

# Observational Studies Spring 2020 Syllabus

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# Key Information

This is the Spring 2020 syllabus page for PQHS / CRSP / MPHP 500: Observational Studies, taught by Professor Thomas Love. The course is given on Thursdays from 8:30 to 11 AM, in Wolstein Research Building room 1217.

## Course Home Page

The course home page, with links to everything else you'll need, is at <https://github.com/THOMASELOVE/2020-500>.

## Course Text

As the semester progresses, we are going to read a book together. The book we're reading is

- Paul Rosenbaum's *Observation and Experiment: An Introduction to Causal Inference*, published in 2017 by Harvard University Press. The ISBN-13 number is 978-0674975576. The book is available electronically or in hardcover from Amazon and other retailers. The schedule for reading the book is part of the course calendar

Additional sources will be presented and/or referenced in class, and those are gathered at the sources page of our web site.

## Getting Help

To get help for anything related to the course, email Dr. Love at [thomas.love@case.edu](mailto:thomas.love@case.edu).

- Dr. Love is available on Tuesdays and Thursdays at CWRU, by appointment. To make an appointment, email him at [thomas.love@case.edu](mailto:thomas.love@case.edu). He is also

available from 11 AM to Noon after each class for drop-in conversations. His office is Wood WG-82 J.

- If you have any special concerns about the course, need special accommodations or any other issues for Dr. Love, please email or speak with him before or after class.



# Chapter 1

## Course Description

PQHS 500 (cross-listed as CRSP 500 and MPHP 500 and formerly known as EPBI 500) is a one-semester advanced course in modern design and analysis of observational studies, usually in the context of comparative effectiveness research, with a special emphasis on issues that arise in clinical and health services research.

An observational study is an empirical investigation of treatments, policies or exposures and the effects that they cause, but it differs from an experiment in that the investigator cannot control the assignment of treatments to subjects. This course is designed to introduce design, data collection and analysis methods appropriate for scientists engaged in observational studies, and will prepare students to design and interpret their own studies, as well as those of others in their field. Technical formalities will be minimized, and the presentations will focus on the practical application of methods and strategies.

### 1.1 Prerequisites

People take this course with a wide range of backgrounds and a common interest in using data effectively in research related to biology or medicine. All CWRU students who feel up to it are welcome, regardless of their field of study or prior experience. Students with a working knowledge of R, multiple regression, and some familiarity with logistic regression, should be well prepared.

I strongly encourage people to first complete the PQHS 431-432 sequence, or at least to be substantially familiar with the use of R and RStudio (as well as, ideally, R Markdown) on the coding side, and with multivariate regression modeling and in particular logistic regression on the statistical side. Those who are unsure if they are well prepared for the course should contact the instructor for some advice.

## 1.2 Everything is on the Web

<https://github.com/THOMASELOVE/2020-500> is the place to go for everything related to this course. Please visit any time you need something. I update the web site frequently. You'll find links there related to:

- Your **homework**
- Materials about **Observational Studies in Action**
- Materials about your course **Project**
- **Data and Code** I will provide
- my in-class presentation **Slides**
- various outside **Sources**
- a **Calendar** specifying all deadlines

## Chapter 2

### Dr. Love



Thomas E. Love, Ph.D.

- Professor of Medicine, Population and Quantitative Health Sciences, CWRU
- Director of Biostatistics and Evaluation, Center for Health Care Research & Policy, MetroHealth Medical Center
- Chief Data Scientist, Better Health Partnership
- Track Lead for Health Care Analytics, MS in Biostatistics, Department of Population and Quantitative Health Sciences, CWRU
- Fellow, American Statistical Association

#### 2.1 Email

- Thomas dot Love at case dot edu

- Dr. Love is hard to reach by phone without an appointment. Email is always the best way to reach him.

## 2.2 Offices

- Wood WG-82J on the ground floor of the Wood building (Tuesdays and Thursdays)
- Rammelkamp R-229A at MetroHealth Medical Center (Wednesdays and Fridays)

Dr. Love is available from 11 AM to noon after each class, otherwise by appointment on Tuesdays and Thursdays (send him an email to schedule an appointment.)

## 2.3 Web

- Web site for this course
- Dr. Love's GitHub name is THOMASELOVE.
- His Twitter handle is @ThomasELove

## 2.4 A More Complete Biography

Hi. I have at least three different jobs.

- I am a Professor in the Departments of Medicine and Population & Quantitative Health Sciences at Case Western Reserve University. I teach three courses per year there: PQHS 431, 432 and 500, and also lead the Health Care Analytics track of the MS program in Biostatistics.
- I direct Biostatistics and Evaluation at the Center for Health Care Research & Policy, which is a joint venture of CWRU and MetroHealth Medical Center.
- For ten years, I was the (founding) Data Director for Better Health Partnership, an alliance of people who provide, pay for and receive care in Northeast Ohio. I now serve as Chief Data Scientist there.
- I am a Fellow of the American Statistical Association, and have won some awards for my teaching and my research.
- I have been teaching at CWRU since 1994, and have taught every type of CWRU student over the years, especially graduate students in biostatistics, medicine, and management.

In research, I use statistical methods to look at questions in health policy and in particular the provision of health services. I mostly work with observational

data, rather than data that emerge from randomized clinical trials, and I have a special interest in working with data from electronic health records.

- You may be interested in a study in Health Affairs showing the impact of a Medicaid-like expansion plan on care and outcomes of poor patients in Cleveland.
- Or you might be interested in our New England Journal of Medicine study of the effect of electronic health records on the care and outcomes of people with diabetes.
- In 2011, James O'Malley and I chaired the Ninth International Conference on Health Policy Statistics, here in Cleveland. Here's a recap.
- I've also worked on many projects involving the use of propensity scores to make causal inferences from observational studies, particularly in heart failure.
- I serve on an AHRQ study section which reviews research training and career development grants.

If you want to see some of my publications, knock yourself out.

I hold degrees from Columbia University in the City of New York and from the University of Pennsylvania. My dissertation advisor was Paul Rosenbaum. I am married to a brilliant woman and we are raising two terrific sons. The elder is a junior at the University of Pittsburgh, and the younger will study at Columbia this Fall. I live in Shaker Heights. In spare moments, I do community theater among other things.



## Chapter 3

# Assignments

The four types of assignments required of you in this course are:

1. A semester-long project
2. An “observational studies in action” presentation
3. Several brief “essays” about chapters in the Rosenbaum (2017) text, and
4. Several “homework” assignments involving using R to perform and present analyses.

### 3.1 Deadlines

All deadlines are specified on the Course Calendar.

### 3.2 The Course Project

You will do a small observational study as a capstone project for the course. Your deliverables include:

1. a **proposal** which you will submit for my approval before proceeding further.
2. an **update** verifying that you have the data and are proceeding appropriately.
3. a final **presentation** to the class about your results accompanied by an **abstract**, and by R Markdown and HTML files that describe the work you did.

Complete details on the Course Project are available [here](#).

### 3.3 An “Observational Studies in Action” presentation

During the semester, you will be responsible for presenting the methods and results of an observational study from the literature that uses propensity scores. Your choice of manuscript must be accepted in advance by Dr. Love. After you’ve claimed a study, you’ll give a 15-minute presentation of it to the class, and you’ll also act as “second reviewer” for one of the studies selected by your colleagues.

Complete details on the OSIA work are available [here](#).

### 3.4 Homework Assignments

Several homework assignments require you to do some analyses (using R and R Markdown) on data I will provide to you.

Details on the homework assignments are available [here](#).

### 3.5 Essays in reaction to the course text

In most sessions, we will be reading chapters from Paul Rosenbaum’s *Observation and Experiment*. In early sessions, we will be reading several chapters at once (see the Schedule for up-to-date details.) Beginning with Class 4, you will produce an essay in reaction to this reading to share with the rest of the class.

The essay prompts are available [here](#).

### 3.6 A Note on Feedback

500 is a very different course from 431-432 in terms of the “hands on” assistance that I make available to you as you’re working on a homework assignment, in part because I don’t have a TA for the course. In particular, I’m not going to review your code to be sure you’re going in the right direction, even though I understand some of you have come to expect that from 431-432.

Instead, we discuss the homework in class and I provide a detailed answer sketch after the fact. So if you have questions, please feel free to send them, and I’ll answer sometimes, but what I am likely to say to anything I cannot resolve quickly for you (or think is worthy of deeper discussion as a group) is:

1. That sounds like an excellent question to bring up on Thursday in class, and



2. I'm going to let you (and everyone else) flounder a bit between now and our discussion of this homework in class.

## 3.7 Grading

- If you complete all deliverables **on time**, and your project and OSIA presentations are solid, you will receive an A in the course.
  - If you mostly meet that standard but don't quite (either because more than one thing is late or because you have substantial project problems that linger), either an A or B is possible.
- This is an advanced graduate school course. I don't anticipate that anyone who makes a concerted effort will fall below the B standard, as no one has in the past.
- If you have any concerns, raise them with me directly as soon as possible. Email is likely the best approach.

