Topics in Applied Mathematics I: Math 311
Section 506, Fall 2017, MWF 1:50–2:40 p.m. in BLOC 163

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Webpage: [http://www.math.tamu.edu/~manshel/m311/m311.html](http://www.math.tamu.edu/~manshel/m311/m311.html).
Office hours: W 3–4:30 p.m., Th 2:30–4 p.m. (subject to change later in the semester), or by appointment.


Course Description: (Credit 3) Systems of linear equations, matrices, determinants, vector spaces, linear transformations, eigenvalues and eigenvectors, diagonalization, inner product spaces, orthogonal functions; vector analysis, including gradient, divergence, curl, line and surface integrals, Gauss’, Green’s and Stokes’ theorems. No credit will be given for more than one of MATH 304, MATH 309, MATH 311 and MATH 323. Prerequisites: MATH 221, MATH 251, or MATH 253; MATH 308 or concurrent enrollment; junior or senior classification or approval of instructor.

Course Objectives: This course will provide the students with qualitative understanding and computational skills in linear algebra and vector calculus, and the ability to apply them. At the conclusion of the course, students should:

- Know how to solve systems of linear equations and understand qualitative properties of such solutions. Perform matrix arithmetic. (Chapter 1, 2 weeks).
- Be able to compute determinants. (Chapter 2, 1 week).
- Understand the abstract notions and basic theory of vector spaces and linear transformations; be able to compute in the abstract framework, and apply the results to more specific settings. Be able to use the fundamental notions of linear independence, bases, and coordinates. Understand the relationship between linear transformations and matrices. (Chapters 3 and 4, 3 weeks).
- Understand the notion of an inner product. Be able to construct an orthogonal basis, in abstract and concrete settings, and use the least squares procedure. (Chapter 5, 2 weeks).
- Understand and be able to compute eigenvalues and eigenvectors of linear transformations and matrices. Be able to apply these techniques to solving differential equations and diagonalizing matrices. (Chapter 6, 1 week).
- Understand how matrices and linear transformations arise in multivariate calculus. Be able to compute partial derivatives, including the chain rule, and multiple integrals, including the change of variables (Chapters 8 and 9, 2 weeks).
- Understand and be able to apply the fundamental theorems of vector calculus: Green’s, Stokes’s, and Gauss’s theorems (Chapters 10 and 11, 2 weeks).
**Grading:** A total score of 90% or more guarantees an A, a score of 80% or more a B, 70% or more a C, 60% or more a D.

Homework and quizzes .......................................................... 25%
Midterm Exam I, Friday, **September 29,** in class ................................................. 15%
Midterm Exam II, Friday, **October 27,** in class .................................................. 15%
Midterm Exam III, Friday, **November 17,** in class ............................................. 15%
Final exam, Tuesday, **December 12,** 3:30–5:30 p.m. ........................................... 30%

**Exam make-up policy:** If, under *completely exceptional* circumstances, you need to miss one of the tests, a make-up exam will be given. Only University-approved excuses, with appropriate documentation, will be accepted, and you have to let me know preferably in advance, and no later than 2 days after the exam. The exams are closed book, closed notes, and calculators are not permitted. You should bring your ID to all tests.

**Quizzes:** There will be several short quizzes in class, announced in advance. The lowest score will be dropped.

**Homework:** weekly, due on Fridays in class. Homework problems may appear on the exams and quizzes. You are encouraged to work together, but straight copying of homework is not allowed. Late homework will not be accepted, but the lowest homework score will be dropped.

**Scholastic Dishonesty:** Cheating of any form is not acceptable and it will be dealt with harshly. In particular, copying work done by others, either in-class or out of class, is an act of scholastic dishonesty and it will be prosecuted to the full extent allowed by university policy. Students are encouraged to discuss the course material outside of class, and work on the homework assignments together, however all the homework turned in must represent the result of individual effort. In particular, copying the homework from any sources is not allowed. For more information on university policies regarding scholastic dishonesty, see the University Student Rules.

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

**Students with disabilities:** Come talk to me no later than the first week of classes. “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 http://disability.tamu.edu.”

**Attendance:** According to the University Student Rules, absence for three or more class days requires a University-approved excuse and documentation.

**Other important dates:** September 1 (last day to add or drop a course), November 17 (Q-drop), November 22-24 (reading day, Thanksgiving), December 6 (last class).

**Keys to success:** Attend class (of course :) Solve *all* the homework problems, well before the exams. Spend more than seven hours per week working on the problems. Form study groups to discuss the course material and homework problems. Read ahead in the text.

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