

**Schedule and Homework Write Ups**

Instructor: **J. Nathan Kutz**

Website: <https://faculty.washington.edu/kutz/am584/am584.html>

Time: 2:30pm-3:20pm on Monday, Wednesday and Friday

Place: Live zoom session (recorded for posterity)

Office hours: TBD

**Schedule (ONLINE ONLY DUE TO CONVID-19)**

**27 Total Lectures: 3 Lectures per Topic**

**Topic 1:** Matrix Decompositions, LA Basics

Lecture 1: The diversity of matrix decompositions for  $\mathbf{Ax} = \mathbf{b}$

Lecture 2: Orthogonality and projectors

Lecture 3: Special matrices: unitary, symmetric, etc

**Topic 2:** Singular Value Decomposition

Lecture 1: The singular value decomposition

Lecture 2: Theorems concerning the SVD

Lecture 3: Connections to eigen-decompositions and low-rank approximations

**Topic 3:** QR Decomposition

Lecture 1: The QR decomposition

Lecture 2: Algorithms: Gram-Schmitt and Householder

Lecture 3: Column pivoting and sparse selection

**Topic 4:** Conditioning and Stability

**Topic 5:** Solving  $\mathbf{Ax} = \mathbf{b}$

Lecture 1: Over- and Under-determined systems

Lecture 2: The diversity of regularizations

Lecture 3:

**Topic 6:** Eigen Decompositions

**Topic 7:** Iterative Methods

**Topic 8:** Randomized Linear Algebra

**Topic 9:** Tensor Decompositions

**Grades:** Course grade determined from homework (50%), a midterm (25%) and a final (25%).

Midterm: November 6, 2020

Final: December 9, 2020