MATH 101: Calculus

Truong-Son Van

Contents

Fall 2024

Key info

Lectures: M-W, 4:45pm - 6:15pm, CR1

Instructor: Truong-Son Van, **Email:** son.van+101@fulbright.edu.vn,

Office Hours (Instructor): TBD

TA: TBD

Office Hours (TA): TBD

Prerequisites: being curious.

Important dates

- Exams:
  - Mini Exam 1:
  - Mini Exam 2:
  - Mini Exam 3:
  - Mini Exam 4:
  - Final Exam:
- Drop dates:
  - without consequences: 4:00 PM Friday, Aug. 30
  - with "W" on transcript: 4:00 PM Friday, Oct. 11
- Breaks:

- First day of class:
- Independence day break: Sept 2-3, 2024
- Mid-term break: Oct 14-18
- End of semester: Dec 12
- End of semester break: Dec 16, 2024 - Jan 3, 2025

Textbook(s) and References

It is required that students read the textbooks before the class.

1. Main Text: Calculus Vol.1 & Vol. 2, OpenStax
2. Calculus, Vol. 1, Tom Apostol
3. Active Calculus by Schlicker et al. (https://activecalculus.org/single/book-1.html)
4. Thomas' Calculus: Early Transcendentals by Hass, Heil, et al. 14^{th} edition.
5. Calculus Early Transcendental by Stewart. 8^{th} edition.
6. Anything you can find on Google would work. Calculus is a subject that people have written about so much. So, there's no excuse for not having access to the knowledge.

Course description

How can we estimate the weight of a bridge? What price should a store set for a product so as to maximize the revenue? Calculus provides tools to answer these questions and many more. Calculus is fundamental to many scientific disciplines including physics, engineering, statistics, computer science, and economics. Using everyday language and graphs, as well as equations, data, and numerical approaches, this course will provide the essential concepts of Calculus, illustrated, and explored through a wide range of real-world examples. Students will develop their critical thinking and problem-solving skills, while also gaining a solid preparation for higher-level courses such as differential equations or statistics. The main topics are functions, limits, derivatives, and integrals.

Learning objectives

Two things: - I hope this course will help you have fun and nerdy conversations with friends (or strangers on the bus), whether they're math people or not. At the least, if you don't like the awkward silence, strike a conversation about ∞! - I hope you will find beauty in mathematics by knowing that mathematics is all about ideas, not computations (although computations play a big part in the usefulness of mathematics).

Tentative Syllabus (subject to change)

1. Functions and Limits

- Functions, graphs, and mathematical modeling
- Compositions and transformations
- Limits, asymptotes, and continuity

2. Derivatives

- Slope of a straight line
- Concept and definition of the derivative
- Differentiability
- Techniques of calculating derivatives

- Shapes of curves, extrema, and optimization
- Implicit differentiation
- Related rates
- Differentials and small changes
- Antiderivatives

3. Integrals

- Sequences and series
- Concept and definition of the integral
- The fundamental theorem of calculus
- Integrals and areas
- Techniques of calculating integrals
- Numerical integration
- Improper integrals

Schedule

- Week 1 (Aug. 19 - Aug. 23):
  - M: General discussion & Review of functions. Read
    - Vol.1, Chapter 1.
  - W: Preview of Calculus, Introduction to limits. Read
    - Vol.1, 2.1
    - Vol.1, 2.2
- Week 2 (Aug. 26 - Aug. 30):
  - M: Limit Laws. Read
    - Vol.1, 2.3
  - W: Continuity. Read
    - Vol.1, 2.4
- Week 3 (Sep. 2 - Sep. 6). Break and Mini Exam 1.
  - M: Break
  - W: Mini Exam 1
- Week 4 (Sep. 9 - Sep. 13). Introdunction to Derivatives.
  - M: Derivative. Read
    - Vol. 1, 3.1
    - Vol. 1, 3.2
  - W: Derivative rules. Read
    - Vol. 1, 3.3
    - Vol. 1, 3.6
- Week 5 (Sep. 16 - Sep. 20). Special derivatives.
  - M: Derivatives of Trig functions, Derivatives of Inverse Functions. Read
    - Vol. 1, 3.5
    - Vol. 1, 3.7
  - W: Implicit Differentiations, Derivatives of Exponential and Logarithmic Functions. Read
    - Vol. 1, 3.8
    - Vol. 1, 3.9
- Week 6 (Sep. 23 - Sep. 27). L'Hospital Rule and Mini Exam 2.
  - M: L'Hospital's Rule. Read
    - Vol. 1, 4.8

  - W: Mini Exam 2
- Week 7 (Sep. 30 - Oct. 4). Applications of Derivatives.
  - M: Related Rates, Linear Approximations. Read
    - Vol. 1, 4.1
    - Vol. 1, 4.2
  - W: Basic Optimization. Read
    - Vol. 1, 4.3
    - Vol. 1, 4.7
- Week 8 (Oct. 7 - Oct. 11). Applications of Derivatives (cont.).
  - M: Drivatives and Shape of a Graph. Read
    - Vol. 1, 4.5
  - W: Newton's Method
    - Vol. 1, 4.9
- Week 9 (Oct. 21 - Oct. 25). Review and Mini Exam 3.
  - M: Review
  - W: Mini Exam 3
- Week 10 (Oct. 28 - Nov. 1). Antiderivative and Integration.
  - M: Antiderivatives. Read
    - Vol. 1, 4.10
  - W: Introduction to Integration. Read
    - Vol. 1, 5.1
- Week 11 (Nov. 4 - Nov. 8)
  - M: Definite Integral. Read
    - Vol. 1, 5.2
  - W: Fundamental Theorem of Calculus. Read
    - Vol. 1, 5.3
- Week 12 (Nov. 11 - Nov. 15)
  - M: Integration Formulas and the Net Change Theorem. Read
    - Vol. 1, 5.4
  - W: Substitution. Read
    - Vol. 1, 5.5
- Week 13 (Nov. 18 - Nov. 22)
  - M: Areas between Curves. Read
    - Vol. 1, 6.1
  - W: Determining Volumes by Slicing
    - Vol. 1, 6.2
- Week 14 (Nov. 25 - Nov. 29)
  - M: Volumes of Revolution: Cylindrical Shells. Read
    - Vol. 1, 6.3
  - W: Exponential Growth and Decay. Read
    - Vol. 1, 6.8
- Week 15 (Dec. 2 - Dec. 6)
  - M: Review
  - W: Final

Class Policies (subject to change)

Lectures

- If you must sleep, please don't snore. (Thanks Gautam Iyer for this amazing policy!)
- Please be respectful to your classmates.

Attendance

I don't take attendance. It's up to you to decide if it's worth it to go to class.

Homework

Homework is highly recommended and often required to learn any Math subject. However, I will not collect your homework. As adults, you are responsibile for your own learning.

Instead of spending time grading your homework, I decide to increase my office hour time so you have more access to me, should you need it.

Grading (subject to change)

- Mini Exams: 15% x 4
- Final: 40%

Letter Grade	Percentage
A	[93,100]
A-	[90,93)
B+	[87,90)
B	[83,87)
B-	[80, 83)
C+	[77,80)
C	[73,77)
C-	[70,73)
D+	[67,70)
D	[60, 66)
F	[0,60)

Time Expectations

On average, you should expect to be roughly 3 hours in class per week, which are included in a total of 10 working hours per course per week. If you are finding it difficult to complete your work in time, please come talk to me ASAP so that we can diagnose the issue and adjust accordingly. If something is not working for you, please do not hesitate to raise it in one of the feedback sessions or come see me outside of class.

Academic Dishonesty

As Fulbright University's Code of Academic Integrity explains: "plagiarism occurs when a writer appropriates another's ideas, research, or writing without proper acknowledgement of the source or uses another's words without the use of quotation marks, whether intentional or not." All Fulbright students are responsible for familiarizing themselves with the Code of Academic Integrity.

Learning Support

Please remember that "Help is always available at FUV, if you just reach out!". There are ample resources available to help you survive and thrive on your academic journey. The Fulbright Learning Support team can provide you with guidance in the following areas:

- Academic skills (e.g., Reading, Writing, Listening, Speaking and Presentation)
- Study skills (e.g., Time management, Planning your Assignments, Task Management, Note-taking Skills)
- Research-related skills (e.g., Selecting Peer-reviewed Journals, Qualitative Coding, Planning a Research Project)
- Exam strategies & Test-taking skills
- Academic Integrity (e.g., Avoiding Plagiarism, Paraphrasing Skills, Citing and Referencing)

- Individual Learning Plan (i.e., Brainstorming, Planning, Prioritizing, Monitoring, Reflection on Learning)
- Making use of the Work-in-Progress Learning Guides for independently learning fundamental academic skills and study skills
- Discipline-related content (e.g., Arts, History, Vietnam Studies)

Support for these areas includes Workshops, Skill Practice Sessions and Group Advising Sessions organized during the semesters, and you can also refer to the Study Skills & Academic Skills 101 canvas module. Additionally, if you would like to have one-on-one advising/ mentoring sessions to discuss your specific academic concerns (e.g., how to improve your thesis statement, how to 'polish' your academic writing style, identify your strengths and weaknesses in your academic reading skills), you can book an appointment with a learning support staff member or with a peer mentor via the booking link.
If you have further questions about learning support, please send an email to learning.support@fulbright.edu.vn

Wellness Center

The Wellness Center support students to take care of your emotional and social health and wellbeing so you can enjoy your college experience more fully. Our offers include various wellness programs, free counseling service, safer community, and accessibility service for all Fulbright students. You can contact the Wellness Center via wellness@fulbright.edu.vn or find us at the Wellness Center office on the Level 5 of our Crescent campus.

Counseling service

If you are experiencing any stress or emotional concern that may be interfering with your ability to perform academically, or you want to explore more about mental health and how to live life in a more balanced way, you can contact the Wellness Center Counseling service. Our counseling service is confidential, private, and free of charge for all Fulbright students. You can book a counseling session at this link or contact counseling@fulbright.edu.vn. If you need urgent support, you can contact the International SOS via their hotline (+84 28 38298520) or access their mobile app.

Safe Learning Environment

Fulbright is dedicated to a safe, supportive and non-discriminatory learning environment. Bullying, abuse, discrimination, harassment, sexual misconduct, and any other actions that create an unsafe learning environment will not be tolerated. It is the responsibility of all students to familiarize themselves with the Student Code of Conduct. Actions which threaten a safe campus environment - including the physical and emotional safety all students - will be investigated according to this code and may be subject to sanctions including loss of privileges, suspension, or expulsion from FUV. The Wellness Center offers Safer Community - a central point of enquiry, response, and support for concerning, threatening, or inappropriate behaviors, including sexual harassment, sexual assault, and/or any actions mentioned above. If you are feeling unsafe or unsure what to do, Safer Community will listen to you and explore options with you. Conversations are confidential unless you give your consent to involve others. You can book an appointment with Safer Community here or contact them at safer-community@fulbright.edu.vn for any query.

Accessibility Learning Service

Fulbright University Vietnam commits to providing excellent student-centered services that supports diversity, inclusivity and accessibility where the student's voice and presence matters. Accessibility Learning Service provides support for students with conditions, including disability, long-term illness, mental health condition or being primary carers of individuals with a disability. ALS can meet with you to develop individualized learning plan, share your plan with your professors and provide continuing support if necessary. You can contact us at wellness@fulbright.edu.vn to book an appointment. We strongly recommend that you meet with us prior to the semester start to ensure timely development and implementation of your learning plan.