MATH 311, Section 503

Topics in Applied Mathematics I

(Linear Algebra and Vector Analysis)

Fall 2015

Instructor: Yaroslav Vorobets
Time: MWF 9:10 – 10:00 a.m.
Location: BLOC 163
Web page: `http://www.math.tamu.edu/~yvorobet/MATH311/`

Office: BLOC 223b (e-mail: `yvorobet@math.tamu.edu`)

Office hours: Monday 12:00-1:00 p.m., Wednesday 12:00–2:00 p.m., and by appointment.

Text: S.J. Leon and S.J. Colley, *Math 311: Linear Algebra and Vector Calculus*, Pearson Education (custom edition for Texas A&M University, ISBN-13: 978-1256983699).

Prerequisites: MATH 221, 251, or 253 (multivariable calculus); MATH 308 (differential equations) or concurrent enrollment; junior or senior classification (or approval of instructor).

Course content: see the next page.

Grading system: There will be 3 in-class tests and the final comprehensive exam. The tests are worth 100 points (or 16.6% of the final grade) each, the final exam is worth 150 points (or 25% of the final grade). Extra credit can be earned by solving bonus problems. Also, there will be homework assignments, which will account for another 150 points (or 25% of the final grade). The final grades will be assigned according to the 90–80–70–60% scale, that is, A for 540+ pts, B for 480–539 pts, C for 420–479 pts, D for 360–419 pts, and F for less than 360 pts.

The *tentative* dates for the three tests are October 2, November 4, and December 4. The final exam is scheduled for Monday, December 14, 8:00 – 10:00 a.m.

I will assign and collect homework about once per week. Late homework will be accepted only for legitimate reasons and may be penalized if circumstances warrant.

Make-ups: Make-ups for missed tests will only be allowed for a university approved excuse in writing. Wherever possible, inform the instructor before a test is missed. Consistent with University Student Rules, students are required to notify the instructor by the end of the next working day after missing a test. Otherwise, they forfeit their rights to a make-up.

Academic integrity: Although students are encouraged to discuss homework problems, each student is expected to write his/her own solutions. Copying another student's work is dishonest and academically worthless. Information about the Honor Council Rules and Procedures can be found at `http://aggiehonor.tamu.edu/`

Students with disabilities: 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 Room B118 of Cain Hall or call 845–1637. For additional information, visit `http://disability.tamu.edu/`

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Course content: The course consists of two parts. The first, larger part is an introductory course in linear algebra covering the abstract concepts of vector space and linear transformation as well as some models and applications of these concepts. The main topics to be covered are: systems of linear equations, matrices, determinants, vector spaces, linear transformations, orthogonality, eigenvalues and eigenvectors. In the second part of the course, the concepts of linear algebra are applied to the study of vector calculus. The topics to cover here include gradient, divergence, curl, line and surface integrals, Green's, Gauss' and Stokes' theorems.

The emphasis of the course is on applications and problem solving. However the course also contains a substantial amount of abstract theory. The student should be able to do simple proofs.

Course outline

Part I ($\approx$ 3 weeks): *Elementary linear algebra*

- Systems of linear equations
- Gaussian elimination, Gauss-Jordan reduction
- Matrices, matrix algebra
- Determinants

Leon/Colley: Chapters 1–2

Part II ($\approx$ 4 weeks): *Abstract linear algebra*

- Vector spaces
- Linear independence
- Basis and dimension
- Coordinates, change of basis
- Linear transformations

Leon/Colley: Chapters 3–4

Part III ($\approx$ 3 weeks): *Advanced linear algebra*

- Orthogonality
- Inner products and norms
- The Gram-Schmidt orthogonalization process
- Eigenvalues and eigenvectors
- Diagonalization

Leon/Colley: Chapters 5–7

Part IV ($\approx$ 4 weeks): *Vector analysis*

- Main notions of vector analysis
- Review of multiple integrals
- Line and surface integrals
- Green's, Gauss' and Stokes' theorems

Leon/Colley: Chapters 8–11