Differential and Integral Calculus Math 21-120, Fall 2022

Instructor: Amzi Jeffs (amzij@cmu.edu) Lectures: 8-8:50am Monday, Wednesday, and Friday Office hours: Mondays 11am - 12pm & Wednesdays 12 - 1pm (Location TBD) Course site: All materials and announcements will be posted on Canvas

Text: *Calculus Volume I* by Strang and Herman. Available online for free at https://openstax.org/details/books/calculus-volume-1.

Recitation sections (Tuesdays and Thursdays):

А	9:05 - 9:55am	GHC 4301	Andrew Cuonzo	acuonzo@andrew.cmu.edu
В	11:15am - 12:05pm	GHC 4301	Indulekha Madathil Sali	imadathi@andrew.cmu.edu
С	4:40 - 5:30pm	WEH 4625	Jane Fleischman	jfleisch@andrew.cmu.edu
D	3:35 - 4:25pm	PH A18C	Indulekha Madathil Sali	imadathi@andrew.cmu.edu

Overview: Calculus lets us measure how functions change depending on their input. Measuring change is of fundamental importance in a variety of contexts such as physics, engineering, other sciences, optimization, and more. This course introduces calculus via derivatives (which describe how fast a function changes) and integrals (which can describe the area bounded by a curve). We will cover: logarithmic, exponential, and trigonometric functions, inverse functions, limits, derivatives, L'Hopital's rule, curve sketching, the mean value theorem, related rates, linear approximations, maximum-minimum problems, definite / indefinite integrals, the fundamental theorem of calculus, integration by substitution, applications of integration, and hyperbolic functions.

Grading: Grades will be calculated as follows:

Homework	20%
(Lowest score dropped)	
Midterm exams I, II, and III	50%
(Lowest score dropped)	
Final Exam	30%

The final will be cumulative. Letter grades will be determined according to the usual cutoffs (90% or more for A, 80%-90% for B, etc). I may lower these cutoffs slightly, but I will not raise them.

Homework: Homework will consist of approximately eight problems per week, except during break weeks or exam weeks. There will be ten homework assignments, and your lowest score will be dropped. Homework must be submitted on Gradescope by 5pm each Friday. You can access Gradescope via Canvas, and view instructions for using Gradescope here: https://www.cmu.edu/teaching/gradescope/

Exams: Exams will occur during lecture, lasting 50 minutes. You may use one double-sided handwritten 8.5×11 note sheet. Calculators are not allowed; I will write problems so they are not needed. If you require accommodations for exams (such as extra time, or a reduced-distraction testing environment) please see the accommodations section of the syllabus below.

Exam I	September 23, Friday
Exam II	October 26, Wednesday
Exam III	November 16, Wednesday
Final Exam	To be scheduled

How to write homework and exam solutions: For your solutions to receive full points, they must meet the following standard: Any other student in the class who has not solved the problem should be able to follow all your steps and reconstruct your reasoning. This means that homework and exam solutions are not simply about computing the correct answer. All significant steps and work must be shown in a clear and well-organized way. After working together on a homework problem, each student must write up their own solution in their own words.

Here are some general tips for success in writing your solutions.

- Solve problems on scratch paper first, then write up a final version of your solution.
- Write sentences to explain your solutions when appropriate, don't only use math symbols.
- After writing your solution, double check that you have answered the question fully.

Participation in lecture and recitation: You are expected to attend all lecture and recitation sections, and I strongly encourage all students to ask questions during lecture. Your participation and collaboration during recitation sections will also be essential for your success. Discussing the material and problems with your peers and practicing your mathematical communication skills will help you understand the material and write stronger solutions on homeworks and exams. If you miss a lecture or recitation section, it is your responsibility to get in touch with me or your recitation instructor for make-up materials.

Lastly, I strongly encourage you to get to know your classmates, and work together on the homeworks and study with them. Regularly share feedback with each other and collaborate.

Tutoring: The Student Academic Success Center provides various programs to support student learning. Check out the SASC's site (https://www.cmu.edu/student-success) for a full list of programs. I encourage you to try out their peer tutoring. This is a free tutoring service available to all CMU students.

Make-ups and absences: Extensions and make-up submissions on homework cannot be given, except for observance of religious holidays or participation in university sponsored activities, such as class field trips or athletics. If you require a make-up or extension I need to be notified at least one week in advance. Make-up exams will not be given, however, if you miss an exam due to unavoidable, compelling, and well-documented circumstances (e.g., illness, transportation emergency), we can work together to find an appropriate solution given the circumstances. Please let me know about such situations as soon as possible.

Regrade requests: If you notice an error in the grading on your homework or an exam, please submit a regrade request via Gradescope. Regrade requests should be specific and clearly explain what the grading error was. Requests will be processed within a week, and we can also discuss them individually if you still have questions.

Accommodations: If you require accommodations on exams or assignments due to a disability or other circumstances, please have these approved by the Office of Disability Resources. If you require a distraction-reduced testing environment or extra time on an exam, I will ask that you have the Office of Disability Resources proctor the exam, ideally on the same day that it occurs during lecture. The office is available to proctor exams 8:30am-7:20pm, and they request that you schedule your exam at least five business days in advance.

I encourage you to schedule all of your exams as soon as possible, according to the dates listed above. You can schedule them through an online system, as explained in the following video: https://youtu.be/PS01BzZhbmM.

Diversity and inclusion: It is everyone's responsibility to create a learning environment that is welcoming to students from all backgrounds and perspectives, both in and out of class. The diversity that students bring to this class is a resource, strength, and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know how I can improve the effectiveness of the course for you personally or for other students or student groups. If any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you.

Week 1	M 8/29	1.1 - 1.5 Review of functions	
	W 8/31	2.1 - 2.2 Secants, tangents, and limits	
	F 9/2	2.3 Limit laws	
Week 2	M 9/5	No class	
W 9/7		2.4 Continuity	
	F 9/9	3.1 – 3.2 Derivatives	
Week 3 M 9/12 3.3 Differe		3.3 Differentiation rules	
		3.4 Derivatives as rates of change	
	W 9/14	3.5 Derivatives of trigonometric functions	
	F 9/16	3.6 The chain rule	
Week 4 M 9/19 3.8 Implicit		3.8 Implicit differentiation	
	W 9/21	Exam review	
	F 9/23	Midterm I	
Week 5	F 9/23 M 9/26	Midterm I 3.7 Derivatives of inverses	
Week 5	F 9/23 M 9/26	Midterm I 3.7 Derivatives of inverses 3.9 Exponential and logarithmic functions	
Week 5	F 9/23 M 9/26 W 9/28	Midterm I 3.7 Derivatives of inverses 3.9 Exponential and logarithmic functions 4.1 Related rates	
Week 5	F 9/23 M 9/26 W 9/28 F 9/30	Midterm I3.7Derivatives of inverses3.9Exponential and logarithmic functions4.1Related rates4.2Linear approximation	
Week 5 Week 6	F 9/23 M 9/26 W 9/28 F 9/30 M 10/3	Midterm I3.7Derivatives of inverses3.9Exponential and logarithmic functions4.1Related rates4.2Linear approximation4.3Maxima and minima	
Week 5 Week 6	F 9/23 M 9/26 W 9/28 F 9/30 M 10/3 W 10/5	Midterm I3.7Derivatives of inverses3.9Exponential and logarithmic functions4.1Related rates4.2Linear approximation4.3Maxima and minima4.4The mean value theorem	
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Week 5 Week 6 Week 7	F 9/23 M 9/26 W 9/28 F 9/30 M 10/3 W 10/5 F 10/7 M 10/10	Midterm I3.7Derivatives of inverses3.9Exponential and logarithmic functions4.1Related rates4.2Linear approximation4.3Maxima and minima4.4The mean value theorem4.5The shape of a graph4.6Limits at infinity and asymptotes	
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Tentative course schedule

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Fall Break	M 10/17	No class	
	$W \ 10/19$	No class	
	F 10/21	No class	
Week 8	M 10/24	Exam review	
	W 10/26	Midterm II	
	F 10/28	No class	
Week 9	M 10/31	4.10 Antiderivatives	
	W 11/2	5.1 Approximating areas	
	F 11/4	5.2 Definite integrals	
Week 10	M 11/7	5.3 The Fundamental Theorem of Calculus	
	W 11/9	5.4 Integration formulas and net change	
	F 11/11	5.5 Integration by substitution	
Week 11	M 11/14	Exam review	
	W 11/16	Midterm III	
	F 11/18	5.6 Integrals of logarithms and exponentials	
Week 12	M 11/21	6.1 Areas between curves	
	W 11/23	No class	
	F 11/25	No class	
Week 13	M 11/28	6.2 Volumes via slicing	
	W 11/30	6.3 Volumes via revolution	
	F 12/2	6.9 Hyperbolic functions	
Week 14	M 12/5	2.5 The precise definition of a limit	
	W 12/7	Final exam review or catch-up day	
	F 12/9	Final exam review	
	TBD	Final Exam	