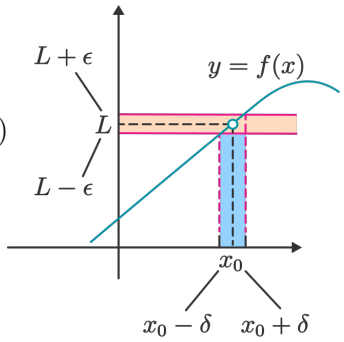
MATH 315: Advanced Calculus I (Fall 2021)

Live Lecture Time:	TR 9:00 - 10:15 am
Zoom Room:	See Blackboard
Instructor:	Jason Bramburger, jbrambur@gmu.edu
Office Hours:	MW 9:00 - 11:00 am or by appointment (Zoom link)
Course Website:	Blackboard



Course Content
The goal of this course is for students to develop a rigorous foundation for calculus, learn how to write proofs, develop examples and counter-examples, give precise statements of definitions and theorems and apply these ideas in various contexts. We will focus on number systems, functions, sequences, limits, continuity, differentiation, integration, transcendental functions, and series.

Textbook Sections	Topics
Chapter 1 (1.1 - 1.8)	The Real Numbers and Limits of Sequences
Chapter 2 (2.1 - 2.5)	Continuous Functions
Chapter 3 (3.1 - 3.3)	Riemann Integral
Chapter 4 (4.1 - 4.6)	The Derivative

Prerequisites
A grade of C or better in MATH 213 or 215 and MATH 290

Textbook
Advanced Calculus: An Introduction to Linear Analysis, L.F. Richardson

Instruction
This course will be entirely online. Lectures will be held on Tuesdays and Thursdays at 9:00 - 10:15 am and you are strongly encouraged to attend the lectures live on Zoom. Recordings of the lectures will be posted on the course webpage following the live lecture and will remain available until the end of the course.

Assessment
Your grade in this course will be assigned according to the percent system given below:

40% Homework
10% Quizzes
20% Midterm
30% Final Exam

Homework
Assignments will be distributed weekly and will be available on Blackboard. Late assignments will **not** be accepted without a legitimate excuse and prior approval. Students are encouraged to collaborate on homework assignments, but assignments must be written up separately and turned in individually. Submitted homework must take the form of a single package with your name and neatly written (or typed) solutions labeled with problem numbers. Solutions must show all work, not just the final answer. Assignments that do not meet these requirements will be subject to point deductions.

Quizzes
There will be quizzes given regularly (approximately weekly) in class and are meant to make sure you are keeping on top of the course material. These will be approximately 15 minutes in length. Your lowest quiz grade will be dropped at the end of the semester. No make-up quizzes will be given.

University Catalog
The University Catalog is the central resource for all university policies affecting student, faculty, and staff conduct in university administration affairs. Other policies are available at universitypolicy.gmu.edu/. All members of the university community are responsible for knowing and following established policies.

Accommodations for Students with Disabilities
If you need accommodations for classes, assignments, or exams, please contact me and Disability Services. Website: https://ds.gmu.edu/.

Counselling and Psychological Services
CAPS at Mason provides a wide range of free services to students and has resources for distance learners. Website: https://caps.gmu.edu/.

Honor Code
It is expected that each student in this class will conduct themselves within the guidelines of the Honor Code. All academic work should be done with the level of honesty and integrity that this university demands. Anyone caught cheating during a quiz, exam or on any other material submitted for a grade will be sent to the University Honor Committee for formal resolution to the situation. The use of cell phones and other electronic communication devices for any purpose during a quiz or an exam will be considered an honor code violation. The most likely recommendation given by the professor to the Honor Committee is failure of the class (not just the specific quiz, exam, etc.) if the student is found guilty of violating the Honor Code.

Diversity and Inclusion Statement
George Mason University is an intentionally inclusive community that promotes and maintains an equitable and just work and learning environment. We welcome and value individuals and their differences including race, economic status, gender expression and identity, sex, sexual orientation, ethnicity, national origin, first language, religion, age, and disability. I invite and respect any concerns about inequitable access or treatment in this course.

I strive to create a learning environment for you that supports a diversity of thoughts, perspectives, and experiences, and honours your identities. To help accomplish this:

- If you have a name and/or set of pronouns that differ from those that appear in your official GMU records, you are encouraged to let me know.
- If you feel your performance in the course is being impacted by your experiences outside of class, please come talk with me.
- I am still in the process of learning about inclusion, diverse perspectives, and identities. If something was said in class (by anyone, including me) that made you feel uncomfortable, please talk to me about it.
- As a participant in course discussion and problem-based sessions, you should strive to honour the diversity of your classmates.

Additional Course Policies

- All announcements will be posted on Blackboard. Be sure your Blackboard notifications are turned on, and you check it periodically.
- You are highly encouraged to ask and answer questions on the Slack channel. Please feel free to also share anything you feel might be relevant to the course!
- I am here to facilitate your learning; let me know if you have questions! I can always be reached by e-mail, and can schedule additional office hours.

Schedule:

Date	Section(s)	Topic
8/24	1.1	The real number system
8/26	1.2	Limits of sequences and Cauchy sequences
8/31	1.2	Limits of sequences and Cauchy sequences
9/2	1.3	The completeness axiom and some consequences
9/7	1.3	The completeness axiom and some consequences
9/9	1.4	Algebraic combinations of sequences
9/14	1.5	The Bolzano–Weierstrass theorem
9/16	1.6	The nested intervals theorem
9/21	1.7	The Heine–Borel covering theorem
9/23	1.8	Countability of the rational numbers
9/28	2.1	Limits of functions
9/30	2.1	Limits of functions
10/5		**MIDTERM**
10/7	2.2	Continuous functions
10/12		**NO CLASS: Fall Break**
10/14	2.3	Some properties of continuous functions
10/19	2.4	Extreme value theorem and its consequences
10/21	2.4	Extreme value theorem and its consequences
10/26	2.5	The Banach space $C[a, b]$
10/28	3.1	Riemann integral definition and basic properties
11/2	3.1	Riemann integral definition and basic properties
11/4	3.2	The Darboux integrability condition
11/9	3.3	Integrals of uniform limits
11/11	4.1	Derivatives and differentials
11/16	4.2	The mean value theorem
11/18	4.3	The fundamental theorem of calculus
11/23	4.5	Cauchy's generalized mean value theorem
11/30	4.6	Taylor's theorem
12/2		Catch-up
12/9		**FINAL EXAM** (Chapters 1-4)