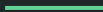# Goals for today

- Explain the plan for the midterm
- Discuss final projects
- Use matrix multiplication to simulate a recurrent network
- Review for the midterm

Midterm Details

- Opens Thursday at 8am, closes Thursday at 10pm
- **We are NOT meeting for class on Thursday**.
- **Open notes, internet, and Python!** The only thing I ask is that you do not speak to others in the class about the midterm.
- Two hours allotted, must be completed in one sitting.
  - If you have OSD accommodations, you *only* need to take the EXTENDED version.
- Includes ~25 multiple choice or matching questions (~5 min/question)

Final Projects in BILD 62

Objectives for the final project

- Choose a topic that you are interested and work on code related to that idea
- Plan out what is required for a computational solution to your chosen topic
- Practice following best practices for coding style, documentation and code testing
- Work with different coding tools and packages
- Collaborate with at least one other student

The main goal of the project is to demonstrate that you can design, write, and implement code to fulfill some task that you choose.

Project Scope
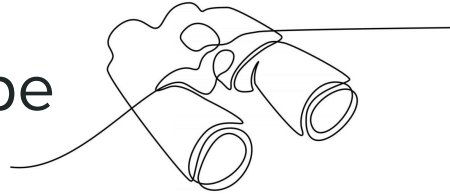
- **There is not a specific amount of code that you have to write for the project.**
- **Your project must implement some new thing, that you design and write the code for.** To do so, you are expected to write new code that creates or adds some functionality.
- A project that appropriately responds to this call will have organized and documented code that:
  - Includes at least **three new functions (or methods)**
  - Uses code constructs such as loops and conditionals when needed
  - Imports code from available modules when needed
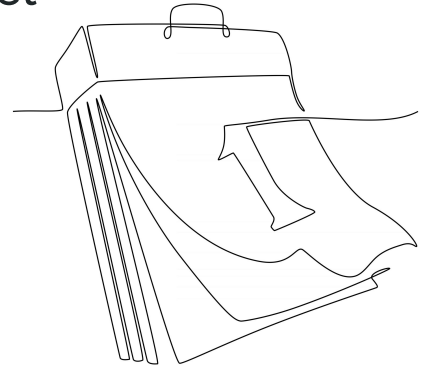- **There is no need to perform a complex task!**

Project schedule

Weeks 7 & 8 — form teams and consider what you'd like to work on

Wednesday of Week 9 — one page proposal due

Weeks 9 & 10 — work on the project

Thursday of finals week — turn in and share your project

Project topics

For your project, you can choose a topic that extends an application from one of the assignments or in class notebooks, or propose your own topic.

Topics largely fall into two categories:
1. Write a program that will analyze a biological dataset and generate plots
2. Write a program that will simulate a simple model of a biological system (example next week)

Example datasets:
- nytimes covid dataset
  https://github.com/nytimes/covid-19-data
- Human mortality/fertility/cause of death etc.
  https://www.demogr.mpg.de/en/publications_databases_6118/online_databases_6676/
- CDC / WHO / Allen Institute / Janelia Research Campus / NIH

Sample projects (from COGS18)

BILD 62 Spring 2022: https://github.com/BILD62/StudentProjects
Data Analysis (COGS18): https://github.com/bydanielasodre/Project_COGS18_WI21

Biological Data Pipeline (COGS18):

https://github.com/n1tsai/Lab-Assays
https://github.com/n1tsai/Lab-Assays/blob/main/ProjectNotebook.ipynb

Modular design, like modular programming, is the approach of designing and building things as independent modules.

Project Organization

- **Notebooks**: good for interactive development
  - For when seeing the inputs and outputs of code running needs to be seen start to finish
  - file ends in .ipynb
- **Modules**: for storing mature Python code, that you can import
  - you don't *use* the functions in there, just define them
  - file ends in .py
- **Scripts**: a Python file for executing a particular task
  - this takes an input and does something start to finish
  - file ends in .py