

Final Project Guidelines

BIOE 498/598

Purpose

The final project will allow you to:

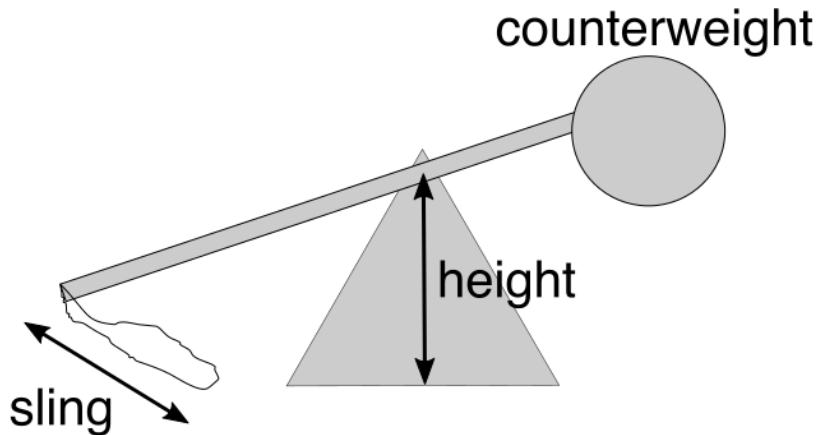
- ▶ Implement methods from our class
- ▶ Develop strategies with less structure than on homeworks
- ▶ Have fun

Goal

- ▶ You will use a trebuchet simulator to launch a projectile and hit a target distance.
- ▶ Your goal is **accuracy**.
- ▶ You may apply any of the techniques from our class.

Methods

- ▶ You can vary three factors on our simulated trebuchet.



Methods (continued)

- ▶ You will be told a target distance (e.g. 25 m).
- ▶ You have 12 training runs to analyze the trebuchet. The accuracy of these runs do not count.
- ▶ You will subsequently fire 8 test runs. Your final error will be the sum of the absolute error over the test runs, i.e.

$$\text{error} = \sum_{i=1}^8 |\text{distance}_i - \text{target}|$$

- ▶ You do not need to use the same factor settings for all 8 test runs. You can continue to improve your predictions during the test runs, but all 8 runs will count toward the total error.

Demonstration

<https://jensenlab.shinyapps.io/trebsim/>

Logistics

- ▶ You are allowed to work in teams.
- ▶ You can use the online simulator as much as you want to develop and test your experimental plan.
 - ▶ However, the settings on the exam trebuchet will be different, so don't save any data!
- ▶ We will open the final simulator for 24 h on **May 12, 2020**. You have this entire time block to complete your 12+8 runs.

Grading

- ▶ You will be graded primarily on your approach. You will develop and submit a plan for your experiment as Homework 5.
- ▶ You will need to turn in your code and data following the exam. Adjusting your factor settings without using the methods from this course is not allowed.
- ▶ The simulator has random error; however, every team receives the same sequence of errors. There is no "luck" involved.
- ▶ Your final error will be worth bonus points.
 - ▶ The teams will be ranked by decreasing error.
 - ▶ Your bonus points will be equal to your rank.
 - ▶ Example: If there are 10 teams, the team with the lowest error gets 10 bonus points.
 - ▶ The bonus points apply to whatever assignment will be most beneficial to your final grade.

Additional assignment for BIOE 598

- ▶ Students enrolled in BIOE 598 need to complete an additional assignment to fulfill the graduate requirements.

Part I

- ▶ Find a paper **in your field** that uses the methods from this course. You will write a brief (1 page) critique of the paper with a focus on the topics from this course.
 - ▶ If possible, find a preprint rather than a published paper.

Part II

- ▶ Write a brief (1 page) experimental plan to use the techniques from this class in your own research.
- ▶ The goal is to find a “good fit” between your research and experimental design. Small experiments are perfectly fine.

Due date: May 14, 2020 by 5pm CDT