

Math 1231-12: Single-Variable Calculus I

Fall 2024

Lectures:	MW 11:10 – 12:25 PM	Funger 223
Recitations:	36: T 8:00 AM – 8:50 AM 37: T 9:35 AM – 10:25 AM 38: T 11:10 AM – 12:00 Noon	Bell 107 Monroe 350 1776 G C-103
Textbook:	OpenStax Calculus Volume 1 by Gilbert Strang and Edwin Herman	
Course Webpage:	https://jaydaigle.net/calculus12/	
Homework System:	WeBWorK	Discord: https://discord.gg/VWRUXaNc4f
Instructor:	Jay Daigle	TA: Ben Clingenpeel
Email:	jaydaigle@gwu.edu	ben.clingenpeel@gwu.edu
Office:	Phillips 720E	720G
Office hours:	T 3:00–6:00 R 2:00–4:00	T 12:15–1:15 W 4:30–5:30

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/VWRUXaNc4f> 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.)

Aug 26	Functions	Oct 16	Mean Value Theorem
Aug 28	Estimation	Oct 21	Classifying Extrema
Sep 04	Continuity and computing limits	Oct 23	Concavity and Curve Sketching
Sep 09	More on Limits	Oct 28	Physical Optimization
Sep 11	Infinite Limits	Oct 30	The Area Problem
Sep 16	Intro to Derivatives	Nov 04	The Definite Integral
Sep 18	Computing Derivatives	Nov 06	The Fundamental Theorem of Calculus I
Sep 23	Trig Derivatives and Chain Rule	Nov 11	Midterm
Sep 25	Linear Approximations and Speed	Nov 13	FTC2 and the Antiderivative
Sep 30	Rates of Change and Tangent Lines	Nov 18	Substitution
Oct 02	Implicit Differentiation	Nov 20	Finding Areas
Oct 07	Midterm	<i>Nov 25-30</i>	<i>Thanksgiving Break</i>
Oct 09	Related Rates	Dec 02	Applications of the Integral
<i>Oct 10-11</i>	<i>Fall Break</i>	Dec 04	Volumes by slicing
Oct 14	Absolute Extrema	Dec 09	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 Tuesday and Thursday, weekly mastery quizzes, four skills quizzes, and two midterms and a comprehensive final exam.

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. Rates of Change and Models | 9. Riemann Sums |
| 5. Implicit Differentiation | 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.

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.

Skills Quizzes

There will be four skills quizzes, one on each of the four major topics, given in person, usually in recitation sections. I expect these to be September 17, October 1, October 29, and December 3. 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 October 7 and November 11, 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 replace the missed midterm exam and be worth 40% of your course grade.

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 December 17.

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.

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.

University Policies

Academic Integrity Code

Academic integrity is an essential part of the educational process, and all members of the GW community take these matters very seriously. As the instructor of record for this course, my role is to provide clear expectations and uphold them in all assessments. Violations of academic integrity occur when students fail to cite research sources properly, engage in unauthorized collaboration, falsify data, and otherwise violate the Code of Academic Integrity. If you have any questions about whether particular academic practices or resources are permitted, you should ask me for clarification. If you are reported for an academic integrity violation, you should contact Conflict Education and Student Accountability (CESA) to learn more about your rights and options in the process. Consequences can range from failure of assignment to expulsion from the University and may include a transcript notation. For more information, refer to the CESA website at students.gwu.edu/code-academic-integrity or contact CESA by email cesa@gwu.edu or phone 202-994-6757.

University policy on observance of religious holidays

Students must notify faculty during the first week of the semester in which they are enrolled in the course, or as early as possible, but no later than three weeks prior to the absence, of their intention to be absent from class on their day(s) of religious observance. If the holiday falls within the first three weeks of class, the student must inform faculty in the first week of the semester. For details and policy, see provost.gwu.edu/policies-procedures-and-guidelines.

Use of Electronic Course Materials and Class Recordings

Students are encouraged to use electronic course materials, including recorded class sessions, for private personal use in connection with their academic program of study. Electronic course materials and recorded class sessions should not be shared or used for non-course related purposes unless express permission has been granted by the instructor. Students who impermissibly share any electronic course materials are subject to discipline under the Student Code of Conduct. Contact the instructor if you have questions regarding what constitutes permissible or impermissible use of electronic course materials and/or recorded class sessions. Contact Disability Support Services at disabilitysupport.gwu.edu if you have questions or need assistance in accessing electronic course materials.

Academic Support

Academic Commons

Academic Commons is the central location for academic support resources for GW students. To schedule a peer tutoring session for a variety of courses visit go.gwu.edu/tutoring. Visit academiccommons.gwu.edu for study skills tips, finding help with research, and connecting with other campus resources. For questions email academiccommons@gwu.edu.

GW Writing Center

GW Writing Center cultivates confident writers in the University community by facilitating collaborative, critical, and inclusive conversations at all stages of the writing process. Working alongside peer mentors, writers develop strategies to write independently in academic and public settings. Appointments can be booked online at gwu.mywconline.

Support for students in and outside the classroom

Disability Support Services (DSS) 202-994-8250

Any student who may need an accommodation based on the potential impact of a disability should contact Disability Support Services at disabilitysupport.gwu.edu to establish eligibility and to coordinate reasonable accommodations.

Student Health Center 202-994-5300, 24/7

The Student Health Center (SHC) offers medical, counseling/psychological, and psychiatric services to GW students. More information about the SHC is available at healthcenter.gwu.edu. Students experiencing a medical or mental health emergency on campus should contact GW Emergency Services at 202-994-6111, or off campus at 911.

GW Campus Emergency Information

GW Emergency Services: 202-994-6111

For situation-specific instructions, refer to GW's Emergency Procedures guide.

GW Alert

GW Alert is an emergency notification system that sends alerts to the GW community. GW requests students, faculty, and staff maintain current contact information by logging on to alert.gwu.edu. Alerts are sent via email, text, social media, and other means, including the Guardian app. The Guardian app is a safety app that allows you to communicate quickly with GW Emergency Services, 911, and other resources. Learn more at safety.gwu.edu.

Protective Actions

GW prescribes four protective actions that can be issued by university officials depending on the type of emergency. All GW community members are expected to follow directions according to the specified protective action. The protective actions are Shelter, Evacuate, Secure, and Lockdown (details below). Learn more at safety.gwu.edu/gw-standard-emergency-statuses.

Shelter

- Protection from a specific hazard
- The hazard could be a tornado, earthquake, hazardous material spill, or other environmental emergency.
- Specific safety guidance will be shared on a case-by-case basis.

Action:

- Follow safety guidance for the hazard.

Evacuate

- Need to move people from one location to another.
- Students and staff should be prepared to follow specific instructions given by first responders and University officials.

Action:

- Evacuate to a designated location.
- Leave belongings behind.
- Follow additional instructions from first responders.

Secure

- Threat or hazard outside of buildings or around campus.
- Increased security, secured building perimeter, increased situational awareness, and restricted access to entry doors.

Action:

- Go inside and stay inside.
- Activities inside may continue.

Lockdown

- Threat or hazard with the potential to impact individuals inside buildings.
- Room-based protocol that requires locking interior doors, turning off lights, and staying out of sight of corridor window.

Action:

- Locks, lights, out of sight
 - Consider Run, Hide, Fight
- Classroom emergency lockdown buttons All classrooms have been equipped with classroom emergency lockdown buttons. If the button is pushed, GWorld Card access to the room will be disabled, and GW Dispatch will be alerted. The door must be manually closed if it is not closed when the button is pushed. Anyone in the classroom will be able to exit, but no one will be able to get in.