

CAAM 335 · MATRIX ANALYSIS

Fall 2021 · Rice University

Lectures: CAAM 335 MWF 2:00-2:50pm.
Location: DCH 1070 (in person)
We will have zoom lectures to begin the semester.

Canvas: Homework assignments and exams should be uploaded to Canvas <https://www.rice.edu/canvas>

Website: Homework assignments, exams, and course notes will be posted on our class website https://cpuelz.github.io/Matrix_Fall_2021/

Instructor: Charles Puelz (cp16 @ rice.edu),
Office Hours: Wednesdays 3-4pm or by appointment.

Teaching Assistant: Samuel Kroger (sak8 @ rice.edu)
Recitation Session: Mondays 6:30-8:30pm
Office Hours: Fridays 3-4pm

Course objectives: Students should learn the four fundamental subspace associated with a matrix, learn how to characterize the solution of systems of linear equations and of linear least squares problems, how to compute the eigen-decomposition of matrices and the singular value decomposition of matrices, and how to apply these linear algebra tools to select science or engineering applications.

Outcomes: Apply the Fundamental Theorem of Linear Algebra to characterize solutions of linear systems.
Solve linear systems and linear least squares problems.
Compute eigenvalues and eigenvectors of matrices.
Compute the singular value decomposition (SVD) of matrices.
Apply linear algebra tools to select science and engineering applications, such as electrical circuits and planar trusses.

Prerequisites: (MATH 212 or MATH 222) AND (COMP 140 or CAAM 210).
Less formally: you should be familiar with multivariable calculus and elementary matrix manipulations (matrix addition and multiplication, Gaussian elimination), and be able to write MATLAB or Python programs.

Grading: 50% homeworks, 50% exams. (Class participation and improving performance on the exams will be considered when assigning borderline grades.)

- Homeworks: Homework will be assigned roughly once a week. Typically a homework assignment is due one week after it has been posted. Unless otherwise stated, you may collaborate with other students, but you must write up your solutions separately. Transcribed solutions are unacceptable. *You may not consult solutions from previous sections of this class.*
The lowest homework grade will be dropped.
- Exams: There will be two exams in the form of a pledged problem set. Each exam must be your individual, unassisted effort; indicate compliance by writing out in full and signing the traditional pledge.
- Late Policy: Homeworks and exams must be turned in on time.
- Required *Linear Algebra in Situ* by Steven Cox, available at <https://www.caam.rice.edu/~cox/lais/bundle.pdf>.
- Reading: *Course Notes*. Available on the CANVAS course site; updated as the semester progresses.
- Recommended Carl Meyer, *Matrix Analysis and Applied Linear Algebra* (SIAM, Philadelphia 2000).
- Reading: Gilbert Strang, *Linear Algebra and Its Applications*, 5th ed. <https://math.mit.edu/~gs/linearalgebra>
Gilbert Strang, *Linear Algebra and Learning from Data*, <http://math.mit.edu/~gs/learningfromdata>
Sheldon Axler, *Linear Algebra Done Right*, 3rd ed. (Springer, 2015), <http://doi.org/10.1007/978-3-319-11080-6>
- Programming: Homework assignments may require MATLAB or Python programming. Your solutions should adhere to good programming standards, and must not be copied from other students.
- ADA: If you have a documented disability that may affect academic performance, you should: 1) make sure this documentation is on file with Disability Resource Center (Allen Center, Room 111 / adarice@rice.edu / <https://drc.rice.edu> / 713-348-5841) to determine the accommodations you need; and 2) meet with the instructor to discuss your accommodation needs.
- Title IX: Rice University cares about your wellbeing and safety. Rice encourages any student who has experienced an incident of harassment, pregnancy discrimination, gender discrimination, or relationship, sexual, or other forms interpersonal violence to seek support through The SAFE Office. Students should be aware when seeking support on campus that most employees, including myself, as the instructor/TA, are required by Title IX to disclose all incidents of non-consensual interpersonal behaviors to Title IX professionals on campus who can act to support that student and meet their needs. For more information, please visit <https://safe.rice.edu> or email titleixsupport@rice.edu.