

**LINEAR ALGEBRA**  
**MATH 2568H AUTUMN 2018**

**COURSE:** Math 2568: Linear Algebra  
**INSTRUCTOR:** Sanjeevi Krishnan  
**OFFICE HOURS:** Math Tower 754 Tuesdays and Thursdays 2:00-3:00  
**LECTURES:** MWF 10:20-11:15 Caldwell Lab 177  
**SITE:** Carmen  
**TEXT:** G. Strang, *Linear Algebra and Its Applications* (Fourth Edition) and supplemental notes

**Description.** This course, an introduction to linear algebra, is aimed at math majors who want: a rigorous background in finite-dimensional linear algebra and exposure to applications of modern relevance, including some practice in implementing ideas from this course on a computer. Coursework consists of homework assignments that are assigned nearly every week, 2 midterms, a final exam, and a final project. Homeworks and the final project will incorporate the use of computing platforms in implementing ideas from this course. A detailed but tentative schedule of topics will be continually updated on the course site. This material will draw most from the course text but also from supplemental notes later in the semester. Coursework consists of participation, homework assignments that are assigned nearly every week, 2 midterms, a final exam, and a final project. Homeworks are to be collected at the start of class on the day that they are due, late homeworks are not accepted, but the lowest two homeworks are dropped. Students can meet with the instructor during office hours or by appointment.

**Curriculum.** A list of topics is given below.

- (1) vector geometry
- (2) linear systems, Gauss-Jordan elimination
- (3) matrix operations (incl. inverses)
- (4) determinants and non-singularity
- (5) vector spaces (abstract and subspaces of Euclidean space), linear independence, basis and dimension
- (6) linear transformations
- (7) eigenvalues and diagonalization
- (8) symmetry, positive-definiteness, similarity
- (9) orthogonality, Gram-Schmidt orthogonalization
- (10) singular value decomposition
- (11) applications optionally drawn from the following list:
  - (a) numerical integration, numerical differentiation
  - (b) least-squares regression and QR factorization
  - (c) finding equilibrium states in Markov chains (e.g. Google PageRank algorithm)
  - (d) network analysis (spanning trees, Kirchoff's Laws for electrical circuits)
  - (e) data analysis (e.g. PCA algorithm or support vector machines)
  - (f) linear programming and LU factorization
  - (g) Fast Fourier Transform
  - (h) difference equations

**Grades.** Class grades are calculated as follows.

**PARTICIPATION:** 5%  
**HOMEWORK:** 15%  
**MIDTERM 1:** 20%  
**MIDTERM 2:** 20%  
**FINAL:** 20%  
**PROJECT:** 20%

**Exams.** Exams are to be taken without external assistance in the regular classroom. *Tentative* midterm dates, subject to change, and final date are given as follows. All exams are taken in the regular lecture room unless noted otherwise on Carmen.

**MIDTERM 1:** TBA 10:20-11:15  
**MIDTERM 2:** TBA 10:20-11:15  
**FINAL:** TBA TBA

**Final projects.** The final project, a group project, will incorporate an implementation of one of the discussed applications for a real-world problem or simulation thereof, involving the use of a computer. This project will culminate in a presentation, for example in the form of a poster to be presented in a poster session or the production of a video presentation to be viewed by the teacher (exam format will be determined after midterm 1). All projects will require prior approval. Final projects will be graded on the basis of clarity in communication, correctness of the mathematics and its communication, topicality, and the use of computer to implement ideas from the course in an essential manner.

**Academic Misconduct.** It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-48.7). For additional information, see the Code of Student Conduct at <http://studentlife.osu.edu/csc/>.

**Disabilities:** Students with disabilities that have been certified by Student Life Disabilities Services (SLDS) will be appropriately accommodated and should inform the instructor as soon as possible of their needs. SLDS contact information: [slds@osu.edu](mailto:slds@osu.edu); 614-292-3307; 098 Baker Hall, 113 W. 12th Avenue.