

# DS2001 - CS Practicum

Spring 2023

## Practicum 3 – Loops and Lists

Practicum is DUE at the end of your scheduled practicum.

We'll be working in pairs, and today you can choose your own partner instead of being assigned. You may not finish every problem every week, but we expect your best effort.

We will let you know when there are 15 minutes left in class – at that point, it is time to wrap up your code and move on to the self-reflection portion of the assignment! Read the self-reflection questions below, write your answers, and save them in a PDF.

**Submit both your code and your self-reflection PDF on Gradescope.**

### **Grading Policy**

You will receive full credit if you submit your self-reflection (with thoughtful answers) and any code by the deadline. All questions in the self-reflection must be answered for full credit.

### **Feedback**

We will provide feedback on your code if requested in your self-reflection. Otherwise, we will not look at your code. Our feedback will mirror the expectations of your DS200 homeworks, and we will use the same criteria for grading your projects in DS2001. So, make sure you ask for feedback when helpful, and read our notes!

## Today's Goals

- Open and read data from a file using a while loop
- Store data in lists
- Conduct an analysis of the data

## Working in Pairs

Each pair will work at one computer, and everyone contributes. Here's how we split up the work:

- Navigator: Dictates the code to be written. Explains the *why* as we go. Checks for syntax errors.
- Driver: Writes the code. Listens closely to the navigator. Asks questions whenever there is a lack of clarity.
- Both driver and navigator are responsible for contributing to the work, and for making space for the other person to make contributions.

# Programming Assignment

## 1. Gather Data

Download bike\_counts.txt from the course website and save it in the same folder as the python file you will write today. This datafile contains counts of bicycles on Broadway St. in Cambridge in 15 minutes increments for one week of 2023 (01/15 – 01/21). The data is derived from this source: <https://data.cambridgema.gov/Transportation-Planning/Eco-Totem-Broadway-Bicycle-Count/q8v9-mcfg/data>.

The format of bike\_counts.txt is:

```
Day (day of the week)
Date
Time
Total (total bicycles)
Westbound (bicycles heading west)
Eastbound (bicycles heading east)
```

Start a python file for today's work. Above main(), save the data filename as a constant variable.

Inside of main(), start by creating empty lists that will each hold one type of data we have to work with: day, date, time, total, westbound, and eastbound. Use a while loop to read in the data, appending each line to the appropriate list. **Hint:** You will want to read in 6 lines of data on each iteration of the loop.

## 2. Computations

How many total bikes traveled on Broadway St. over the course of the week? Calculate this value and save it as a variable.

Did more bikes travel eastbound or westbound over the course of the week? Calculate total bike observed going eastbound and westbound and save these values as variables.

What was the maximum number of bikes observed in one 15 min segment? What was the minimum? Calculate these values and save them as variables.

Iterating through the days list, calculate total bikes observed each day of the week. Save these totals in a new list. **Hint:** You will need to create a variable to track location in the list.

### 3. Communication

Print answers to all of the questions asked above. Be sure to print full sentences so the user knows what the numbers you're showing them mean!

Use matplotlib to create a bar chart that shows how many total bikes were observed each day on Broadway St..

At this point, please complete the self-reflection! If you still have time afterwards, scroll down for a little extra/bonus work you can do on this assignment.

## Self-Reflection

Create a PDF with answers to the following questions (each should be answered collaboratively with your partner unless instructed otherwise):

- Does this work reflect the best effort of both partners?
- In what way(s) did each partner (1) make contributions to the assignment, and (2) give the other person space to make contributions? (Each partner should respond to this question separately.)
- Which problem(s) would you like feedback on and why?

## Keep Going (if time!)

Here are some ways you can improve and build on what we've done so far. Try any/all of them in the time we have left.

- Calculate the total bikes traveling westbound and eastbound on each day of the week. Create a grouped bar chart that shows the comparison of these two numbers.
- Print out the first date and time where 0 bikes are observed on Broadway.
- Count and print how many times the maximum number of bikes were observed on Broadway.