Introduction

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Technological developments

- data is super plentiful
- storage, transmission of data is easy
- computers are super fast (and many are super cheap)
- high level programming languages make it easy to do complex stuff

Linear algebra and matrix methods

- branch of math with 200 year history (at the least . . .)
- applied since development of computers (1950s)
  - economics
  - control
  - signal processing
  - simulation
  - statistics and data modeling
- applications have *exploded* since 2000 or so
  - large-scale machine learning, artificial intelligence
  - image processing
  - medical imaging
  - communication systems
  - embedded intelligent systems
- drift from physics-based towards information-based applications

What ENGR108 is about

- we will take you from zero to functional in the big world of modern information-based applications (at least, on the math end)
- you'll learn
  - the math, and how it's connected to the real world
  - about some cool applications (and some not cool ones, too)
- and, *you'll actually do stuff with it*
  - data fitting and classification
  - tomography
  - control
  - portfolio optimization

  (to mention just a few things)
- we'll de-mystify some things that (might) look like magic to you now

Prerequisites

you should know:

- minimal programming
  (CS106A is co- or prerequisite, but more than you need)
- some calculus
  (Math 51 is more than you need)

you don't need to know:

- any linear algebra
- any of the applications

Requirements

- attendance at weekly section
- weekly homework
- midterm
- final

Julia

we'll be using Julia, a relatively new computer language

- open source (like all real languages)
- can be used to write simple scripts (like matlab)
- but also is very efficient
- supports really fancy stuff (that we won't use)

Course materials

- we'll be using Canvas and Ed
- the course web site has basic info but won't be updated too often
- if you find an error or inconsistency in Canvas, Ed, or the website, please let us know

The book

Introduction to Applied Linear Algebra
Vectors, Matrices, and Least Squares

Stephen Boyd (Stanford) & Lieven Vandenberghe (UCLA)

- online at book website `https://vmls-book.stanford.edu/`
- we'll cover chapters 1–17

Your instructors this quarter

- Stephen Boyd and Babak Ayazifar
- . . . and some fantastic course assistants and section leaders