The outline of the course is as follows. Questions are encouraged throughout the course.

1. Lecture
2. (30 minutes) Section I: Background of mediation analysis and moderated mediation analysis
3. An introduction to mediation analysis and moderated mediation analysis
4. Data example and its hypothesized moderated mediation mechanism

(Participants will brainstorm moderated mediation examples in their own research)

1. The existing literature on moderated mediation analysis and limitations

(Break: 5 minutes)

1. (1 hour) Section II: Definition, identification, and estimation of causal mediation effects and causal moderated mediation effects under the potential outcomes framework
2. Definition of potential outcomes and causal effects
3. Identifying the effects by relating the counterfactual quantities to observed data
4. Identification assumptions

* No unmeasured pretreatment confounder of the treatment-mediator, treatment-outcome, and mediator-outcome relationships
* No posttreatment confounder of the mediator-outcome relationship

1. Estimation
2. Using visual tools to assess how mediation effects change with moderators

(Break: 5 minutes)

1. (30 minutes) Section III: sensitivity analysis for assessing how sensitive analysis results are to potential unmeasured confounding
2. The rationale of the sensitivity analysis strategy
3. Using visual tools to assess how sensitive results are to unmeasured confounding

(Break: 5 minutes)

1. R package
2. Section I: estimate causal mediation effects and causal moderated mediation effects
3. (20 minutes) Illustration
4. (15 minutes) Hands-on exercise
5. Section II: conduct sensitivity analysis
6. (20 minutes) Illustration
7. (15 minutes) Hands-on exercise
8. Section III: visualize the original analysis results and sensitivity analysis results
9. (20 minutes) Illustration
10. (15 minutes) Hands-on exercise