Calculus II, section 3: syllabus

Time and location: MW 6:10 - 7:25 PM, location TBA
Instructor: Avi Zeff, email cbz2106@columbia.edu
Office hours: 3 - 4:30 Tuesdays (Uris 328) and Thursdays (Hamilton 406)
TA: Andrew Park, office hours 2 - 4 PM Mondays in Barnard math help room (502 Milstein)

Prerequisites
The prerequisite for this class is Calculus I or equivalent: in other words, you should be familiar with the concepts of derivatives and integrals, be able to fluently compute derivatives and some simple integrals, and understand the fundamental theorem of calculus. If you are not sure whether you have the prerequisites, email me or come to my office hours.

Summary
There are four main areas we will cover:

- Methods of integration
- Applications of integration
- Differential equations
- Sequences and series

By the end of the course, students should be able to evaluate many kinds of integrals and use these skills to compute things such as arc lengths or surface areas of various objects; have a good conceptual understanding of differential equations, and be able to solve some simple ones; and have an intuitive understanding of infinite series, especially Taylor series, and their place in calculus.

A more detailed course outline can be found at the end of this document.

Textbook
The nominal textbook for this course is the eighth edition of *Calculus: Early Transcendentals*, by James Stewart. If you feel that access to a textbook will help you learn, you are free to purchase it; it can also be found online or in the library. If you would like access to the textbook and are having trouble getting it let me know.

That said, use of the textbook in any form is not required: although problems may be drawn from it, their statements will always be included in the assignment, and no readings from the book will be assigned. Lecture notes will be sent out at the beginning of each week; you will not be responsible for any material not included in these.

For those who find textbooks useful, in addition to the lecture notes there exist many good calculus textbooks, including Strang's *Calculus*, which the author has made freely available online.

We will not use WebAssign.

Course structure

Classes will be mostly lecture, with some time set aside for Q&A sessions and group work. Attendance is not mandatory but is highly encouraged.

Homework will be due each week in (or by, if submitted digitally) class. You should expect to spend a while on these, in the neighborhood of 3-9 hours; much of learning is done through exercises. Collaboration is strongly encouraged, but everyone should write their own solutions; write on your homeworks anyone you have worked with. (Note, though, that contributions from different collaborators should be roughly equal; if you find that you are typically doing more or less than your collaborators, consider finding a different group.)

You may use any and all resources, including any textbooks you have access to, your classmates and friends, the help room, office hours (you should come to these!), or the internet, with the following exceptions:

- do not post the problem on any website to be answered by someone else;
- do not use computerized systems (e.g. WolframAlpha, SageMath, Mathematica, integral-calculator.com, etc.) to do your computations unless otherwise specified. That said, these are all useful resources I encourage you to familiarize yourself with for any purpose other than homework for this class (and naturally any other classes with similar policies).

The lowest homework score will be dropped. Officially, homework will be due Wednesday, either in class or online (by email or via CourseWorks) by the start of class (i.e. 6:10 PM). However, I encourage you to turn in homework by Monday: homework turned in (in either format) by the start of class on Monday, i.e. two days before the official deadline, will receive 5 points of extra credit, while homework turned in by the same time on Tuesday will receive two points of extra credit. If you are unable to turn in your homework by the official deadline, please contact me at least 24 hours in advance; extensions will be given on a case-by-case basis. Without an extension, late homework will be penalized 25% a day.

You can also earn up to 5 points of extra credit on homeworks by catching errors in either the homework or that week's lecture notes, with the amount of extra credit depending on the size of the error.

There will be two midterms and a final exam. The final exam can be replaced by a project, group or individual; if you want to do this let me know by the second midterm so that we can discuss a suitable topic. If you choose to do a project, you will give a short presentation on it to the class near the end of the semester. I'll talk more about projects and guidelines for them further into the semester.

There will be no homework the weeks of the midterms (or, of course, the final exam).

Grading

The default grading scheme is as follows:

- Homework: 35%
- Midterm 1: 20%

- Midterm 2: 20%
- Final exam/project: 25%

However, you have the opportunity to individualize the weight you would like each component of this course to have, within constraints. To opt in, send me an email by February 1 with your desired weights, which must fall within the following range (and add up to 100%):

- Homework: at least 20%
- Midterm 1: 10 - 25%
- Midterm 2: 10 - 25%
- Final exam/project: at least the greater of the two midterms

There will be a renegotiation period from March 1 to March 7 during which you have the option to change your desired weighting, with the same restrictions and subject to the condition that the weight of midterm 1 cannot be changed. After that point it is fixed.

Grades will not be curved, but the precise cutoffs will be set (and announced) after the second midterm based on my estimate at that point of the difficulty of the class. However based on your overall average you are guaranteed to get *at least* the following grade:

97	93	90	87	83	80	77	73	70	67	63	60
A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-

For example if your overall average is 81% your grade is guaranteed to be at least a B-, though it may end up being higher.

COVID-19 policies

As with all courses this semester, the first two weeks of classes will be online. If all goes well, future classes will be in person, but please do not come to class if you are feeling sick or test positive: lecture notes will be available, class can be streamed or recorded as needed, and I will be happy to help you make up the material. If you are sick and unable to do the work for a prolonged period, contact me to work out a way to make up the work: it is important to do the work for each section of the class, since that is the way to learn the material and the later portions of the class will build on the earlier ones, but when necessary we can figure out how to reduce the workload to be manageable without having to work through illness. Similarly, please do not attend exams if you are ill or have recently tested positive for COVID-19: we will figure out solutions if these situations arise.

Academic Honesty Policy

Please read the Columbia University Undergraduate Guide to Academic Integrity.

Accessibility and accommodations

Please let me know if there is anything I can do to make this course more accessible to you, or if aspects of the course are excluding you, and we can work together to develop

strategies to improve the class. If you think you may need official accommodations, such as extended time on exams, I encourage you to contact the Office of Disability Services for an accommodation letter.

Course outline
As promised:

January 19	Review of calculus 1
January 24	Integrals and volume
January 26	Integration by parts
January 31	Trigonometric substitution
February 2	Partial fractions
February 7	Improper integrals
February 9	*Flex*
February 14	Review
February 16	Midterm 1
February 21	Arc length
February 23	Surfaces of revolution
February 28	Polar coordinates
March 2	Parametrized curves
March 7	Differential equations
March 9	
March 14	*Spring break*
March 16	
March 21	More differential equations
March 23	*Flex*
March 28	Review
March 30	Midterm 2
April 4	Sequences and series
April 6	First convergence tests
April 11	More convergence tests
April 13	Power series
April 18	Taylor series
April 20	Applications
April 25	Presentations
April 27	*Flex*
May 2	Review

We have a few days to spare, marked as *Flex*, which we can use for flexibility (in case of canceled classes or just needing more time than expected on some material) or, if not needed, for bonus fun math.