SYLLABUS

COURSE INFORMATION

Course Number: MATH 151
Course Title: Engineering Mathematics I

The lecture for 151: 549 – 557 is MWF 9:10 –10:00 AM in ILCB 111.			
Lab/Recitation (549)	TR 8:25 – 9:15 AM	T: Lab in BLOC 126	R: Recitation in HEB 223
Lab/Recitation (550)	TR 9:35 – 10:25 AM	T: Lab in BLOC 104	R: Recitation in BLOC 104
Lab/Recitation (551)	TR 11:10AM – 12:00 PM	T: Lab in BLOC 126	R: Recitation in HEB 223
Lab/Recitation (552)	TR 12:45 – 1:35 PM	T: Lab in BLOC 124	R: Recitation in HEB 222
Lab/Recitation (553)	TR 2:20 – 3:10 PM	T: Lab in BLOC 123	R: Recitation in HEB 134
Lab/Recitation (554)	TR 3:55 – 4:45 PM	T: Lab in BLOC 126	R: Recitation in HEB 223
Lab/Recitation (555)	TR 8:25 – 9:15 AM	T: Lab in BLOC 122	R: Recitation in CHEM 2122
Lab/Recitation (556)	TR 3:55 – 4:45 PM	T: Lab in BLOC 122	R: Recitation in BLOC 110
Lab/Recitation (557)	TR 5:05 – 5:55 PM	T: Lab in BLOC 122	R: Recitation in LAAH 467

INSTRUCTOR DETAILS

Instructor: Bret Lockhart
Office: BLOC 352
Phone: Math Department: 979-845-3261 *(no phone in my office)*
E-Mail: blockhart@tamu.edu *(email is the best method of correspondence.)*
In-person Office Hours: By Appointment Only
Online office hours: 11:30 AM – 1:00 PM on MWF
Office Hours Login: https://tamu.zoom.us/j/94067355433; Meeting ID: 940 6735 5433

COURSE DESCRIPTION

MATH 151 Engineering Mathematics I (MATH 2413), Rectangular coordinates, vectors, analytic geometry, functions, limits, derivatives of functions, applications, integration, computer algebra. MATH 171 designed to be a more demanding version of this course. Only one of the following will satisfy the requirements for a degree: MATH 131, MATH 142, MATH 147, MATH 151 and MATH 171.

COURSE PREREQUISITES

MATH 150 or equivalent or acceptable score on TAMU Math Placement Exam.

SPECIAL COURSE DESIGNATION

This is a CORE curriculum course in Mathematics equivalent to MATH 2413.

COURSE LEARNING OUTCOMES

This course focuses on quantitative literacy in mathematics along with real world applications to physics, related rate problems, and optimization. Upon successful completion of this course, students will be able to:

- Understand vectors and vector functions, both graphically and quantitatively, and apply them to real world situations involving velocity, forces, and work.
- Construct vector and parametric equations of lines and understand vector functions and their relationship to parametric equations.
- Understand the concept of a limit graphically, numerically, and algebraically, and apply the relationship between limits, continuity, and differentiability in determining where a function is continuous and/or differentiable.

- Define the limit definition of the derivative and calculate derivatives using the limit definition, differentiation formulas, the chain rule, and implicit differentiation, with applications to tangent line and velocity problems.
- Calculate limits and derivatives of vector functions with applications to physics such as computing velocity and acceleration vectors.
- Identify exponential, logarithmic, and inverse trigonometric functions, and compute limits and derivatives involving these classes of functions.
- Apply the derivative to mathematically model velocity and acceleration as well as real world related rate applications, such as calculating the rate at which the distance between two moving objects is changing or the rate at which the volume of a cone being filled with water is changing.
- Approximate functions and function values using the derivative and the tangent line.
- Identify and understand indeterminate forms and apply the derivative to calculate limits using L'Hôpital's Rule.
- Understand and apply the Intermediate Value Theorem and the Mean Value Theorem and be able to logically determine when these theorems can be used.
- Use calculus and logic to sketch graphs of functions and analyze their properties, including where a function is increasing/decreasing and in describing the concavity of the function.
- Determine the maximum/minimum values of functions, including applied optimization problems.
- Compute antiderivatives and understand the concept of integration as it relates to area and Riemann sums.
- Articulate the relationship between derivatives and integrals using the Fundamental Theorem of Calculus, and evaluate definite integrals using the Fundamental Theorem of Calculus.
- Use a Computer Algebra System to solve problems.

CORE OBJECTIVES

CRITICAL THINKING

As a result of this course, students will…

- Think critically about limits in determining how the limit conceptually relates to the behavior of the function.
- Think critically about continuity and differentiability to justify whether a function is continuous and or differentiable at a point.
- Evaluate the proper technique to use when computing limits and derivatives of functions.
- Synthesize data determined from the first and second derivatives to determine the properties and shape of a function.
- Use inquiry to determine on what intervals a function is increasing/decreasing and to determine the intervals of concavity of the function by analyzing the signs of the first and second derivatives.
- Innovatively think about how to solve related rate word problems and optimization problems.
- Analyze functions using continuity and the derivative in determining the maximum and minimum values of the function, and if they exist.
- Develop a critical understanding of the relationship between the derivative and the integral using the Fundamental Theorem of Calculus.

COMMUNICATION SKILLS

As a result of this course, students will…

- Recognize and construct graphs of basic functions, including polynomials, exponential functions, logarithmic functions, and trigonometric functions.
- Justify solutions to optimization problems in writing.
- Interpret information from the derivatives of a function in order to develop a visual sketch of the graph of the function and to communicate in writing the properties of the function.
- Identify points of discontinuity and non-differentiability by examining the graphs of functions.
- Express mathematical concepts, such as the definition of the derivative, both abstractly with equations and in writing solutions to problems.

- Develop solutions to problems that involve the use of theorems, such as the Squeeze Theorem, the Intermediate Value Theorem, and the Mean Value Theorem.
- Students will use graphs of functions to determine the value of definite integrals as they relate to area.
- Be required to communicate orally with other group members when working on Computer Algebra System projects or other group activities.
- Communicate orally in group discussion in the required weekly recitation sessions.

EMPIRICAL AND QUANTITATIVE SKILLS

As a result of this course, students will…

- Analyze limits numerically to determine the sign of the infinite limit.
- Analyze numerical data in determining the signs of the first and second derivative in order to make conclusions on the shape of the graph.
- Compute derivatives and interpret the results as they relate to tangent line, velocity, and other rate of change problems.
- Numerically approximate the values of a function by using the tangent line approximation.
- Calculate antiderivatives of functions and use initial data to determine any unknown constants.
- Make conclusions involving maximum and minimum values of functions (both local and absolute) based on information from the derivative.
- Manipulate given information to develop a function to be used in optimization problems and then apply calculus to find and interpret the optimal solution.
- Approximate the value of a definite integral numerically using Riemann sums.
- Compute definite integrals and interpret the results as they relate to area under a curve.
- Manipulate given information to create a related rate model involving known quantities, and then apply calculus to solve for an unknown rate of change.

TEXTBOOK AND/OR RESOURCE MATERIALS

TEXTBOOK: *Calculus: Early Transcendentals (Custom Edition)* by James Stewart; Cengage Learning
Note: You will be required to purchase access to the online homework system, WebAssign, but doing so will automatically give you access to the eBook version of the text. The textbook is available in different formats, and there are a variety of purchasing options available (course specific access or Cengage Unlimited). Purchase can be made through the local bookstores or directly in WebAssign. Starting on the first day of classes, you will be granted access for a trial period while you determine the appropriate purchasing option for you.

WEBASSIGN ACCESS: WebAssign will be used for homework in this class. In order to use WebAssign, you must purchase access. For access purchasing information and options, please visit

http://www.math.tamu.edu/courses/eHomework/

CALCULATOR: Calculators (handheld or online) are not allowed on quizzes or exams but may be needed on homework.

GRADING POLICY

The course grading will be based on the tables below. At the end of the semester, you will receive the grade you *earned*, according to the scale given. Due to FERPA privacy issues, I cannot discuss grades over email or phone. If you have a question about your grade, please schedule a one-on-one Zoom meeting with me.

Grade Breakdown

Activity	Date	Percentage
Homework	Weekly	10%
Quizzes	Weekly	5%
Python Labs	See Lab Schedule	5%
Exam I	9/29/22	20%
Exam II	10/27/22	20%
Exam III	11/22/22	20%
Final Exam	See Below	20%
TOTAL		**100%**

Grading Scale

Range	Grade
$90 \leq$ Average ≤ 100	A
$80 \leq$ Average < 90	B
$67 \leq$ Average < 80	C
$57 \leq$ Average < 67	D
Average < 57	F

Appeal Policy

Students have one week upon the return of a lab, quiz, or exam to notify their instructor of any inaccuracies in their graded work. No changes will be made after this one-week period and the grade will stand. You must present the actual, original assignment or assessment to your instructor before any consideration is made. For labs or quizzes, please consult your recitation instructor.

Online Homework

Online homework will be done in WebAssign. Important information such as how to log in, how to access and take assignments, and the Student Help Request Form can be found at:

http://www.math.tamu.edu/courses/eHomework/

You can find further information including screenshot instruction and videos under "Student Information" therein

https://www.math.tamu.edu/courses/eHomework/studenthelp.html

WebAssign accounts have an access fee and you will need to "purchase access online" during the first two weeks of school. After that, you risk being locked out of the system and missing important assignments. Do not wait until the last minute to complete your WebAssign homework as technical difficulties will not be an excuse for missing a WebAssign deadline. Pay close attention to the due dates inside of WebAssign.

Quizzes and Labs

Each section will meet twice weekly for lab (Tuesdays) and recitation (Thursdays). Quizzes will be given during recitation. You will work in groups to complete Python assignments. Group members who do not participate in the lab assignment will not receive any credit for the assignment. Lab assignments and due dates will be posted online. Find the lab schedule here: Math151 Python Lab Schedule - Fall 2022.

Exams (Midterms)

There will be **three common exams** during the semester. These exams are evening exams taken by all Math 151 students at the same time. Bring your Texas A&M student ID and a pencil to all exams. You will need the Texas A&M scantron for all exams. The location of the common exams will be determined later. The tentative exam schedule is as follows:

Common Exam I: Thursday, September 29, 7:30 – 9:30 PM
Common Exam II: Thursday, October 27, 7:30 – 9:30 PM
Common Exam III: Tuesday, November 22, 7:30 – 9:30 PM

FINAL EXAM

The final exam will be **comprehensive** and is **required** for all students. **Note: If your final exam grade is higher than your lowest test grade, the grade on your final will replace that test grade in the final grade calculation.** The final exam schedule is as follows:

Sections	Usual Lecture Time	Final Exam Date & Time
549 – 557	MWF 9:10 – 10:00 AM	Monday, Dec 12: 8:00 – 10:00 AM

(Refer to https://registrar.tamu.edu/Courses,-Registration,-Scheduling/Final-Examination-Schedules for the University final exam schedule.)

ATTENDANCE AND MAKE-UP POLICIES

Attendance is essential to complete this course successfully.

- **Excused Absences:** University student rules concerning excused and unexcused absences, as well as makeups, can be found at http://student-rules.tamu.edu/rule07. In particular, make-up exams and quizzes or late homework will NOT be allowed unless a **University approved reason is given to me in writing**. Notification *before* the absence is **required** when possible. Otherwise (e.g., accident, or emergency), you must notify me **within two business days** of the missed exam, quiz, or assignment to arrange a makeup.
- **Working with Friends:** In this course, students can discuss homework and their solutions. However, it is NOT permissible to copy homework solutions from another student. It is NOT permissible to discuss any aspect of any test or examination until ALL students have completed the exam. The penalties for violating this policy will range from an F on an assignment or test, to failing in the course.
- **Makeup Exams** will only be allowed due to excused absences and the makeup must be taken as soon as possible after the missed exam. You will need to schedule to make up your exam within 3 business days of the originally scheduled time to allow for grades to be returned in a timely manner. If you know ahead of time you will be absent during an exam, you must notify me in advance.
- **Missed Recitation Assignments**: Your recitation instructor will coordinate with you for making up a recitation assignment.

LATE WORK POLICY

Late work will NOT be accepted unless you have a University approved reason and contact me or your recitation instructor within two working days of the missed assignment.

TENTATIVE COURSE TOPICS AND CALENDAR OF ACTIVITIES

WEEK OF	TOPIC	SECTIONS
Aug 22	Vectors	Appendix J.1
Aug 29	The Dot Product; Vector Functions and Parametric Curves; Inverse Trigonometric Functions	Appendix J.2 & J.3, 1.5
Sep 5	**Labor Day;** The Limit of a Function; Calculating Limits using Limit Laws; Continuity	2.2, 2.3, 2.5
Sep 12	Limits at Infinity and Horizontal Asymptotes; Derivatives and Rates of Change	2.6, 2.7
Sep 19	The Derivative as a Function; Derivatives of Polynomial and Exponential Functions; The Product and Quotient Rules	2.8, 3.1, 3.2
Sep 26	Derivatives of Trigonometric Functions; The Chain Rule; **EXAM I (Appendix J.1 through 2.8)**	3.3, 3.4
Oct 3	Implicit Differentiation; Derivatives of Logarithmic Functions	3.5, 3.6, Appendix K.1
Oct 10	**Fall Break;** Derivatives of Vector Functions; Slopes and Tangents to Parametric Curves; Rates of Change in the Natural and Social Sciences; Exponential Growth and Decay	Appendix K.2, 3.7, 3.8
Oct 17	Related Rates; Linear Approximations and Differentials	3.9, 3.10

Oct 24	Maximum and Minimum Values; **EXAM II (3.1 through 3.10)**	4.1
Oct 31	The Mean Value Theorem; How Derivatives Affect the Shape of a Graph; Indeterminate Forms and L'Hospital's Rule	4.2, 4.3, 4.4
Nov 7	Indeterminate Forms and L'Hospital's Rule cont.; Optimization Problems; Antiderivatives	4.4, 4.7, 4.9
Nov 14	Areas and Distances; The Definite Integral; The Fundamental Theorem of Calculus	5.1, 5.2, 5.3
Nov 21	The Fundamental Theorem of Calculus cont.; **EXAM III (4.1 through 5.2); Thanksgiving**	5.3
Nov 28	Indefinite Integrals and the Net Change Theorem; The Substitution Rule	5.4, 5.5
Dec 5	Catch up; Review for Final Exam; Final Exams	
Dec 12	Final Exams	

OTHER COURSE INFORMATION

TECHNOLOGY SUPPORT

As much of our learning experience relies on technology, many students can get overwhelmed when something goes wrong or things get overwhelming. If you're looking for a curation of online learning resources, consider checking out https://keeplearning.tamu.edu/. If your need is specific to a course-related technology issue, consider seeking help from the 24/7 TAMU IT Help Desk. https://it.tamu.edu/help/.

LEARNING RESOURCES

Week-in-Review (WIR)

There will be Week-in-Review sessions starting the second week of classes. Each review is open to all Math 151 students to review the topics of the previous week and to provide additional examples. I ***highly*** recommend attending them. The schedule and problem sets that will be worked during these sessions can be found at

http://mlc.tamu.edu/Online-Help-Services/Week-in-Review-(A)

Help Sessions

Help sessions are an opportunity for you to ask questions and get help with your homework. These sessions are led by students, where you may come and go, as your schedule allows. The schedule can be found at

http://mlc.tamu.edu/Online-Help-Services/MLC-Help-Sessions

Course Webpage

You can find information including past common exams in the course webpage

https://www.math.tamu.edu/courses/math151/

UNIVERSITY POLICIES

ATTENDANCE POLICY

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to Student Rule 7 in its entirety for information about excused absences, including definitions, and related documentation and timelines.

MAKEUP WORK POLICY

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to Student Rule 7 in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See Student Rule 24.)

ACADEMIC INTEGRITY STATEMENT AND POLICY

"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" (Section 20.1.2.3, Student Rule 20).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

AMERICANS WITH DISABILITIES ACT (ADA) POLICY

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 Disability Resources in the Student Services Building or at (979) 845-1637 or visit 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.

TITLE IX AND STATEMENT ON LIMITS TO CONFIDENTIALITY

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage.

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 Texas A&M Helpline (979-845-2700) from 4 p.m. to 8 a.m. weekdays and 24 hours on weekends. Emergency help is also available 24 hours through the National Suicide and Crisis Hotline 988.

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.