**UW SISCER 2024**

**Module 14: Statistical Learning in Mediation Analysis**

**July 29–31, 2024**

Mediation is a fundamental goal in many areas of research. Mediation methods seek to describe the pathways whereby a clinical treatment or public health intervention has an impact on downstream outcomes. Many methods have been developed over the years across many different literatures to tackle this problem, with varying degrees of statistical and causal assumptions. In this course, we will provide an overview of modern approaches to mediation analysis based on formal frameworks for casual inference. We will focus on precisely defining mediation effects and discussing assumptions needed to learn these effects from data generated in observational studies and clinical trials. Where possible, we will emphasize so-called multiply robust approaches that integrate modern machine learning methods to flexibly adjust for confounding while yielding valid statistical inference.

We will discuss at length methods for evaluating mediation of an intervention occurring at a single time point through a single mediator. We will also provide a brief overview, time permitting, of the multiple time-point (i.e., longitudinal) and/or multiple mediator extensions of these approaches. When possible, methods will be illustrated using data from recent vaccine studies. Analyses will be illustrated in R but knowledge of R is not required for this module. The three-day course is geared towards health science researchers with some experience in data analysis and statistics. A basic understanding of the following concepts will be assumed: confounding, probability (e.g., what is meant by the distribution of random variable, its mean and its variance), statistical inference (confidence intervals, hypothesis tests), and regression (linear and logistic). Advanced knowledge of these topics is useful but not necessary. Equivalent UW SPH course pre-requisites are [BIOS 511/512 (or BIOS 514/515)](https://www.washington.edu/students/crscat/biostat.html). It is recommended but not required to have previously taken Module 8: Modern Statistical Learning for Observational Data.

**Overview and Schedule**

\* All times are Pacific Daylight Time (PDT)

**Accessing recordings**

Recordings will be put [in this shared Dropbox folder](https://www.dropbox.com/sh/b4jc2aafzph8snv/AAAgeIa9pkj_kdbvQ0eZB4IVa?st=dckce5sm&dl=0) and available until December 31, 2024.

**Wednesday, July 26**

8:30 – 8:45 Introduction to the course

8:45 -- 10:00 Introduction to causal inference and mediation analysis

10:00 – 10:15 BREAK

10:15 – 11:00 Controlled direct effects

11:00 – 11:15 BREAK

11:15 – 12:00 Controlled direct effects

**Thursday, July 27**

8:30 –10:00 Natural direct and indirect effects

10:00 – 10:15 BREAK

10:15 – 11:00 Exposure-induced confounding

11:00 – 11:15 BREAK

11:15 – 12:00 Exposure-induced confounding

**Friday, July 28**

8:30 –10:00 Interventional direct and indirect effects

10:00 – 10:15 BREAK

10:15 – 11:00 Stochastic interventional effects

11:00 – 11:15 BREAK

11:15 – 12:00 Stochastic interventional effects + overview of longitudinal mediation

**Zoom information**

Call-in information is included below. We will use a waiting room to ensure only registered participants are able to access the room. Accordingly, **please enter the name you used to register for the module as your Zoom name when entering the room**.

Join Zoom Meeting
<https://zoom.us/j/92177589973?pwd=s42Tm1GJimt5YCVBUjBV6hhfFSINjJ.1>

Meeting ID: 921 7758 9973
Passcode: 548814

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• 115.114.115.7 (India Hyderabad)
• 213.19.144.110 (Amsterdam Netherlands)
• 213.244.140.110 (Germany)
• 103.122.166.55 (Australia Sydney)
• 103.122.167.55 (Australia Melbourne)
• 64.211.144.160 (Brazil)
• 159.124.168.213 (Canada Toronto)
• 65.39.152.160 (Canada Vancouver)
• 207.226.132.110 (Japan Tokyo)
• 149.137.24.110 (Japan Osaka)

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**Other notes**

All course materials are posted on the SISCER website (participant login required). Slides are also available for download [via Dropbox](https://www.dropbox.com/sh/6k0ek76806jlrzn/AAD4RBwn6XiKsKPrHXlDEftua?dl=0).