# Math 151 Syllabus

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| **Course title and number** | Math 151 - Engineering Mathematics I |
| **Term** | Fall 2015 |
| **Class times and location** | Sections 570-572: TR 3:55-5:10 BLOC 169<br>Sections 582-584: TR 11:10-12:25  BLOC 169<br>Sections 591-593: TR 12:45-2 BLOC 169 |

## INSTRUCTOR INFORMATION

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| **Name** | Amy Austin, Instructional Assistant Professor |
| **Phone Number** | Department of Mathematics: 845-3261 |
| **Email address** | austin@math.tamu.edu |
| **Instructor Web Page** | www.math.tamu.edu/~austin/math151.html |
| **Office** | BLOC 247C |
| **Office Hours** | MW 3-5 BLOC 246 |
| **Course Page** | http://www.math.tamu.edu/courses/math151 |

**Course Description**:Engineering Mathematics I.  Rectangular coordinates, vectors, analytic geometry, functions, limits, derivatives of functions, applications, integration, computer algebra (MATLAB).  MATH 171 is designed to be a more demanding version of this course.

**Prerequisites**:  MATH 150 or equivalent or acceptable score on TAMU Math Placement Exam. Credit will not be given for more than one of MATH 131, MATH 142, MATH 147, MATH 151 and MATH 171.

**Calculator Policy:**  A calculator may not be used on exams or quizzes.  A calculator may be used, and is often required, on WebAssign Homework.

## LEARNING OUTCOMES

- 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'HOSPITAL'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.
- USE A COMPUTER ALGEBRA SYSTEM TO SOLVE PROBLEMS.

## TEXTBOOK AND/OR RESOURCE MATERIAL

- Stewart, *Calculus: Early Vectors,* Cengage Learning. You paid for an electronic version of this textbook (eBook) through the online system WebAssign when you paid your course fees. Information on how to access your eBook can be found under the "Student Information Page" at http://www.math.tamu.edu/courses/eHomework.You are welcome to purchase a physical copy of this book if you prefer, but it is not required.

- *Lab Manual:* Gilat-Amos, *MATLAB: An Introduction with Applications,* 5th edition, Wiley.

## GRADING POLICIES

- **Common Exams**: There are three common exams (see schedule below). The average of these three exams count as 50% of the course grade.
- **Quizzes**: Quizzes will be administered during recitation every Wednesday, and possibly during lecture, if time permits. The average of these quizzes count as 10% of the course grade.
- **Matlab**: Each Monday, the student will attend lab where MATLAB will be introduced. See http://calclab.math.tamu.edu/MATLAB/MATLAB151C.html for the Matlab schedule. The average of these labs count as 7% of the course grade.
- **Webassign**: Each week, students will complete the assigned WebAssign homework. The schedule can be found here: http://www.math.tamu.edu/courses/eHomework.The average of these assignments count as 8% of the course grade. Note: The 'practice homework' is not graded. It is suggested as good indicator of the homework.
- **Final Exam**: The final exam is comprehensive and counts as 25% of the course grade.
- **Suggested Homework**: Math cannot be learned by watching someone else do math. It requires lots of practice. I **strongly suggest** you do these suggested problems in addition to the online homework. They will not be graded, but doing them to help you learn the material is very important. HW: http://www.math.tamu.edu/courses/math151/currenthw.html.
- **Grade Appeals**: If you believe an error has been made in grading, you have until the next class period after the exam/quiz has been handed back. Otherwise you must accept your grade. Once final grades have been assigned, they will NOT be changed unless there was an error in the calculation of the grade.

The course grading will be based on the results of

| Activity | | Date | Percent |
|---|---|---|---|
| Exam I | | R, Oct 1, 7:30-9:30 pm | 50/3% |
| Exam II | | R, Oct 29, 7:30-9:30 pm | 50/3% |
| Exam III | | T, Dec 1, 7:30-9:30 pm | 50/3% |
| Webassign | | Weekly | 8% |
| Quizzes | | Weekly | 10% |
| Matlab | | See schedule | 7% |
| Final Exam | Sections 570-572: | T Dec 15: 1-3 pm | 25% |
| | Sections 582-584: | F Dec 11: 3-5 pm | |
| | Sections 591-593: | W Dec 16: 8-10 am | |
| TOTAL | | | 100% |

- **Grading Scale**

| Range | Grade |
|---|---|
| 90%≤Average≤100% | A |
| 80%≤Average<90% | B |
| 70%≤Average<80% | C |
| 60%≤Average<70% | D |
| 0%≤Average<60% | F |

**Attendance and Make-up policies**

- **Excused absences**: Attendance is mandatory and may affect your grade. For excused absences we refer the student to Student Rule 7 at http://student-rules.tamu.edu/rule07. Excuses for absences during an exam or quiz must be substantiated by appropriate documentation. Falsification of documentation is a violation of the Honor Code.

- **Make-up Policy:** Make up exams/quizzes will be only allowed due to excused absences. If you foresee the need to be absent during an exam/quiz, you **must** notify me in advance, when possible. Otherwise you must contact me within 2 working days of the missed assignment.I will not accept the 'University Explanatory Statement for Absence from class' form. Further, an absence due to a non-acute medical service or appointment (such as a regular check up) is not an excused absence.

- **Disability Services**: 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, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu

- **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. For more information, please visit visit http://aggiehonor.tamu.edu/.

**COURSE TOPICS** (Tentative weekly schedule)

| WEEK | TOPIC | REQUIRED READING |
|---|---|---|
| 1 | Introduction, trigonometry review, two-dimensional vectors | Appendix D, Section 1.1 |
| 2 | Dot product, parameterized curves, (qualitative) definition of limit | Sections 1.2–1.3, 2.2 |
| 3 | Calculation of limits, limits at infinity, continuity. | Sections 2.3, 2.5–2.6 |
| 4 | Velocity, differentiation (**Note:** Physics has requested that we cover antidifferentiation formulas along with differentiation formulas) | Sections 2.7, 3.1–3.2 |
| 5 | Rates of Change. Derivatives of the trigonometric functions, and **Exam I** (Covering thru Section 3.1) | Sections 3.3–3.4 |
| 6 | Chain rule, implicit differentiation, derivatives of vector-valued functions | Sections 3.5–3.7 |
| 7 | Higher derivatives, tangents of parameterized curves, Related rates | Sections 3.8–3.10 |
| 8 | Differentials and approximation, exponential and inverse functions. | Sections 3.11, 4.1–4.2 |
| 9 | Logarithmic functions, derivatives of logarithms, and **Exam II** (Covering Sections 3.2–4.2) | Sections 4.3–4.4 |
| 10 | Exponential growth and decay, inverse trigonometric functions, L'Hospital's Rule | Sections 4.5–4.6, 4.8 |
| 11 | Graphical interpretation of the derivative, first and second derivative tests (Section 5.4 on curve sketching with technology will be done in lab) | Sections 5.1–5.3 |
| 12 | Applied max/min, antiderivatives, Riemann sums | Sections 5.5, 5.7, 6.1 |
| 13 | Area and the definite integral. | Sections 6.2–6.3 |
| 14/15 | The Fundamental Theorem of Calculus and **Exam III** (Covering Sections 4.3–6.3) , Review for Final Exam | Section 6.4 |

Additional Helpful Links:
- Help Sessions — http://www.math.tamu.edu/courses/helpsessions.html
- Week in Reviews — http://www.math.tamu.edu/courses/weekinreview.html
- Academic Calendar — http://registrar.tamu.edu/General/Calendar.aspx
- Final Exam Schedule — http://registrar.tamu.edu/General/FinalSchedule.aspx

Classroom Respect:  **Please refrain from using electronic devices during class.**  During class, I am 100% focused on you and your learning. Texting and playing on your phone or computer distracts not only you, but also those around you. It is also an enormous  distraction to me, since I am watching to see if others are distracted by this behavior. You will **likely** be called out in class or be asked to leave the room if I see you on your phone. If you would like to use a laptop or iPad during class to take notes with, please ask for permission prior to doing so.