

# Math 000 Nonstandard Calculus I Syllabus

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# Why Read the Syllabus?

- The syllabus is a contract between you and me.
- It contains important information about the course structure, policies, and expectations.
- Reading the syllabus helps you understand what is required to succeed in this course.
- I have made the syllabus very easy to navigate with a interactive table of contents.
- If you have any questions about the syllabus, please ask me in class, during office hours, or via email.

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# Meeting Information

- Mondays, Wednesdays, and Fridays
- 12:40 PM - 1:30 PM
- Location: Blocker 123
- Start Date: August 25, 2025
- End Date: December 16, 2025

# Instructor Information

- Name: Mengxiang Jiang
- Office: Blocker 456
- Email: [mj294@tamu.edu](mailto:mj294@tamu.edu)
- Office Hours: Tuesdays and Thursdays 2:00 PM - 4:00 PM  
and by appointment (ask at least one day in advance)

# Halmos's Description of Calculus

*What we call calculus nowadays is the union of a dab of logic and set theory, some axiomatic theory of complete ordered fields, analytic geometry and topology [...], differentiation, [...] formal integration, [...] measure theory, [...]. Any one of these is hard to write a good book on; the mixture is impossible.*

— Paul R. Halmos [1]

# What's Wrong With the Standard Approach?

- Students are overwhelmed by the amount of material.
- The way infinity is treated is indirect and unintuitive.
- Students often memorize definitions and procedures without understanding the underlying concepts.
- As a result, students have difficulty relating theoretical concepts to practical applications.

# Why Nonstandard?

- This was the way Newton and Leibniz originally formulated calculus.
- Directly deals with infinity as a number as well as with infinitesimals.
- This greatly reduces the number of notations and concepts students need to learn.
- Follows the historical development of calculus more closely, and as a result feels more intuitive and natural.

# Course Description

- Credit Hours: 4
- Prerequisites: Math 150 (Precalculus) or equivalent
- Fulfills the Calculus I requirement (Math 131, 142, 147, 151, 171).
- I follow Plutarch's advice on teaching [4]:

*The mind is not a vessel to be filled, but a fire to be kindled.*

As such, the lectures will not be simply a transfer of information from me to you. Instead, I will guide you to think about the material and discover the concepts for yourself.

# Start of the Calculus Journey

This course is the first in a sequence of two courses:

- Math 000 Nonstandard Calculus I
- Math 001 Nonstandard Calculus II

which together cover the core concepts as the traditional two-semester sequence of Calculus I and Calculus II. This will not be a fully rigorous treatment of calculus (but neither is the traditional sequence). For a more rigorous treatment, see Math 409 Analysis on the Real Line or Math 689 Special Topics in Analysis: Nonstandard Analysis.

# Learning Outcomes

"It is important to remember that we cannot give students goals—they must own their goals. However, with goal ownership comes responsibility. Students need to learn how to set, analyze, and use goals and how to respond to goal achievement and failure."

[4] With this in mind, I hope students will set for themselves the following learning outcomes for this course:

- Understand the basic concepts of the hyperreal numbers.
- Think critically about continuity and differentiability.
- Apply differentiation techniques to solve a variety of problems.

# Required Textbook

- **Yet Another Calculus Text**, by Dan Sloughter [2]
- Freely available online at  
<https://www.yact.synechism.org/>
- And libretexts  
<https://math.libretexts.org/Bookshelves/Calculus/>

# Learning Resources

- The Texas A&M Math Learning Center (MLC) offers various forms of support for Calculus I. Find out more at the following website:  
<https://vmlc.tamu.edu/course-selection/calculus-i>
- Technology Services (IT) - Main Campus:  
<https://it.tamu.edu/help>
- Texas A&M University Libraries:  
<https://library.tamu.edu/>
- University Writing Center:  
<https://writingcenter.tamu.edu>
- Learning Management System (LMS) Support:  
<https://lms.tamu.edu/support>

# Grade Breakdown

- Homework: 40%
- Quizzes: 20%
- In-class participation: 20%
- Midterm Exam: 10%
- Final Exam: 10%
- Grades will be assigned according to the following scale:
  - A: 90-100
  - B: 80-89
  - C: 70-79
  - D: 60-69
  - F: 0-59

# Homework Policy

- Homework will be assigned weekly and is due at 11:59 PM on the due date (upload to Canvas).
- Late homework will be accepted up to one week late with a 5% penalty per day.
- Collaboration is encouraged, but each student must submit their own work.
- Please follow Francis Su's advice on writing mathematics linked here <https://mathcs.holycross.edu/~rmcgee/files/Su-Guidelines-for-Good-Mathematical-Writing.pdf>.  
[3]

# Quiz Policy

- Quizzes will be given on Mondays biweekly and will cover material from the previous two weeks.
- The purpose of the quizzes is to ensure that students are keeping up with the material and can apply it with no outside help.
- The lowest quiz score will be dropped.

# Participation Policy

- Active participation in class discussions is expected.
- Random students will be selected to answer questions or solve problems in front of the class.
- Participation will be assessed through in-class activities and discussions.
- The purpose of participation is not to test your knowledge, but to encourage you to think about the material and engage with your peers.

# Exam Policy

- There will be one midterm exam and one final exam.
- The midterm will be held in class on October 17.
- The final exam will be held on December 12 from 10:30 AM to 12:30 PM.
- Both exams are closed book and closed notes.
- No makeup exams will be given except in extreme circumstances.

# Weekly Topics

- Week 1: Zeno's Paradoxes and the History of Calculus
- Week 2: Rates of Change
- Week 3: The Hyperreal Numbers
- Week 4: Functions and Continuity
- Week 5: Properties of Continuous Functions
- Week 6: Introduction to Derivatives
- Week 7: Properties of Derivatives
- Week 8: Review and Midterm Exam
- Week 9: Geometric Interpretation of Derivatives
- Week 10: Increasing, Decreasing, and Local Extrema
- Week 11: Optimization Problems
- Week 12: Implicit Differentiation and Rates of Change
- Week 13: Higher-Order Derivatives
- Week 14: L'Hopital's Rule and Other Tricks
- Week 15: Review and Final Exam

# Attendance and Makeup Policy

- Regular attendance is expected and will be recorded.
- If you miss a class, it is your responsibility to catch up on the material.
- Excessive absences will result in a lower participation grade.
- If you have a valid reason for missing class (e.g., illness, family emergency), please inform me as soon as possible and a makeup can be arranged (See Student Rule 7 <https://student-rules.tamu.edu/rule07/>).

# Academic Integrity

- “An Aggie does not lie, cheat, or steal, or tolerate those who do.”
- “Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one’s work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case.”
- For more information, see the Aggie Honor website:  
<https://aggiehonor.tamu.edu/>

# Students with Disabilities

- Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact the Disability Resources office (<https://disability.tamu.edu/>).
- Disabilities may include, but are not limited to, attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability-related needs with Disability Resources and their instructors as soon as possible.

# Nondiscrimination, Civil Rights, Title IX, and Free Speech

- Texas A&M University is committed to providing an inclusive and welcoming environment for all members of our community.
- Discrimination based on race, color, religion, national origin, sex, age, disability, or veteran status is not tolerated.
- For more information, see the Office of Civil Rights and Title IX: <https://titleix.tamu.edu/>
- This class embraces academic freedom to support learning objectives and promote educational excellence. Throughout this semester, we will explore new and sometimes controversial ideas. It is possible that discussions of these topics will reveal diverse but legitimate differences of opinion. Such differences are not only likely but can be desirable, as they can be essential to the promotion of a dynamic and informative learning environment for us all.

# Pregnancy Accommodations

- Texas A&M provides reasonable accommodations to students due to pregnancy and/or related conditions, such as childbirth, recovery, and lactation. Students should contact the University's Pregnancy Coordinator as soon as they become aware of the need for accommodation.
- [https://titleix.tamu.edu/  
title-ix-and-pregnancy-students/](https://titleix.tamu.edu/title-ix-and-pregnancy-students/)
- Depending on the circumstances, accommodations could include extended time to complete assignments or exams, changes in course sequence, or modifications to the physical classroom environment.

# Mental Health Resources

- Texas A&M University is committed to supporting the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available.
- Free and confidential mental health services are provided by the University Health Services (<https://uhs.tamu.edu/mental-health/>).
- Additional mental health resources include:
  - The TELUS Health Student Support App (<https://uhs.tamu.edu/mental-health/student-support.html>)
  - Suicide and Crisis Lifeline: Call or text 988 or chat at <https://988lifeline.org/chat/>

# FERPA

- The Family Educational Rights and Privacy Act (FERPA) is a federal law that protects the privacy of student education records.
- Students have the right to inspect and review their education records, request the amendment of inaccurate or misleading records, and control the disclosure of personally identifiable information.
- Currently enrolled students wishing to withhold any or all directory information items can do so within <https://howdy.tamu.edu> using the Directory Information Withholding Form. The complete FERPA Notice to Students (<https://registrar.tamu.edu/about-us/policies/ferpa>) and the student records policy is available on the Office of the Registrar webpage.

## References

-  Paul R Halmos.  
How to write mathematics.  
*L'enseignement mathématique*, 16(2):123–152, 1970.
  -  Dan Sloughter.  
Yet another calculus text.  
2007.
  -  Francis Edward Su.  
Some guidelines for good mathematical writing.  
*MAA Focus*, 35(4):20–22, 2015.
  -  M Svinicki and WJ McKeachie.  
McKeachie's teaching tips: Strategies, research, and theory for college and.  
2014.
- Fall 2025 Honors Calculus I Syllabus by Dr. Anne Shiu  
<https://people.tamu.edu/~annejls/>