Ma110B - Introduction to Linear Algebra - Fall 2017 Syllabus

Catalog Description

Vectors in two- and three-dimensions, vector algebra, inner product, cross product and applications. Analytic geometry in three dimensions: lines, planes, spheres. Matrix algebra; solution of systems of linear equations, determinants, inverses, complex numbers. *2 credits. Prerequisite: none*

Textbook

Howard Anton, "Elementary Linear Algebra", 10^{th} edition, Wiley (2010), ISBN-13: 978-0470458211

Instructor

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See `http://faculty.cooper.edu/smyth` for office hours and contact information.

Course Objectives

1. Develop the basic vector algebra toolkit and use it to formulate and solve problems in $\mathbb{R}^n$.
2. Develop methods to represent and solve systems of linear equations.
3. Prove elementary results involving matrices and determinants.

Course Topics and Homework

1. Vectors in 2-space, 3-space, and n-space (3.1, H.A.: 1, 2, 3c–f, 6, 7, 9, 11, 13d, 15f, 21, 23, 24, 26 [also redo 26 using (0,3,-1) in place of (0,3,1)], 32, 33, 36e, 37b, ALL True-False exercises).

2. Norm, dot product, and distance in $\mathbb{R}^n$ (3.2, H.A.: 1a,c, 2c, 3a,b, 5a,c, 7, 9, 11a, 13a, 15, 17, 18, 20b, 22, 23c, 27, 30c, 33, 34, ALL True-False exercises).

3. Orthogonality (3.3, H.A.: 1, 3, 5–7, 9, 11, 12, 13, 14, 16, 17, 19, 21, 24, 25, 29, 31, 33, 36, 37, 41–43, 45, 46, ALL True-False exercises).

4. The geometry of linear systems (3.4, H.A.: 1, 3, 4, 6, 7, 9, 13, 15, True-False (a)–(c)).

5. Cross product (3.5, H.A.: 1, 3, 6, 7, 10, 11, 13, 15, 17, 20, 22, 25, 29–31, 34–36, 40a, ALL True-False exercises).

6. Introduction to systems of linear equations (1.1, H.A.: 1–7, 9, 11, 13, 15–17, ALL True-False exercises).

7. Gaussian elimination (1.2, H.A.: 1–3, 5, 7, 8, 9, 13–17, 19, 24–31, 33, 36, 37, 39–43, ALL True-False exercises).

8. Matrices and matrix operations (1.3, H.A.: 1, 3, 7, 10, 11, 13a, 15–17, 19, 21, 22, 24–30, ALL True-False exercises). Inverses; algebraic properties of matrices (1.4, H.A.: 1, 3, 4, 7–10, 16, 18, 24, 25, 27–30, 32, 33, 35, 50, 52, 54, ALL True-False exercises).

9. Elementary matrices and a method for finding A^{-1} (1.5, H.A.: 1–3, 5, 7, 9, 13, 20, 25–27, 29, 31, 33, 35, 37, 40–43, ALL True-False exercises).

10. More on linear systems and invertible matrices (1.6, H.A.: 2, 3, 8, 9, 15, 18, 19, 21–24, ALL True-False exercises). Diagonal, triangular, and symmetric matrices (1.7, H.A.: 2–6, 8, 10, 13–25, 27, 32–38, 42, 43, ALL True-False exercises).

11. Determinants by cofactor expansion (2.1, H.A.: 1, 3, 5, 15–17, 19, 21, 23, 26–34, 37, 38, 40, ALL True-False exercises).

12. Evaluating determinants by row reduction (2.2, H.A.: 2, 5–10, 13, 17, 18, 20–23, 28, 29, 31, 33–35, ALL True-False exercises).

13. Properties of determinants; Cramer's rule (2.3, H.A.: 1, 5, 8–10, 15–17, 20, 24, 25, 27, 30, 31, 34, 35a,d, 36, 38, 39, ALL True-False exercises).

14. Complex numbers (App. B, H.A.: See `faculty.cooper.edu/smyth/ma110/hw.htm`). Eigenvalues and eigenvectors (5.1, H.A.: 1–4 [Also find eigenvectors corresponding to any real eigenvalues in prob. 4.]).

Assessment The term grade will be based on two midterms (26% each), and one cumulative final exam (48%).

Course Policies Makeup exams are oral exams and are only offered to students with a documented excused absence for the date of the in-class exam.

All exams are closed book / closed notebook exams. You may use a basic scientific calculator, but no graphing or programmable calculators, computers, cellphones, books, notebooks, or other resources may be used. Bring a pencil or pen on the day of the exam. Paper will be provided.

Exams are timed. Your score may be reduced if you do not stop working on your exam after time has been called.

If you choose to leave the exam room during the exam period you will not be permitted to resume working on the exam after returning.

If you believe you are entitled to an accommodation on assessments through the Americans with Disabilities Act you must self-identify to the Office of the Dean of Students, and meet with me during the first week of the term to discuss arrangements for meeting your accommodation.