

Besides learning the *topics* usually comprising a linear algebra course, we have additional objectives related to your growth as a mathematician, namely that you are able to study a topic independently and explain your findings to the group, listen actively and learn from your peers' presentations, and discuss your findings carefully and compellingly in a written paper. It is in order to accomplish these objectives specifically that we have a project as a part of the course requirements.

Each of you will choose a topic related to linear algebra to study independently this semester. You will present your findings in two ways: (1) a seven to ten minute presentation to the class at some point during the semester and (2) a paper to be handed in to me by the end of the semester, though you may wish to submit your paper at the same time you make your presentation.

We will talk more about the presentations and papers themselves in a couple of weeks.

On the next page are some possible topics, along with the dates that are available for presenting on each topic. All of the topics below have been selected from the textbook. If you wish to study a topic not on this list, you will need to submit a written proposal to me by September 9.

The topics I have selected from the textbook occur as "explorations," "applications," or "vignettes" in the textbook. The explorations are mathematical in nature, and the book provides a series of exercises to guide your study. The applications pertain to fields outside of mathematics; the level of detail in the book's exposition varies from application to application. The vignettes briefly discuss a particular use of linear algebra outside of mathematics. If you choose a topic of a vignette for your project, you will certainly need to do outside research.

Later this week, I will post a sign-up sheet on the M-drive in the folder for our class. Please indicate the topic you would like to study and what day(s) you would prefer to present to the class.

1. Vectors and geometry (exp), *Sep 23-30*
2. Error-detecting codes (app), *Sep 23-30*
3. Algorithms (app), *Sep 23-30*
4. Markov chains (app), *as early as Oct 3*
5. Population growth (app), *as early as Oct 3*
6. A dynamical system of graphs (exp), *Oct 7-14*
7. Geometric applications of determinants (exp), *Oct 14-21*
8. Linear recurrence relations (app), *Oct 28-Nov 11*
9. Systems of linear differential equations (app), *Oct 28-Nov 11*
10. Discrete linear dynamical systems (app), *Oct 28-Nov 11*
11. Ranking sports teams and searching the internet (vig), *Oct 28-Nov 11*
12. Systems of linear differential equations (app), *Oct 28-Nov 11*
13. Modified QR factorization (exp), *Nov 14-23*
14. Approximating eigenvalues (exp), *Nov 14-23*
15. Quadratic forms (app), *Nov 14-23*
16. Graphing quadratic equations (app), *Nov 14-23*
17. Fibonacci in vector space (exp), *Nov 14-23*
18. Magic squares (exp), *Nov 21-30*
19. Tilings, lattices, and the crystallographic restriction (exp), *Nov 21-30*
20. Homogeneous linear differential equations (app), *Nov 21-30*
21. Vectors and matrices with complex coefficients (exp), *Nov 28-Dec 5*
22. Geometric inequalities and optimization (exp), *Nov 28-Dec 5*
23. Digital image compression (vig), *Nov 28-Dec 5*
24. Approximation of functions (app), *Nov 28-Dec 5*
25. Error-correcting codes (app), *Nov 28-Dec 5*