Course Syllabus

Integral Calculus for Life Sciences

UCR Math-007B-B01, Summer 2019

Everything in this syllabus is subject to change, but I assure you any changes will be quite agreeable.

Course Description

In this course we'll define definite and indefinite integrals and relate them to derivatives via the Fundamental Theorem of Calculus. Then we'll relate the two conceptual interpretations of an integral, the geometric interpretation as the area under a curve and the analytic interpretation as the cumulative change of a function. Using these two interpretations we'll calculate the volumes of certain solids and the arc-lengths of curves. Then we'll talk about various techniques of integration since evaluating integrals isn't necessarily a straightforward endeavor. At the end of this course if there's time we'll discuss some of the basics of differential equations, a preview of what you can see more of in Math-046 here at UCR.

Logistical Details

The course starts on the 29th of July. The main lecture will be held Monday, Tuesday, Wednesday, and Thursday, 8:10–9:30am in Skye Hall 170, hosted by myself, Mike Pierce. Feel free to email me any questions or comments you have at mpierce@math.ucr.edu. Also I will hold office hours on Mondays 10am–3pm in Skye 284. You don't necessarily have to have questions to attend; feel free to use my office hours as a designated place and time to just study. All documents and information related to the course, including lecture notes and homework assignments, will be posted to this page on my website:

math.ucr.edu/~mpierce/7B

The discussion section will be Wednesdays, 11:40–1:30pm in Skye 171, hosted by Matthew Burns. Each week in discussion you will be given an assessment based on the homework I asked you to think about the previous week. Matthew will also have weekly office hours.

The final will be Saturday (sorry) the 31st of August, 8–10am in the same room as lecture. If you cannot take the final at this data/time due to religious reasons, medical reasons, or a sudden emergency, just let me know *before the scheduled final time* and we'll figure something out.

Textbooks and Resources

CALCULUS FOR BIOLOGY AND MEDICINE, THIRD EDITION, by *Claudia Neuhauser* — This is the main resource I will be following for the course. This textbook is expensive: you don't need to buy it for this class. If you would like access to this book anyways, come talk to me. I'll talk about possible ways to get access to this book on the first day of lecture.

YOUTUBE — Really, it's a good educational resource. For any topic that's got you stuck, there are dozens of instructional videos that talk about that topic.

WOLFRAMALPHA — Much of this course will revolve around solving integrals, and WolframAlpha can often calculate these for you. I encourage you to check your answers with WolframAlpha. Note that what WolframAlpha tells you a solution is and what you calculate a solution to be may *look* very different, but might actually be equivalent solutions; in this way, checking your answers with

WolframAlpha is an exercise all in itself. A word of warning: let WolframAlpha be your aide, not your crutch. You will not have access to it on the final exam.

wolframalpha.com/examples/mathematics/calculus-and-analysis/integrals

DESMOS — An online graphing calculator that is rather pretty, and has an iPhone and Android app.

desmos.com/calculator

SPIVAK'S CALCULUS — Among old-school mathematicians this is regarded as one of the best books on calculus. It is definitely written for aspiring mathematicians, and does not shy away from proofs or from asking tough questions about nitty-gritty mathematical details. As your instructor, I would be more than happy to guide you in working through this book and better understanding the abstract mathematical underpinnings of calculus. Ask me in lecture about how you can get a copy of this book if you are interested.

Assessments, the Final, and your Grade

The assessments each week in discussion will be based on the previous week's homework. If you understand the ideas that I'm asking you to think about in the homework, then you'll do fine on these. The assessments, and my solutions to them, also serve as a weekly check-in to see if you're meeting my expectations of you for this course. If you are struggling on these assessments, come talk to me so we can figure out how to help you together.

Now, it's an unfortunate thing that I don't get to just teach you in this class but I also must judge you and assign you a grade for the university. I hope you find how I do this fair and agreeable. Grades in this course will be based on just two things: the weekly assessments in discussion and the final exam at the end of the course. Your discussion TA will grade the assessments, and I will grade the final exam. I want your grade to be assigned in such a way that if you ace the final, you ace the class regardless of how well you did on the assessments. But also, a student might feel pressured or anxious or ill for the final, and so it wouldn't make for a good assessment of what they know. So to determine your grade for the class I will use your scores on the assessments to *restore up to half of the points that your don't score on the final.* Let's write this out explicitly: Let E be a your percent-grade on the final exam and let A be your percent-grade on the homework assignments, each realized as a real number in the interval $[0, 100]$. Then your percent-grade for the course G will be given by the formula

$$G = E + \frac{1}{2} A(100 - E),$$

and your corresponding letter-grade for the course will be assigned according to this table:

If G is at least	0	60	63	67	70	73	77	80	83	87	90	93
your grade will be at least	F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A

Academic Honesty

Students caught cheating on the final exam or an assessment will automatically fail the exam or assessment and will be reported to the Office of Student Conduct. So please don't cheat. It's just a pain in the neck for everyone. For information on UCR's full Academic Integrity Policy, see

conduct.ucr.edu/policies/academic-integrity-policies-and-procedures

Inclusivity & Accessibility and UCR

UC Riverside is committed to creating a learning environment that meets the needs of its diverse student body. If you anticipate or experience any barriers to learning in this course, please feel welcome to discuss your concerns with me. If you don't feel comfortable coming to me to talk to me there are a plethora of resources and communities available on the UCR campus that I urge you to reach out to. Here is a curated list of some of those resources and communities.

math.ucr.edu/~mpierce/links#ucr

In particular, if you have a disability, or think you may have a disability, you may want to contact the Student Disabilities Resource Center (SDRC) at

sdrc.ucr.edu

to begin this conversation or request an official accommodation.

Miscellaneous Advice

- Remember that this class, and academics in general, should not be the most important thing to you. Your health and your happiness take precedence over you success in this class. In particular, if you are feeling sick, please take care of yourself instead of coming to class; I can walk you through the lecture you missed in my office hours, and you can request and extension on any assignment if you let me know with enough time before the due date.

- Math is hard. It's hard for everyone, even for the folks who make it look easy. The important thing is that you don't give up. As you do math, that feeling of struggling is a sign that you are learning, and that your analytical and problem-solving skills are improving. Just keep at it.

- I'll try to remember to remind you of this when it's relevant, but you should always take some time to conscientiously reflect on a score you got on an exam/assessment/quiz/homework after you receive it. Like literally close your eyes and take a few minutes to ask yourself these questions:

  1. Does this score make me happy? Am I satisfied with this score, or do I want to do better?

  2. If I want to do better, how could I have better prepared? How can I achieve this goal of improving?

  3. Should I consult with the instructor or TA for advice or specific guidance on how to improve?