

HBEH 761: Advanced Research Methods II

Linear Regression, Mediation, and Moderation with Applications to Health Behavior

Instructors:

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Office Hours:

By appointment

Class Information:

Tu/Th 11-12:15, Rosenau 332
Tu/Th 11:30-12:30, Rosenau 304 (computer lab time)

Course Website:

Accessible through Sakai

Course Description

Advanced Research Methods II, HBEH 761, is a required for first year doctoral students in the Department of Health Behavior. Although students are expected to have encountered ANOVA and simple linear regression previously, this course will provide more in-depth coverage of these topics, and will expand upon prior material by covering multiple linear regression with normal and non-normal predictors and outcomes, moderation, and mediation. We will cover a variety of topics that are tangential to MLR but that are necessary for developing competency in MLR (e.g., reliability; missing data). **This is an intensive course** and much of class time is devoted to hands-on applications. To facilitate this, students will be **responsible for reading ahead of the class period** and conducting self-assessments. In-class lecture will focus on topics not covered in the reading and more difficult concepts.

Course Objectives

At the completion of the course, students will be able to do the following, independently:

- Develop an appropriate linear regression model to test your research hypotheses and be able to develop and compare alternative models
- Test and probe interactions
- Apply appropriate analytic methods for testing mediation hypotheses
- Deal with categorical, count, and normally distributed predictors and response variables in a principled way
- Critically evaluate use of these statistical approaches during manuscript review or in published manuscripts

Prerequisites

Knowledge gained from an introductory statistics course, including sampling distributions, null hypothesis testing, confidence intervals, Type I and II error, power analysis, correlations, and t-tests.

Grading & Assignments

The required readings are crucial to success in this class and must be completed before coming to class. Completion of an online self-assessment based on the readings will be required for most classes.

Additionally, students will conduct several in-class assignments. There will be two midterms and a (non-cumulative) final exam. There will be a penalty of 25% of earned credit per day late for assignments.

Self-assessments will be posted on Sakai. They are open-book but must be completed independently. Self-assessments are due by 3pm on the day before class. Self-assessments contain reading material that is fundamental to the course and, along with lecture notes, may serve as a study guide for exams. If a topic that is in the reading is not covered on the self-assessment or in class, it will not be on the exams.

To maximize reading comprehension and efficiency, we suggest doing one full reading of the week's required material and then going back for a directed search of the information for the self-assessments.

Grades will be assigned as follows:

- On-time completion of self-assessments (equally weighted) – 25%
- Exams (12%, 14%, 9%) – 35%
- Written assignments (equally weighted) - 40%

HP: 90% or above; P: 80-89.9%; LP: 70-79.9%; F: Below 70%

Sakai Discussion Board

Students are encouraged to use the discussion board to post questions that are of general interest to the class and to support their peers by answering questions. The teaching assistant and instructors will monitor the discussion board.

Honor Code & Expectations

Students:

Students are expected to be independent, self-motivated, and to actively participate in their learning experience. Students must observe the Honor Code in all course assignments. Students are expected to answer self-assessments and exam questions completely independently. Even if working with other students on an in-class assignment, final reports must be completed independently.

Please keep smartphones put away during class and refrain from using the laptop computers except to work on in-class activities. Do not check or send emails or other messages during class.

Instructors:

We will provide for every student an environment that is intellectually stimulating, emotionally supportive, safe, and free of harassment. We will be supportive, equitable, accessible, encouraging, and respectful. We will foster professional confidence and encourage critical thinking, skepticism, and creativity.

Required Textbooks

Cohen, J., Cohen, P., West, S.G., & Aiken, L.S. (2003). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences: Third Edition*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Hayes, A.F. (2013). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. New York: Guilford Press.

Software

Most analysis will be SAS-based, and some in *Mplus*. You can access both software programs using Virtual Lab, visit a computer lab with these programs installed, or obtain a copy to install on your computer.

Tentative Schedule (Subject to Change)

Date	Topic	Readings Due Before Class	Due Before Class
1/12/17	Orientation; ANOVA (Guest Lecture: Tara Queen)	-	-
1/17/17	ANOVA (Guest Lecture: Tara Queen)	CCAW: 1.2	Self- assessment
1/19/17	Types of correlation coefficients (Assignment 1 given)	CCAW: 2.1-2.5	Self-assessment
1/24/17	Simple linear regression & Inference	CCAW: 2.6-2.8	Assignment 1 & Self-assessment
1/26/17	Power and factors affecting the size of correlations	CCAW: 2.9-2.10. 3 MacCallum, Zhang, Preacher, & Rucker (2002)	Self-assessment
1/31/17	Reliability (Assignment 2 given)	-	-
2/2/17	Multiple linear regression	CCAW: 3.1-3.3	Self-assessment
2/7/17	Partial and semi-partial correlation; Inference in MLR (Assignment 3 given)	CCAW: 3.5	Assignment 2 & Self- assessment
2/9/17	Inference in MLR; Multicollinearity; Prediction and cross-validation	CCAW: 3.6-3.8	Self-assessment
2/14/17	Midterm 1 [covers material up to 2/9]	-	Assignment 3
2/16/17	Assumptions and testing assumptions (Assignment 4 given)	CCAW: 4.3-4.5	Self-assessment
2/21/17	Data analytic strategies	CCAW: 5.1-5.4.2	Self-assessment Assignment 4
2/23/17	Categorical Predictors: Types of Coding (Assignment 5 given)	CCAW: 8.1-8.4	Self-assessment
2/28/17	Categorical Predictors in MLR	CCAW: 8.7.1-8.7.4	Self-assessment
3/2/17	Diagnostics: Outliers	CCAW: 10.1-10.4	Self-assessment Assignment 5
3/7/17	Modeling data from a two time-points (Assignment 6 given)	-	-
3/9/17	Linear regression with powers and exponents & work on Assignment 6	CCAW: 6.1-6.2 (6.4-6.5 skim)	Self-assessment
3/14/17	Spring Break		Assignment 6
3/16/17	Spring Break		
3/21/17	Logistic regression and survival analysis	CCAW: 13.1-13.2	Self-assessment
3/23/17	Ordinal and nominal regression (Assignment 7 given)	CCAW: 13.3	Self-assessment
3/28/17	Count outcomes (Guest Lecture: Veronica Cole)	CCAW: 13.4-13.5	Self-assessment

3/30/17	SBM Meeting – No Class Missing Data/Multiple Imputation *Self Study* (Assignment 8 given)	Graham (2009; skip sections on longitudinal and clustered data and stop at p. 564)	Self-assessment Assignment 7
4/4/17	Midterm 2 [covers material from 2/16-3/30]		
4/6/17	Mediation lecture	MacKinnon, Krull, & Lockwood (2000) H: Chapter 4	Assignment 8
4/11/17	Testing Mediation: In-class exercise (Assignment 9 given)	H: Chapter 5	
4/13/17	Testing Mediation: In-class exercise	H: Chapter 6: (skip section 6.3)	
4/18/17	Moderation	Frazier, Tix, & Barron (2004)	Assignment 9
4/20/17	In-class exercise (Assignment 10 given)	H: Chapter 7	
4/25/17	In-class exercise		
4/27/17	Conditional process models	H: Chapter 10 Foshee et al. (2015)	Assignment 10
5/2/17	Take home final exam given [covers material from 4/6-4/27]		
