

# MATH 251 SYLLABUS

## *Fun in Several Variables*

Welcome to MAT 251, a multivariable adventure awaits you! This is the survival manual for this course, where you can find all the administrative info you need to know, such as office hours, grading, and other goodies. Feel free to e-mail me if you have any other questions.

**Disclaimer:** Any item on this syllabus is subject to change. Any in-class or online announcement, verbal or written, is considered official addendum to this syllabus.

## 1. AT A GLANCE

<b>Course Name</b>	<b>MATH 251 – Engineering Mathematics III</b>
<b>Term</b>	Fall 2021
<b>Class times and location</b>	Section 501: MWF 12:40 – 1:30 pm in HELD 111 Section 512: MWF 1:50 – 2:40 pm in HELD 111
<b>Instructor Name</b>	Peyam ( $\pi$ -m) Tabrizian
<b>E-mail</b>	<a href="mailto:drpeyam@tamu.edu">drpeyam@tamu.edu</a> or <a href="mailto:drpeyam@math.tamu.edu">drpeyam@math.tamu.edu</a>
	Please check your TAMU email account <b>regularly</b> because this is where class emails will be sent.
<b>Office</b>	353 Blocker
<b>Office Hours</b>	W 3:00 – 4:30 pm Th 2:15 – 3:45 pm + by appointment
	Office Hours will be through zoom, but you are allowed to request in-person office hours by appointment
<b>Zoom Link for OH</b>	<a href="https://tamu.zoom.us/my/drpeyam">https://tamu.zoom.us/my/drpeyam</a>

## 2. LOGISTICS

**Course Description: (Credit 3)** The official description includes: Vector algebra, calculus of functions of several variables, partial derivatives, directional derivatives, gradient, multiple integration, line and surface integrals, Stokes' and Green's theorem.

**Prerequisites:** Math 152 or equivalent. You won't need to know much from 152, except review Parametric Equations (Chapter 10), and integration techniques like the substitution rule (section 5.5)

**Calculator Policy:** Calculators are **NOT** allowed on exams. That said, you **ARE** allowed to use them on the homework and the quizzes

**Learning Outcomes:** We will cover chapter 12 through 16 of the textbook. We will revisit the notions learned in single-variable calculus (precisely differentiation and integration) and generalize them to three dimensions, and we will cover different concepts used in physics, engineering, and electronics. At the end of this course, you should be able to manipulate these concepts correctly in order to apply them to engineering applications. After mastering this course, you will be able to:

- Do calculus on vector-valued functions, including derivatives, integrals, displacement, velocity, and acceleration.
- Perform Calculus on functions of several variables, including partial derivatives, tangent planes, directional derivatives, and multiple integrals.
- Find local maxima and minima of functions, with or without constraints.
- Solve problems using the 4 (!) Fundamental Theorems of Calculus: the FTC of Line Integrals, Green's Theorem, the Divergence Theorem, and Stokes' Theorem.
- Apply your knowledge of calculus to the solutions of real-world problems.

One of my personal goals in this course is to show you that the techniques in this course are an intuitive extension of what you've learned in single-variable calculus

**What this course is really about:** I highly doubt that you'll forget the techniques you'll learn in this course because they are essential to human survival. That said, as Steve Krantz puts it in his book *How to teach Mathematics*, there is another goal of teaching this course. Namely, real purpose of this course is to teach you about mathematical discourse and critical thought. Just like in rhetoric, philosophy or politics, mathematics has its own language and way of thinking. How do mathematicians deal with an unknown problem? What methods do they use? What do they do when a given method doesn't work? Getting acquainted with all those different types of discourses is what your college education is really about.

**Textbook:** Stewart, *Calculus: 8<sup>th</sup> Edition Early Transcendentals*

**Recommended:** There are tons of great calculus textbooks out there! I particularly recommend *Calculus: Early Transcendentals*, by Adams and Rogawski. There's also a fun book called *Zombies and Calculus* by Colin Adams, where you can apply your calculus knowledge to defeat zombies.

For the Vector Calculus part (Chapter 16), a great reference is *Div, Grad, Curl and all that: An Informal Text on Vector Calculus* (4th edition) by H.M.Schey, ISBN 978-0393925166, which gives an intuitive approach to the subject using physical principles.

Finally, if you're looking for a more rigorous treatment of calculus, I recommend *Calculus, Vol. 1* by Apostol.

### **Online resources you can use:**

- **Course Website:** There will be a main course website, where you can find the lecture notes, YouTube videos, and study guides/practice exams. The website is not set up yet, so in the meantime, everything will be posted on Canvas
- **[Canvas](#):** Here is where I'll post announcements and you can check your grades. You will also upload your quizzes there
- **[WebAssign](#):** Here is where you complete your homework assignments.

- [Campuswire](#): A forum-like tool like Canvas Discussions or Piazza, but cooler, where you can post questions and either your classmates or I can answer them.
- [YouTube Channel](#): My YouTube channel, where you'll find useful videos related to this course.
- [TikTok channel](#): I also have a TikTok channel with fun math-related videos, although I haven't posted on there in a while

### 3. GRADING (the part you've all been waiting for)

The course grading will be based on the tables below. Due to FERPA privacy issues, I cannot discuss grades over email or phone. If you have a question about your grade, please come see me through Zoom.

#### Grade Breakdown

<b>Activity</b>	<b>Date</b>	<b>Percent</b>
<b>Homework</b>	Weekly	<b>10%</b>
<b>Quizzes</b>	Weekly (except exam weeks)	<b>10%</b>
<b>Exam I (Chap. 12, 13)</b>	Friday, September 24	<b>20%</b>
<b>Exam II (Chapter 14)</b>	Friday, October 15	<b>20%</b>
<b>Exam III (Chapter 15)</b>	Friday, November 12	<b>20%</b>
<b>Final Exam (Chap. 16)</b>	See dates below	<b>20%</b>
<b>TOTAL</b>		<b>100%</b>

**Note:** There is also an extra credit opportunity, see below

- **Grading Scale:**

<b>Range</b>	<b>Grade</b>
[90,100]	A
[80,90)	B
[70,80)	C
[60,70)	D
[0,60)	F

**Note:** The scales below are a guarantee. For example, if you get 85, you are guaranteed at least a B. The final grade calculation is up the instructor's discretion.

**Exams:** There will be 3 exams and a final exam administered. Bring your Texas A&M student ID and a pencil to all exams. The *tentative* dates for the exams are as follows. Exam dates will be announced the previous week. Exams 1, 2, and 3 will be administered in the usual lecture room (111 HELD) and the usual lecture time, so from 12:40-1:30 pm for section 501, and from 1:50-2:40 pm for section 512.

**Exam 1:** Friday, September 24

**Exam 2:** Friday, October 15

**Exam 3:** Friday, November 12

**Final Exam:** Section 501: Monday, December 13, 10:30 am – 12:30 pm

Section 512: Tuesday, December 14, 3:30 pm – 5:30 pm

**Note:** If your final exam grade is higher than your lowest taken midterm exam score, the grade on your final will replace that lowest exam grade in the course grade calculation. In order for you to be eligible for this, you must have taken the first three exams. So technically, the final exam could count up to 40% of your grade

**The exams are closed book, closed notes, and no calculators are allowed. They are NOT cumulative, although the material is itself cumulative.**

**Graded Homework:** Online graded homework assignments will be due every Friday by 11:55 pm using WebAssign, except for exam weeks. WebAssign access is required, and you will have to purchase an access code. Here is you can find more information on getting the access code: <http://www.math.tamu.edu/courses/ehomework>. There are no ‘make ups’ for WebAssign (unless you have a university-approved excuse), but the lowest **3 sections**, **NOT** assignments, are dropped. For example, if you score low on sections 13.1, 15.2, and 16.4, those will get dropped. There are also some ‘practice’ assignments that will not be graded, and therefore are not required. For every homework, you may request an extension that will extend the original due date by two days. Any problem submitted during the extension period will only receive half credit. An extension will **NOT** be granted if it is requested more than two days after the original due date. There will be no homework due during midterm weeks, but beware that the assignments after exam weeks are a bit heavier than usual.

**Suggested Homework:** Some problems from your textbook will also be assigned but **NOT** graded. You are strongly recommended to do all of them which will provide a

valuable practice for both on-line HWs, quizzes, and exams. For a list of suggested HWs see: [Suggested Homework](#)

**Quizzes:** There will be a quiz due every Friday by 11:55 pm, except for exam weeks. There are **NO** make-up quizzes (unless you have a university-approved excuse), but instead your lowest **2** quizzes are dropped. The **first** quiz will be taken **in class**, during lecture time and will be closed books/notes and no calculators allowed. You submit all the other quizzes on Canvas, as an assignment; they are open book/notes, calculators allowed, and you can even collaborate on them, as long as your work is your own. That said, the quizzes are supposed to prepare you for the exams, so I do recommend first attempting them on your own.

**Extra Credit:** You have an opportunity to earn 1% Extra Credit in this course. In order to do so, you have to be one of the top 40 posters (out of the 185 students from my both lectures) on the [Campuswire](#) forum, so make sure to create posts and respond to your peer's posts regularly

## 4. MISCELLANEOUS INFORMATION

**Week-in-Review and Help Sessions:** will be conducted by the Math Learning Center. Please see the information here: <https://mlc.tamu.edu/> Please make sure to use this valuable resource, it is completely free and will help you in your success in the course

**Grade Appeals:** If you believe an error has been made in grading, you have until the next class period after the exam is handed back to let me know. Otherwise, you must accept the grade you received.

**Classroom Respect:** Please refrain from using electronic devices during class, as doing so distracts not only you, but also those around you.

**Copyright:** All printed handouts and web-materials are protected by US Copyright Laws. No multiple copies can be made without written permission by the instructor. [I explicitly allow you to distribute my notes, videos, and exams.](#)

### **Additional Helpful Links:**

- Math Learning Center: <https://mlc.tamu.edu/>

- Academic Calendar: <http://registrar.tamu.edu/General/Calendar.aspx>
- Final Exam Schedule: <http://registrar.tamu.edu/General/finalschedule.aspx>

**Note:** As with any math class, it is *very* important that you keep up with the suggested homework and that you do not fall behind. [Please do not hesitate to ask questions in class, to come to my office hours, or to send me an e-mail. I am here to help you enjoy and succeed in this course](#)

**Campus Safety Measures:** To help protect Aggieland and stop the spread of COVID-19, Texas A&M University urges students to be vaccinated and to wear masks in classrooms and all other academic facilities on campus, including labs. Doing so exemplifies the Aggie Core Values of respect, leadership, integrity, and selfless service by putting community concerns above individual preferences. COVID-19 vaccines and masking — regardless of vaccination status — have been shown to be safe and effective at reducing spread to others, infection, hospitalization, and death.

**Statement on Mental Health and Wellness:** Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. Emergency 24-hour help is also available through the National Suicide Prevention Hotline (800-273-8255) or at [suicidepreventionlifeline.org](http://suicidepreventionlifeline.org).

**Attendance Policy:** Students experiencing personal injury or illness that is too severe for the student to attend class (including students isolating or quarantining due to COVID-19 protocols) qualify for an excused absence (See [Student Rule 7, Section 7.2.2.](#)) To receive an excused absence, students must comply with the documentation and notification guidelines outlined in Student Rule 7.

**Makeup exams** will only be allowed provided the above guidelines are met. You will be allowed to make up a missed exam during one of the scheduled makeup times provided by the Math Department. According to Student Rule 7, you are expected to attend the scheduled makeup unless you have a university-approved excuse for missing the makeup time as well. If there are multiple makeup exam times, you must attend the *earliest* makeup time for which you do not have a university-approved excuse. The list



of makeup times will be available here: [Make up exams](#). A student has to request a make-up exam no later than 48 hours after the actual exam.

**Academic Integrity:** Cheating and other forms of academic dishonesty **will not** be tolerated. Please do not compromise your integrity for the sake of temporary benefits.

**Aggie Honor Code:**  
**“An Aggie does not lie, cheat, or steal,  
or tolerate those who do.”**

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System. For additional information please visit: <http://aggiehonor.tamu.edu>

**Americans with Disabilities Act (ADA):** The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit the following link: <https://disability.tamu.edu>.

**Title IX and Statement on Limits to Confidentiality:** Texas A&M University and the College of Science are committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws provide guidance for achieving such an environment. Although class materials are generally considered confidential pursuant to student record policies and laws, University employees - including instructors - cannot maintain confidentiality when it conflicts with their responsibility to report certain issues that jeopardize the health and safety of our community. As the instructor, I must report (per Texas A&M System Regulation



08.01.01) the following information to other University offices if you share it with me, even if you do not want the disclosed information to be shared:

- Allegations of sexual assault, sexual discrimination, or sexual harassment when they involve TAMU students, faculty, or staff, or third parties visiting campus.

These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In many cases, it will be your decision whether or not you wish to speak with that individual. If you would like to talk about these events in a more confidential setting, you are encouraged to make an appointment with the Student Counseling Service (<https://scs.tamu.edu/>).

Students and faculty can report non-emergency behavior that causes them to be concerned at <http://tellsomebody.tamu.edu>.

## 5. TENTATIVE SCHEDULE

**Note:** As the name indicates, this schedule is *tentative*, and subject to modification. For a more accurate schedule, check out the one on the course website

#		Date	Section	Lecture Title
1	M	Aug 30	12.1	Three-dimensional coordinate systems
2	W	Sep 1	12.2, 12.3	Vectors; The Dot Product
3	F	Sep 3	12.4	The Cross Product
	F	Sep 3		HW 1 / Quiz 1 (in class, 12.1, 12.2, 12.3)
4	M	Sep 6	12.5	Fun with Lines
5	W	Sep 8	12.5	Fun with Planes
6	F	Sep 10	13.1, 13.2	Vector Functions (I)
	F	Sep 10		HW 2 / Quiz 2 (12.4, 12.5)
7	M	Sep 13	13.3, 13.4	Vector Functions (II)
8	W	Sep 15	13.4	Vector Functions (III)
9	F	Sep 17	14.1, 12.6	Functions in Several Variables
	F	Sep 17		HW 3 / Quiz 3 (13.1, 13.2, 13.3, 13.4)
10	M	Sep 20	14.3	Partial Derivatives
11	W	Sep 22		Catch-up / Review
12	F	Sep 24		Midterm 1 (covers chapters 12 and 13)
	F	Sep 24		No HW/Quiz

13	M	Sep 27	14.4	Tangent Planes and Linear Approximations
14	W	Sep 29	14.5	The Chain Rule (chain rule)
15	F	Oct 1	14.6	The Gradient and Applications
	F	Oct 1		Homework 4 (12.6, 14.1, 14.3, 14.4, 14.5)
	F	Oct 1		Quiz 4 (14.4, 14.5)
16	M	Oct 4	14.7	Maximum and Minimum Values (I)
17	W	Oct 6	14.7, 14.8	Maximum and Minimum Values (II), Lagrange Multipliers (I)
18	F	Oct 8	14.8	Lagrange Multipliers (II)
	F	Oct 8		HW 5 / Quiz 5 (14.6, 14.7)
19	M	Oct 11	15.1, 15.2	Double Integrals (I)
20	W	Oct 13		Catch-up / Review
21	F	Oct 15		Midterm 2 (covers Chapter 14)
	F	Oct 15		No HW/Quiz
22	M	Oct 18	15.1, 15.2	Double Integrals (II)
23	W	Oct 20	15.1, 15.2	Double Integrals (III)
24	F	Oct 22	15.3	Double Integrals in Polar Coordinates
	F	Oct 22		Homework 6 (14.8, 15.1, 15.2)
	F	Oct 22		Quiz 6 (15.1, 15.2)
25	M	Oct 25	15.6	Triple Integrals (I)
26	W	Oct 27	15.6	Triple Integrals (II)
27	F	Oct 29	15.7	Cylindrical Coordinates
	F	Oct 29		HW 7 / Quiz 7 (15.3, 15.6)
28	M	Nov 1	15.8	Spherical Coordinates (I)
29	W	Nov 3	15.8, 15.9	Spherical Coordinates (II), The Jacobian (I)
30	F	Nov 5	15.9	The Jacobian (II)
	F	Nov 5		HW 8 / Quiz 8 (15.7, 15.8)
31	M	Nov 8	16.1	Vector Fields
32	W	Nov 10	16.2	Line Integrals (I)
33	F	Nov 12		Midterm 3 (covers Chapter 15)
	F	Nov 12		No HW/Quiz
34	M	Nov 15	16.2, 16.3	Line Integrals (II), FTC for Line Integrals (I)
35	W	Nov 17	16.3	FTC for Line Integrals (II)
36	F	Nov 19	16.4	Green's Theorem
	F	Nov 19		Homework 9 (15.9, 16.1, 16.2, 16.3)
	F	Nov 19		Quiz 9 (16.1, 16.2, 16.3)

37	M	Nov 22	16.5	Curl and Divergence
38	W	Nov 24		No class (thanksgiving)
39	F	Nov 26		No class (thanksgiving)
	F	Nov 26		No HW/Quiz
40	M	Nov 29	16.6	Parametric Surfaces (I)
41	W	Dec 1	16.6, 16.7	Parametric Surfaces (II), Surface Integrals (I)
42	F	Dec 3	16.7	Surface Integrals (II)
	F	Dec 3		Homework 10 (16.4, 16.5, 16.6)
	F	Dec 3		Quiz 10 (16.6)
43	M	Dec 6	16.9	The Divergence Theorem
44	W	Dec 8	16.8	Stokes' Theorem
	F	Dec 10		Homework 11 (16.7, 16.8, 16.9)
	F	Dec 10		No Quiz
45	M	Dec 13		Final Exam for Section 501, from 10:30 am – 12:30 pm (Chapter 16)
45	Tu	Dec 14		Final Exam for Section 512, from 3:30 pm – 5:30 pm (Chapter 16)

Finally, sit back, relax, and enjoy the show 😊 This course will be quite challenging at times, especially towards the end, but it really is going to be worth it. I hope that you will fall in love with multivariable calculus as much as I did!