

Math 1232-12: Calculus 2

Spring 2022

Lectures:	TR 2:20 – 3:35 PM	Phillips B152
Recitations:	36: F 8:00 AM – 8:50 AM 37: F 9:35 AM – 10:25 AM 38: F 11:10 AM – 12:00 Noon	Rome 459 Rome 459 Rome 459
Textbook:	OpenStax Calculus Volume 2	by Gilbert Strang and Edwin Herman
Course Webpage:	https://jaydaigle.net/calculus/	Discord: https://discord.gg/Uj8u5BZjzu
Instructor:	Jay Daigle	TA: Jiayuan Wang
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Office hours:	W 2–5	Monday 2–4
Often in Office:	TR 1–2, sometimes MW 2–5	

Textbook

The official textbook for Math 1232 is OpenStax Calculus Volume 2 by Gilbert Strang and Edwin Herman. It is available for free online at <https://openstax.org/details/books/calculus-volume-2>. 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 links from Blackboard. This service is hosted by GW and is free of charge.

Course content

This is the second semester of a standard year-long sequence in single-variable calculus. The main topics are the behavior, derivatives, and integrals of inverse functions; advanced techniques of integration; sequences, series, and Taylor series; some applications of the integral; differential equations; and parametrized curves and polar coordinates. This corresponds roughly to Chapters 1–7 of Herman–Strang (primarily 3, 5, 6).

Prerequisites

Students must have passed Math 1221, Math 1231, or equivalent. Students will be expected to be able to perform algebraic and trigonometric calculations accurately and effectively, and to be comfortable with derivatives and basic integrals. 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/Uj8u5BZjzu> 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 be primarily in-person, our classrooms are equipped with recording technology and lecture recordings will be uploaded to Blackboard. In some situations, such as the first week of classes, lectures will be given remotely via Blackboard.

Important resources

The following resources are available to help you succeed in Math 1232.

- 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 Define logarithm, exponential, and inverse trigonometric functions, explain their basic properties (continuity, derivatives, asymptotes, etc.) and recognize their graphs; Apply these functions to word problems, and correctly interpret the results; Solve integrals using integration by parts, trigonometric substitution and partial fractions; Analyze, create and recognize polar and parametric graphs; Categorize the convergence of an infinite series; Express algebraic and transcendental functions using Maclaurin and Taylor series.

Lecture schedule

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

intro; inverse functions	Jan 11	Sequences	Mar 03
exponential and logarithm	Jan 13	Series	Mar 08
Derivatives of log and exp	Jan 18	Integral test	Mar 10
Integrals of log and exp	Jan 20	Spring Break	Mar 14-19
inverse trigonometric functions	Jan 25	Comparison Tests and Alternating Series	Mar 22
l'hospital	Jan 27	Absolute Convergence, Ratio and Root tests	Mar 24
Integration by Parts	Feb 01	Power series	Mar 29
Trigonometric Integrals	Feb 03	Series as Functions	Mar 31
Partial Fractions	Feb 08	Taylor Series	Apr 05
Numeric Integration	Feb 10	Computing Taylor Series	Apr 07
Improper Integrals	Feb 15	Applications of Taylor Series	Apr 12
Arc Length and Surface Area	Feb 17	Parametric Curves	Apr 14
Differential Equations	Feb 22	Polar Coordinates	Apr 19
Differential Equations 2	Feb 24	Fun with Series	Apr 21
Midterm	Mar 01		

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 female pronouns; you can call her "Jiayuan".

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 1232, 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 WeBWorK online homework system. This system should be 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. 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, generally a week after it is opened. Assuming the system works properly, you will have a grace period of two weeks 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 a list of 4 major topics and 10 secondary topics I would like you to master.

Major Topics

- | | |
|---|-----------------------|
| 1. Calculus of Transcendental Functions | 3. Series Convergence |
| 2. Advanced Integration Techniques | 4. Taylor Series |

Secondary Topics

- | | |
|--------------------------------|----------------------------------|
| 1. Invertible functions | 6. Differential Equations |
| 2. L'Hospital's Rule | 7. Sequences and Series |
| 3. Numeric integration | 8. Power Series |
| 4. Improper integrals | 9. Applications of Taylor Series |
| 5. Arc Length and Surface Area | 10. Parametrization |

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.

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 March 1, 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
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.