CPH200B: CPH Cornerstone **Winter 2025**

Project 3: Applying Causal Inference Methods to Your Research

Instructor: Ahmed Alaa *Total points: 40 pts*

Note: *LaTeX template courtesy of UC Berkeley EECS dept.*

The goal of this project is to apply the concepts learned in class to a research problem you are currently working on or interested in exploring. This will be a group project, with teams of 2 or 3 students. As part of the project, you will **formulate a causal question** within a research area of your choice, **identify a relevant method or concept from class** (or a closely related one), **propose a solution** to the causal problem based on this method or concept, **apply your solution** to a dataset of your choice, and **write a short paper** summarizing your findings. Your project does not have to be in cardiology—it can focus on any field you are familiar with, currently researching, or considering for your PhD thesis.

Timeline and Milestones

• **2/28/2025**: Each group should designate one member to email the instructor with the names of all group members. We will form a total of four groups: three groups of two students and one group of three students.

• **3/4/2025**: **Email a project proposal to the instructor.** The proposal should be a concise abstract (maximum one page) that includes the following **(5 points)**:

1. **Causal Problem:** Describe the causal question you aim to address. This will typically involve studying the effect of an intervention, but you may also explore creative applications of causal inference, such as assessing algorithmic fairness or model interpretability using methods based on causality. Provide background on the clinical problem and explain its significance.

2. **Dataset:** Identify the dataset you will use for your experiments. You can use a public dataset, a dataset you currently use in your research or data from the UCSF information commons.

3. **Methodology:** Specify a causal inference concept or method from class or the literature that you will apply to solve the problem.

• **3/13/2025**: Each group will give a short presentation (12 minutes + 3-minute QA) on their project, covering the problem, proposed methods, and experimental plan. Presentations will take place during class, and all group members are expected to participate **(5 points)**.

• **3/20/2025**: **Submit a 5-page NeurIPS-style paper on your project**. Please follow the formatting instructions for NeurIPS to prepare your paper **(30 points)**. In the paper, please include the following:

1. **Introduction section:** Clearly state the causal question you are addressing, ensuring it is a well-defined, sensible and significant clinical problem. Provide background on related work to contextualize your study.

2. **Methods section:** Describe your approach to solving the causal question and explain how it relates to the concepts covered in class.

3. **Results:** Present empirical findings based on your selected dataset. Discuss any potential limitations or caveats in your methodology and how they might impact the interpretation of your results.

You will submit your paper and codebase via bcourses (**11:59 pm on 3/20/2025**). The instructor will be available for adhoc meetings throughout the project period (schedule via email: amalaa@berkeley.edu).