

Math 1231-11: Single-Variable Calculus I

Spring 2024

Lectures:	MW 4:45 – 6:00 PM	Phillips B156
Recitations:	36: F 8:00 AM – 8:50 AM	Monroe 350
	37: F 9:35 AM – 10:25 AM	Monroe 110
	38: F 11:10 AM – 12:00 Noon	Rome B103
Textbook:	OpenStax Calculus Volume 1 by Gilbert Strang and Edwin Herman	
Course Webpage:	https://jaydaigle.net/calculus1/	
Homework System:	WeBWorK	Discord: https://discord.gg/dENxjYKrWf
Instructor:	Jay Daigle	TA: Ben Clingenpeel
Email:	jaydaigle@gwu.edu	ben.clingenpeel@gwu.edu
Office:	Phillips 720E	720G
Office hours:	W 2:00–5:00	TR 12:30–1:30
Often in Office:	M 3:00–5:30	

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 WeBWorK web platform. You can log into WeBWorK by following the link on Blackboard. Once you've followed the Blackboard link, you can create a password so you can log in directly, but you can also continue to access it from Blackboard. This service is hosted by GW and is free.

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/dENxjYKrWf> 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.

Lectures will (hopefully) be entirely in-person. On occasion circumstances may force us to hold classes online; in that case they will be streamed over Zoom and the recordings will be posted 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://math.columbian.gwu.edu/calculus-lab-tutoring>
- 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.

Lecture schedule

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

Jan 16	Functions	Mar 7	Classifying Extrema
Jan 18	Approximation		Spring Break
Jan 23	Continuity and computing limits		Spring Break
Jan 25	More on Limits	Mar 19	Concavity
Jan 30	Infinite Limits	Mar 21	Physical Optimization
Feb 1	Intro to Derivatives	Mar 26	The Area Problem
Feb 6	Computing Derivatives	Mar 28	Midterm 2
Feb 8	Trig Derivatives and Chain Rule	Apr 2	Riemann Sums and the Definite Integral
Feb 13	Linear Approximation	Apr 4	The Fundamental Theorem of Calculus I
Feb 15	Rates of Change and Tangent Lines	Apr 9	The FTC2 and the Antiderivative
Feb 20	Implicit Differentiation	Apr 11	Integration by Substitution
Feb 22	Midterm 1	Apr 16	Finding Areas
Feb 27	Related Rates	Apr 18	Physics Applications
Feb 29	Maxima and Minima	Apr 23	Volumes by Slicing
Mar 5	Mean Value Theorem	Apr 25	Volumes by Shells

Communication

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 "Ben".

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 online homework assignments due each Wednesday and Friday, weekly mastery quizzes, four skills quizzes, and two midterms and a comprehensive final exam.

WeBWorK Online Homework System

For each topic I will assign some homework through the WeBWorK online homework system. This system is free to students. It 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. 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. The purpose of this system is to give you an opportunity to *practice*; if you get the points without understanding, it's not fulfilling its purpose.

Each assignment will have a due date, generally a week after it is opened. However, you should attempt to complete these assignments well before the official due date, so that you are prepared to learn the more advanced material we are covering in class. You will have a grace period of one week after the due date during which you can submit your work for 90% credit. Consequently I will not give extensions except in extremely unusual circumstances.

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 4 major concepts and 10 secondary concepts I would like you to master.

Major Topics

- | | |
|--------------------------|-----------------------------|
| 1. Computing Limits | 3. Extrema and optimization |
| 2. Computing Derivatives | 4. Integration |

Secondary Topics

- | | |
|-------------------------------|---------------------------|
| 1. Estimation | 6. Related Rates |
| 2. Definition of derivative | 7. Curve Sketching |
| 3. Linear Approximation | 8. Physical Optimization |
| 4. Implicit Differentiation | 9. Riemann Sums |
| 5. Rates of Change and Models | 10. Integral Applications |

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, where a 0 indicates you have demonstrated little-to-no understanding of the topic, and a 2 indicates mastery of the topic in question.

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.

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 thoroughly 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.

Skills Quizzes

There will be four skills quizzes, one on each of the four major topics, given in person in recitation sections. I expect these to be February 2, February 16, March 22, and April 19. These will be short, timed assignments to make sure you can execute the most important computational skills in this course quickly and fluently. This sort of fluency is critical to mastering the more difficult material in the course.

Midterm and Final

There will be two midterms on February 22 and March 28, and a comprehensive final exam as scheduled by the registrar. 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.

Midterm exams cannot be rescheduled. If, for an acceptable medical or family reason, you miss a midterm exam, your final exam will weigh more and replace the missed midterm exam.

I will update you when the registrar announces the final exam schedule. You will *not* be excused from the final if you schedule travel during finals week; if you must buy your plane ticket before the registrar announces final exam, please make sure it departs after May 10.

Computation of final grades

- WeBWork Homework: 10%
- Two Midterms: 15% each
- Mastery Quizzes: 25%
- Four Skills Quizzes: 2.5% each
- Final Exam: 25%

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%.

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
3. In an active violence situation: Get Out, Hide Out, or Take Out. See go.gwu.edu/shooterpret
4. Stay informed: 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.