRA: SYLLABUS

Tuesday-Saturday, 9:00am-Noon, Science Center E210

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Office Hours: Tues & Fri 4-6pm: Seeley Mudd 206

Course Description

Calculus with Algebra follows most of the curriculum of an AB-level first-semester college calculus course, interspersed with reviews of relevant topics from algebra, trigonometry, and precalculus along the way. Calculus is the study of changing quantities, and this course hinges on three central calculus topics: limits, derivatives, and integrals.

Learning Goals

- By the end of this course, students will have solidified their fluency with algebra, trigonometry, and precalculus, and be able to apply those skills to the problems of calculus.
- Students will learn to approach mathematical concepts in multiple ways: as intuitive ideas, via formal definitions, and in the context of computation and problem-solving.
- Students will learn most of the content of a standard first-year college calculus course.
- When solving problems, students will learn to prioritize carefully reasoned arguments and clear explanations, rather than simply arriving at a final answer.

Tentative Course Schedule

Week 1:

- Review and exploration with algebraic functions and absolute values
- The concept of the limit

Week 2:

- Limit computations
- Defining the derivative (rate of change) via limits
- Introduction to computing derivatives

Week 3:

- Review of trigonometric functions
- Derivatives of trig functions and complicated combinations of functions
- What derivatives say about the graph of a function

Week 4:

- Application: Related Rates problems
- Application: Optimization problems

Week 5:

- Riemann Sums and the area under a curve
- The Definite Integral as a limit
- The Fundamental Theorem of Calculus, and computing integrals

Week 6:

- The Substitution Rule for computing integrals
- Exponentials and logarithms

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Assignments

Every class meeting will consist of a mix of interactive lecturing by the instructor, and worksheets of problems to be solved in small groups. During worksheet times, the instructor and assistants will circulate through the room to talk with the students and provide help. There will also be short homework assignments several times each week. Every Friday, there will be practice test problems during group-work time, and every Saturday, there will be a test. (That schedule will change a bit in the last week, which is a day shorter than usual.)

Grading

- 6 tests, one at the end of each week. Each test counts for 10% of your grade.
- In-class worksheets (Tuesday through Friday) count for a total of 30% of your grade.
- Homework assignments (2-3 per week) count for a total of 10% of your grade.

On all written work, students will be expected to show and explain their steps clearly; this counts for more than getting the final answer numerically correct. A solution with all work shown clearly but with some minor arithmetic or algebra errors will earn more points of credit than a solution with the correct answer but with the steps skipped or jumbled.

Class Policies and Expectations

- **Communication**
 - Email is the best way to contact the instructors and teaching assistants.
 - Assignments and other course information will be announced in class and also posted on the course website.
- **Late work**
 - Late work will not be accepted unless a documented excuse is provided.
- **Electronics**
 - Laptops may occasionally be needed in class, but not usually. Laptops may be used in any class during lecture and group-work times, but **only** for course-related work.
 - Cell phones, tablets, and other similar devices should be silenced and put away during class. Better yet, don't even bring them to class at all.
- **Code of Conduct**
 - Be on time for every class, and be present mentally, not just physically.
 - Respect your instructors, teaching assistants, and classmates.
 - During group work times, listen to your partners but also share your own ideas. Most people find one of those two things harder than the other; whichever one you find harder to do, focus on getting better at **that** this summer.
 - Take pride in your written work. Make it a pleasure to read.
 - Follow the Academic Integrity rules below.
- **Academic Integrity**
 - On tests, your work must be entirely your own; no books, notes, online or other outside materials, and no communication with anyone other than the instructor.
 - On homework and in-class group work, you may (and **should**) work together with your classmates. However:
 - Write a short note at the top saying who you worked with. (Make sure **your** name clearly stands out as the author, though!)
 - Everybody works on every problem.
 - Everybody writes up every problem **in their own words**.
 - **NEVER** copy (or even consult) solutions found online or in any other sources.