Math 1232-11: Single-Variable Calculus II

Spring 2021

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Office hours:	TW 3-4, R 2-3, on Discord	Office hours:	TBD

Lecture:	TR 11:10 am - 12:25 pm US Eastern time
Recitations:	F 8–8:50am (§30), 9:35–10:25am (§31), or 11:10am–noon (§32) US Eastern time
Course Web Page:	`https://jaydaigle.net/calculus/`
	All lectures and recitations will be available through Blackboard:
	`https://blackboard.gwu.edu`

Textbook

The official textbook for Math 1232 is *Calculus*, 8th edition by James Stewart (ISBN-13: 978-1285740621, ISBN-10: 1285740629). It is a very good (and very expensive) textbook. If you go on to take Multivariable Calculus at GW, you may also need this book for that class. Another perfectly fine book is *Calculus 2*, by Gilbert Strang and Jed Herman. It is available for free online at `https://openstax.org/details/books/calculus-volume-2`.

I will be loosely following Stewart, and will attempt to give references to both books whenever I can. I will not assign problems from either book, but both will contain many problems for if you need extra practice.

Do **not** purchase *Calculus: Early Trancendentals*, also by Stewart: it is not the same book as *Calculus* and it is not used in any mathematics course at GW. This section of Math 1232 will **not** use WebAssign.

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 to Chapters 6–11 of Stewart (primarily 6, 7, 11) and 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

Lectures and recitations will be **delivered synchronously through Blackboard, and recorded**. You will get much more out of the class if you are able to participate a computer microphone and possibly a webcam. Please contact the instructor *immediately* if you believe you will have a technical obstruction to participation. Please contact Student Support or Disability Support Services if you have questions or need assistance in accessing electronic course materials.

Under no circumstances may you post or share recordings of lecture or recitation (to YouTube, etc.) without the explicit permission of the instructor and everyone else who appears in the recording. Students who impermissibly share any electronic course materials are subject to discipline under the Student Code of Conduct. Please contact the instructor if you have questions regarding what constitutes permissible or impermissible use of electronic course materials and/or recorded class sessions.

I have set up a Discord server at `https://discord.gg/HD3dvYC` to hold office hours and facilitate low-key discussions of class material. This is totally optional, but highly recommended. You can use the discord 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.

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 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.)

Jan 12	intro; inverse functions	Mar 02	Sequences
Jan 14	Antiderivative and log	Mar 04	Series
Jan 19	differential equations and exp	Mar 09	Integral test
Jan 21	Generic log and exp	Mar 11	Comparison Tests
Jan 26	inverse trig	Mar 23	Alternating Series
Jan 28	l'hospital	Mar 25	Absolute Convergence
Feb 02	Parts	Mar 30	Power series
Feb 04	Trig Sub	Apr 01	Series as Functions
Feb 09	Trig Integrals and Partial Fractions	Apr 06	Taylor Series
Feb 11	Numeric Integration	Apr 08	Applications
Feb 16	Improper Integrals	Apr 13	Arc Length and Surface Area
Feb 18	Differential Equations	Apr 15	Parametric Curves
Feb 23	Differential Equations 2	Apr 20	Polar Coordinates
Feb 25	Midterm	Apr 22	Flexible/TBD

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 "Deborah". 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`.

We will endeavor to treat each of you with respect, and we ask that you do the same towards us and each other.

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

This semester will probably be difficult for all of us. I will endeavor to make things as painless as I can manage. Please let me know if you are facing difficulties and I can do anything to help—or if you just need to talk.

For each class, I will assign some reading and some videos to watch before class. Some of these readings and videos will be produced by me; others will be from the textbook or from other (free) online content sources. Please familiarize yourself with at least some of them; they will make the lecture much more productive if you are already prepared with some idea of what we'll be talking about. Of course, you can also consult these materials after the lecture to reinforce concepts you were confused about.

Class attendance will not be monitored or enforced, but will be extremely helpful to progressing in your understanding of calculus. Class is intended as a resource for you; please take advantage of it.

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

WeBWork Homework

For each topic I will assign some homework through the MAA's WeBWork online homework system. This system is free to students. 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 WeBWork problem. However, most problems will rerandomize numbers after five 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; the system will not accept work submitted after the due date. However, I will often be flexible with extensions, especially during this semester.

Mastery Quizzes

The quiz grading will follow an approach called "mastery" grading, which is a little complicated but which I think will benefit all of you, and hopefully alleviate a little of the inevitable stress of this semester.

In this course I will identify roughly twenty primary concepts I would like you to master. Each week we will introduce a couple of these concepts, and I will give a quiz with one problem for each concept. Each problem will receive a grade of either "apprentice" (A), "journeyman" (J), or "master" (M), based on the overall quality of your work. Minor arithmetic errors will not deny you a M grade, but no amount of "partial credit" will demonstrate mastery.

If you receive a M grade on a topic, you will get full credit and don't need to do any further work on that topic. However, if you receive an A or a J, you will have further opportunities to attempt to demonstrate mastery of that topic. The best grade you receive on a topic will be the one I use in my gradebook, so if you attempt a topic seven times and receive scores of A, A, A, A, J, J, M, you will get full credit for displaying mastery, just as if you had received an M on your first attempt.

You may reattempt mastery of a topic by:

- Attempting a similar problem on a future quiz; or

- Making an appointment with the instructor to work through a similar problem and display mastery.

You may try each of these at most one per week.

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 February 25, 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%
- Mastery Quizzes: 30%

- Midterm: 20%
- Final Exam: 30%

Minimum scores for each letter grade are as follows: A, 95%; 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 unforseen events; in this case, announcements will be posted to Blackboard explaining the change.