MATH 304, Section 501

Linear Algebra

Fall 2012

Instructor: Yaroslav Vorobets
Time: MWF 9:10 – 10:00 a.m.
Location: BLOC 160
Web page: `http://www.math.tamu.edu/~yvorobet/MATH304/`

Office: Milner 004 (e-mail: `yvorobet@math.tamu.edu`)

Office hours: Mondays and Wednesdays 12:00–1:30 p.m., and by appointment.

Text: Steven J. Leon, *Linear Algebra with Applications*, 8th ed., Pearson Prentice Hall, Upper Saddle River, NJ, 2009 (`http://www.pearsonhighered.com/leon/`).

Prerequisite: MATH 152 (in particular, being familiar with analytic geometry and vectors); junior or senior classification.

Course content: see the next page.

Grading system: There will be 2 in-class tests and the final comprehensive exam. The tests are worth 90 points (or 22.5% of the final grade) each, the final exam is worth 100 points (or 25% of the final grade). Extra credit can be earned by solving bonus problems. Also, there will be homework assignments and one or two quizzes, which will account for another 120 points (or 30% of the final grade). The final grades will be assigned according to the 90–80–70–60% scale, that is, A for 360+ pts, B for 320–359 pts, C for 280–319 pts, D for 240–279 pts, and F for less than 240 pts.

The *tentative* dates for the two tests are October 10 and November 16. Quizzes will be given after the second test. The final exam is scheduled for Monday, December 10, 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: This 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 to problems in the real world. The main topics to be covered are: systems of linear equations, matrices, determinants, vector spaces, linear transformations, orthogonality, eigenvalues and eigenvectors.

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's book: Chapters 1–2

Part II ($\approx$ 4.5 weeks): *Abstract linear algebra*

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

Leon's book: Chapters 3–4

Part III ($\approx$ 4 weeks): *Advanced linear algebra*

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

Leon's book: Sections 5.1–5.6, 6.1, 6.3

Part IV ($\approx$ 2 weeks): *Topics in applied linear algebra*

- Matrix exponentials
- Rotations in space
- Orthogonal polynomials
- Fourier series

Leon's book: Chapters 5–6 (selected sections)