

15-110 Hw6 - General Guide

For the last three assignments of the course, instead of working on a set of written and programming problems, you will code a **programming project** from start to finish. This project will guide you through the process of building a CS tool for a specific domain. It will also allow you to make an in-depth study of either data analysis, simulation, or machine learning.

You may choose one of five different projects to work on for this assignment. Each project covers a different topic and a different CS-as-a-tool focus, but all have been standardized to be about the same level of difficulty. The projects are described on the next page; for more information, check each project's official writeup.

Hw6 has two checks and a full assignment. These are broken down as follows:

Check6-1: complete by **Monday 11/20 at noon EST**

- [45] complete a short written assignment on week11 content
- [55] complete Step 1 of your project, which will focus on **data organization**

Check6-2: complete by **Friday 12/01 at noon EST**

- [45] complete a short written assignment on week12-13 content
- [55] complete Step 2 of your project, which will focus on **data processing**

Hw6: complete by **Friday 12/08 at noon EST**

- [20] complete Step 1, as mentioned above
- [20] complete Step 2, as mentioned above
- [60] complete Step 3 of your project, which will focus on **data presentation**

Note that revision deadlines work differently for Hw6. Check6-1 revisions are due slightly before Check6-2 (Wed 11/29); Check6-2 revisions are due slightly before Hw6 (Wed 12/06); and there is no revision deadline for Hw6. We've changed the policy because Check6-2 relies on Check6-1 to work and Hw6 relies on both checks to work; you cannot reasonably complete all three at the same time.

Once you have chosen a project, you will not be allowed to switch to a different project (except in extreme circumstances, with permission from the course instructors). You must select a project by **Friday 11/17 at noon EST**. Notify the instructors about your project selection by filling out this form: <https://forms.gle/jgRfp4DDX6YyZccT6>

Project: Language Modeling

CS Focus: Data Analysis/Machine Learning

Description: build and test your own language model based on the works of two famous folklore and fairytale authors, Andersen and the Grimm Brothers. You'll use the language model you create to generate text that is similar to the texts written by these two authors, and compare how often they used different words and phrases.

Requirements: 2D lists, dictionaries, File I/O, and matplotlib

Project: Battleship

CS Focus: Simulation

Description: use the class simulation framework to program an interactive game of Battleship. If you've never played Battleship before, try an example game here:

<https://www.mathsisfun.com/games/battleship.html>

Requirements: 2D lists, tkinter, and event-based simulation

Project: Protein Sequencing

CS Focus: Data Analysis

Description: use data analysis to process and analyze DNA sequences for the gene p53, which is used to suppress cancer in organisms. Specifically, you will compare the p53 genes in humans and elephants, to identify what they have in common and how they are different.

Requirements: 2D lists, dictionaries, File I/O, and matplotlib

Project: Circuit Simulator

CS Focus: Simulation

Description: build a simple circuit simulator that can take a boolean expression in text format, generate an interactive circuit for the expression using simulation, and create a truth table for the expression automatically. This will allow you to explore what different boolean expressions output. This project provides a bit of extra challenge for students who want to go above and beyond the normal project difficulty!

Requirements: recursion, trees, tkinter, and event-based simulation

Project: Social Media Analytics

CS Focus: Data Analysis

Description: analyze a dataset that maps tweets and facebook messages made by politicians to information about the text's bias, partisanship, and message intent. You will use sentiment analysis to add additional data on message sentiment, and will compare the data across several vectors.

Requirements: 2D lists, dictionaries, File I/O, matplotlib, pandas, and nltk