

HBEH 761: General Linear Models, Mediation, and Moderation with Applications to Health Behavior

Instructor (Module 1): Nisha Gottfredson gottfredson@unc.edu 319C Rosenau Hall Office Hours: By appointment	Instructor (Module 2): Luz McNaughton Reyes mcnaught@email.unc.edu 319G Rosenau Hall Office Hours: By appointment	Teaching Assistant (TA): Rebecca Sokol rwoodke@live.unc.edu M 11-12 (Ros 304) Tu 10-11 (McG 2304) * Note: 2/12, 3/05 in HB Student Lounge Rebecca's OHs end 4/03
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Classroom

McG 2302, Tuesday/Thursday 11-12:15

Course Description

HBEH 761 is 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 regression with normal and non-normal predictors and outcomes, moderation, and mediation.

Course Objectives

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

- Use the general and generalized linear modeling framework to formally operationalize hypotheses
- Understand the principle of least squares
- Test hypotheses appropriately and interpret model results accurately
- Build models using a principled approach
- Evaluate model fit and compare alternative models
- Check model assumptions and run diagnostic procedures and adjust models as necessary
- Be able to estimate and interpret logistic regression models
- Understand the concept of link functions
- Test and probe interactions
- Apply and interpret appropriate analytic methods for testing mediation hypotheses
- 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/II error, correlations, t-tests, and analysis of variance.

Grading & Assignments

Final grades will be calculated on the basis of the following factors:

- **Problem Sets (50%):** Students may work together, but final problem sets must be written up completely independently. 10 percentage points will be deducted from the assignment grade for each day that an assignment is late.

- **Midterms and Final (50%):** These exams will be closed book and must be completed within a specified time period using Sakai.

Honor Code & Expectations

Students:

- Students must observe the Honor Code in all course assignments. You are expected to produce your own work, except where group work is specifically allowed.
- You are expected to complete the assigned readings before class.
- It is expected that you have thoroughly researched a question by checking notes and readings before posting a question to Sakai, sending a question over e-mail, or coming to office hours.
- Please refrain from using your cell phone, checking e-mails, or using computers for any reason other than for in-class assignments or note-taking during class.
- Participate in class by attending regularly, asking questions, and engaging in discussions.
- Visit TA or instructor office hours proactively to address areas of confusion.

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

Kleinbaum, D.G., Kupper, L. L., Muller, K. E., & Nizam, A. (2014). *Applied Regression Analysis and Other Multivariable Methods: Fifth Edition*. Boston: Cengage Learning.

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

Software

We will use SAS. You can access SAS using Virtual Lab or obtain a copy to install on your computer.

Flipped Class Periods

In order to provide more time in class for hands on activities, some of the lectures will be video recorded. Students will be responsible for watching these lectures before class, completing the online quizzes associated with the lecture by 9pm the night before the lecture, and come prepared to practice implementing the material.

Graded and Ungraded Exercises

We will offer several ungraded problem sets that will serve as practice for the graded problem sets. The answer key will be provided for ungraded problem sets.

Please turn in graded assignments using the Dropbox feature on Sakai and use your PID to identify yourself on your assignment, not your name.

Tentative Schedule (Subject to Change)

Date	Topic	Readings Due Before Class	Due Before Class
Module 1: General Linear Model			
1/11/18	Introductions; Review of ANOVA and sampling distributions; Defining the General Linear Model	KKMN Ch. 3 (<i>review material</i>)	
1/16/18	Correlations and Factors Affecting the Size of Correlations & Simple Linear Regression with Standardized Predictors: In-class activity	MacCallum, Zhang, Preacher, & Rucker (2002)	Watch lecture & Online quiz
1/18/18	Snow day		
1/23/18	Ordinary Least Squares; SLR with Unstandardized Predictors (<i>Practice Problem Set 1 Assigned</i>)	KKMN Ch. 5	
1/25/18	Multiple Linear Regression: Partial Regression Coefficients	KKMN Ch. 8 (skip 8.4) & 9	Practice Problem Set 1
1/30/18	R ² : In-class activity (<i>Problem Set 1 Assigned</i>)	KKMN Ch. 6	Watch lecture & Online quiz
2/1/18	Model Assumption	KKMN Ch. 8.4	Problem Set 1
2/6/18	Multicollinearity & Diagnosing Outliers (<i>Ungraded Exercise Assigned</i>)	KKMN Ch. 14	
2/8/18	Katie Wouk Guest Lecture: Directed Acyclic Graph Models (<i>Problem Set 2 Assigned</i>)	Buck & Platt (2011); For reference: Greenland, Pearl, & Robins (1999)	Ungraded Exercise
2/13/18	Article discussion & In-class activity	Helms, Jernigan, & Mascher (2005); KKMN Ch. 4	Guided Reading Questions
2/15/18	Nominal Predictors	KKMN Ch. 12	Problem Set 2
2/20/18	In-class activity (<i>Midterm available @ 12:15 pm</i>)		
2/22/18	Polynomial Regression	KKMN Ch. 15	Finish midterm by 2/21 at 9pm
2/27/18	Model-Building & Model Comparisons: In-class activity		Watch lecture & Online quiz
3/1/18	Cross-Validation; Correction for Multiple Comparisons (<i>Problem Set 3 Assigned</i>)	Skim: Kessler et al. (2014) & Duncan et al. (2017); For reference: Thissen, Steinberg, & Kuang (2002)	
3/6/18	Analyzing Data with Two Time Points: Article discussion	Card & Krueger (1994)	Watch lecture & Online quiz; Guided Reading Questions

3/8/18	Analyzing Data with Two Time Points: In-class activity (finish as ungraded assignment) (<i>Problem Set 4 Assigned</i>)		Problem Set 3
3/13/18	Spring Break		
3/15/18	Spring Break		
3/20/18	Missing Data: In-class activity	Schafer & Graham (2002); Graham (2009)	Watch lecture & Online quiz; Problem Set 4
3/22/18	Logistic Regression	Allison (1999) Ch. 2	
3/27/18	Logistic Regression: In-class activity (<i>Problem Set 5 Assigned</i>)		Watch lecture & Online quiz
3/29/18	Generalized Linear Model (<i>Midterm available 3/31</i>)	Izzo, Smith, Holden, et al. (2016)	Problem Set 5 due 3/30 @ 12pm
Module 2: Mediation & Moderation			
4/3/18	Mediation lecture	MacKinnon, Krull, & Lockwood (2000) H: Chapter 4	Finish midterm by 4/2 at 9pm
4/5/18	Testing Mediation: In-class exercise (<i>Problem Set 6 Assigned</i>)	H: Chapter 5	
4/10/18	Testing Mediation: In-class exercise	H: Chapter 6: (skip section 6.3)	
4/12/18	Moderation	Frazier, Tix, & Barron (2004)	Problem Set 6
4/17/18	In-class exercise (<i>Problem Set 7 Assigned</i>)	H: Chapter 7	
4/19/18	In-class exercise		
4/24/18	Conditional process models	H: Chapter 10 Foshee et al. (2015)	Problem Set 7
4/26/18	Special Topics	TBD	
4/28/18	<i>Final Exam Available</i>		
4/30/18			Final Exam Due