

# Math 1231-10: Calculus 1

Fall 2021

<b>Lectures:</b>	TR 3:45 – 5:00 PM	1957 E St B17
<b>Recitations:</b>	30: W 8:00 AM – 8:50 AM	1957 E St B14
	31: W 9:35 AM – 10:25 AM	1957 E St B14
	32: W 11:10 AM – 12:00 Noon	1957 E St B14
<b>Textbook:</b>	OpenStax Calculus Volume 1 by Gilbert Strang and Edwin Herman	
<b>Course Webpage:</b>	<a href="https://jaydaigle.net/calculus10/">https://jaydaigle.net/calculus10/</a>	
<b>Homework System:</b>	Edfinity	<b>Discord:</b> <a href="https://discord.gg/HD3dvYC">https://discord.gg/HD3dvYC</a>
<b>Instructor:</b>	Jay Daigle	<b>TA:</b> Roberto Estrada
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<b>Office:</b>	Phillips 720E	TBD
<b>Office hours:</b>	MW 3–4:30	TBD
<b>Often in Office:</b>	MW, 2–4:30, TR 2–3:30	

## Textbook

The official textbook for Math 1231 is OpenStax Calculus Volume 1 by Gilbert Strang and Edwin Herman. It is available for free online at <https://openstax.org/details/books/calculus-volume-1>. You can also buy copies from Amazon; a paperback is a little under \$30.

I will be loosely following the textbook, but will often be giving my own take or focusing on topics the textbook doesn't emphasize. All my course notes will be posted to the course web page.

I will be assigning online homework through the Edfinity web platform. You will need to connect to Edfinity through the links on Blackboard or the course web page. The service does have a fee of I believe \$25 dollars.

## Course content

This is the first semester of a standard year-long sequence in single-variable calculus. The main topics are limits and continuity; differentiation and integration of algebraic and trigonometric functions; and applications of these ideas. This corresponds roughly to Chapters 1–6 of Herman–Strang.

## Prerequisites

Students must have received a score of 76 or above on the ALEKS placement exam to register for 1231. Students will be expected to be able to perform algebraic and trigonometric calculations accurately and effectively, and to be comfortable with concepts and theorems from geometry. (Weakness with algebra and trigonometry is the *number one source of difficulty* in calculus; if you find yourself struggling with these topics, come speak to the course staff **early** in the semester!)

## Technological requirements; recordings

I have set up a Discord server at <https://discord.gg/HD3dvYC> to facilitate low-key discussions of class material. This is totally optional, but you can go there to talk about the class with each other or with me; I'll be keeping an eye on it most of the time and it's usually the easiest and fastest way to get in touch with me.

While lectures will (hopefully) be entirely in-person, our classrooms are equipped with recording technology and lecture recordings will be uploaded to Blackboard.

## Important resources

The following resources are available to help you succeed in Math 1231.

- Lecture and recitation
- Faculty and TA office hours (scheduled or by appointment)
- The calculus lab: <https://blogs.gwu.edu/mathtutoring/>
- Academic Commons (including peer tutoring): <https://academiccommons.gwu.edu/>

In addition, the University's Mental Health Services offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include crisis and emergency mental health consultations confidential assessment, counseling services (individual and small group), and referrals. For additional information, see <https://counselingcenter.gwu.edu/> or call 202-994-5300.

## Learning outcomes

By the end of the course, students will acquire the following skills and knowledge: students will know the intuitive and formal definitions of the limit, derivative, antiderivative, and definite integral of a function. Students will be able to distinguish continuous from discontinuous functions by visual and algebraic means; to calculate derivatives of functions both by definition and using various simplification rules; to formulate and solve related rates and optimization problems; to accurately sketch graphs of functions; to calculate antiderivatives and definite integrals of a variety of functions; to compute areas of regions in the plane and volumes of solids of revolution; and to explain the significance of important theoretical results such as the Extreme Value Theorem, Mean Value Theorem, and Fundamental Theorems of Calculus.

## Lecture schedule

The list below gives a tentative outline of what is planned and when. (Please don't take it too literally.)

Functions	Aug 31	Midterm	Oct 19
Informal Continuity and Limits	Sep 02	Mean Value Theorem	Oct 21
Formal Limits	Sep 07	Relative Extrema	Oct 26
Continuity and computing limits	Sep 09	Graph Sketching	Oct 28
Trigonometric Limits	Sep 14	Optimization	Nov 02
Infinite Limits	Sep 16	Quadratic Approximation and Newton's Method	Nov 04
Linear Approximation and the Derivative	Sep 21	Approximating Areas	Nov 09
Computing Derivatives	Sep 23	Riemann Sums and the Definite Integral	Nov 11
Trigonometric Derivatives and the Chain Rule	Sep 28	The Fundamental Theorem of Calculus I	Nov 16
Tangent Lines and Linear Approximations	Sep 30	FTC2 and the Antiderivative	Nov 18
Rates of Change and Models	Oct 05	Substitution	Nov 23
Implicit Differentiation	Oct 07	Averages and Area	Nov 30
Related Rates	Oct 12	Volumes and Applications	Dec 02
Maxima and Minima	Oct 14	More detailed applications	Dec 09

There will not be class on Th 11/25 (Thanksgiving) or Tu 12/7 (a designated Friday).

## Communication

I use male pronouns. You can call me "Professor Daigle", "Dr. Daigle", or just "Jay". I will, however, be sad if you call me "Mr. Daigle". The TA uses male pronouns; you can call him "Roberto".

If you have never e-mailed a college professor before, this blog post provides a short, helpful guide to best practices: <http://tinyurl.com/h5w5nyo>.

## Expected amount of work

There are just over 3 hours of class time each week. In addition, we expect a typical students to spend a minimum of 5 hours each week on independent work (primarily, homework assignments). Of course, you should spend as much time as you need to succeed in 1231, and this may be more than 5 hours per week.

## Course Structure

Attendance will not be monitored or enforced, but will be extremely helpful to progressing in your understanding of calculus.

There will be regular homework assignments, weekly quizzes, and a midterm and a comprehensive final exam.

### Edfinity Homework

For each topic I will assign some homework through the Edfinity online homework system. This will give you an opportunity to practice basic skills you will need to succeed in the course.

You will have an unlimited number of attempts to get credit for each problem. However, some problems will rerandomize numbers after a few failed attempts, so you can't just guess wildly and hope you eventually get it right. If you find yourself struggling with a particular problem or type of problem, *please* discuss it with me, your TA, or one of the other academic resources suggested above.

Each assignment will have a due date; work submitted after that date without prior arrangement will be worth partial credit.

### Mastery Quizzes

The quiz grading will follow an approach called "mastery" grading, which is a little complicated but which I think will make learning both easier and less stressful.

In this course I have identified 6 major concepts and 8 secondary concepts I would like you to master.

#### Major Topics

- |                          |                             |
|--------------------------|-----------------------------|
| 1. Computing Limits      | 4. Extrema and optimization |
| 2. Computing Derivatives | 5. Integration              |
| 3. Linear Approximation  | 6. Integral Applications    |

#### Secondary Topics

- |                               |                          |
|-------------------------------|--------------------------|
| 1. Definition of a limit      | 5. Related Rates         |
| 2. Squeeze Theorem            | 6. Curve Sketching       |
| 3. Definition of derivative   | 7. Numeric Approximation |
| 4. Rates of Change and Models | 8. Riemann Sums          |

Each week there will be a quiz, with questions that will let you demonstrate proficiency with some of these topics. Each topic will be graded on a 2-point scale:

0: Demonstrates little to no understanding of this topic

1: Demonstrates progress on this topic, but without having fully mastered it

2: Demonstrates mastery of this topic

Your final course grade will reflect your two best attempts at each major topic, and your single best attempt at each secondary topic. You will get at least four attempts on each major topic, and two attempts on each minor topic, purely through the weekly quizzes. You can get extra attempts by scheduling meetings with me to discuss a topic you're struggling with, and possibly in other ways as the term progresses.

This approach has a few major advantages: It allows you to focus your work on the topics you need to improve on; it gives you room to improve and have that improvement reflected in your grade; it reduces the stress of each quiz because a poor performance can be completely made up for later. This approach also encourages you to actually master the fundamental skills and ideas of calculus.

The major disadvantage of mastery grading is that it is different and complicated. I will try to make it as clear as possible, but if you have any confusion about how things work or what your grade looks like at any given time, please let me know and I'd be happy to clarify.

## Midterm and Final

There will be a midterm on roughly October 19, and a comprehensive final exam. I will distribute a practice test with solutions before each test so you will know what format to expect going in. If you have mastered the rest of the course material, both tests should be fairly straightforward.

## Computation of final grades

- WeBWork Homework: 20%
- Midterm: 20%
- Mastery Quizzes: 30%
- Final Exam: 30%

Minimum scores for each letter grade are as follows: A, 94%; A-, 90%; B+, 87%; B, 84%; B-, 80%; C+, 77%; C, 74%; C-, 70%; D+, 67%; D, 64%; D-, 60%.

Attendance and engagement in class and recitation, while not formally part of the computation, may be used as deciding factors in borderline cases. No extra credit will be available under any circumstances.

## Academic integrity Code

Students are responsible for the honesty and integrity of their own academic work. In particular, it is unacceptable to present the work or ideas of others as if they were your own. The course staff take this *extremely seriously*, and you should as well. The best way to avoid problems is to clearly indicate on your work what sources/individuals/etc. you consulted. Failure to abide by rules for individual assignments is subject to sanction, including possibly failure of the class. If you have any questions, please do not hesitate to contact the instructor. The complete university code is at <https://studentconduct.gwu.edu/code-academic-integrity>

## Religious holidays and other excused absences

If you will be unable to complete or submit an assignment, notify your TA or instructor *in advance* to discuss your options. Unexcused missing work will be assigned a score of 0. In accordance with University policy, students should notify faculty *during the first week of the semester* of their intention to be absent from class on their day(s) of religious observance. For details and policy, see “Religious Holidays” at <https://provost.gwu.edu/policies-procedures-and-guidelines>

## Students with disabilities

Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in Rome Hall, Suite 102, to establish eligibility and to coordinate reasonable accommodations. For additional information, see <https://disabilitysupport.gwu.edu/>

## Safety and Security

1. In an emergency: call GWPD 202-994-6111 or 911
2. For situation-specific actions: review the Emergency Response Handbook at [safety.gwu.edu/emergency-response-handbook](https://safety.gwu.edu/emergency-response-handbook)
3. In an active violence situation: Get Out, Hide Out, or Take Out. See [go.gwu.edu/shooterpret](https://go.gwu.edu/shooterpret)
4. Stay informed: [safety.gwu.edu/stay-informed](https://safety.gwu.edu/stay-informed)

## Final disclaimer

The course staff reserves the right to change course policies in light of unforeseen events; in this case, announcements will be posted to Blackboard explaining the change.