

Research Design & Analysis II

EDUC/PSY 7610

Syllabus

Spring Semester 2016

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Time: Tuesday and Thursday, 4:30 - 6:00
Location: HPER 116
Credits: 3

Description

This course is an introduction to research design for advanced regression models. Students will gain statistical and methodological knowledge to test non-linear relationships as well as mediation and moderation mechanism. In addition, students will learn how to incorporate covariates and to estimate models with a categorical outcome. Students are welcome to use their own data since regression analysis is very often used in papers and theses.

Objectives

This course has three objectives:

- Understanding statistical concepts of advanced regression analysis
- Conduct advanced regression analysis using a software package such as SPSS or R
- Learning to interpret statistical results and computer outputs

After the course, participants will be able to appropriately analyze covariates, test mediation and moderation effects, and estimate models with a categorical outcome. The course also aims to prepare participants for learning more advanced techniques, such as Structural Equation Modeling and Multilevel Modeling.

Recommended Readings

- Edwards, J. R., & Lambert, L. S. (2007). Methods for integrating moderation and mediation: A general analytical framework using moderated path analysis. *Psychological Methods, 12*, 1-22.
- Hoffmann, J. P. (2005). *Linear Regression Analysis: Assumptions and Applications*. (available on Canvas).
- Osborne, J. W. (2016). *Regression and linear modeling: Best Practices and Modern Methods*. Los Angeles, CA: Sage.

Other Useful Books

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury, CA: Sage.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences* (3rd ed.).

Other Useful Papers (available on Canvas)

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173-1182.

Ledermann, T., & Macho, S. (in press). Assessing mediation in simple and complex models. In L. Rivera (Ed.), *Structural Equation Modeling (SEM): Concepts, applications and misconceptions*. Nova Science Publishers, Inc.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*, 879-891.

Statistical Software

- IBM SPSS (Statistical Package for the Social Science)
IBM SPSS Statistics 21 is available to students through Citrix: https://usu.service-now.com/services/kb_view.do?sysparm_article=KB0013281
- R: The R Project for Statistical Computing (free software available at <https://www.r-project.org/>)
- G*Power for Power analysis (free software available at <http://www.gpower.hhu.de/en.html>)

Annotated SPSS Output

Annotated SPSS output is available at <http://www.ats.ucla.edu/stat/spss/>. The datasets available on this website allows one to rerun all the analyses.

Online Materials

Slides and computer files are provided on Canvas.

Prerequisites

Research Design and Analysis I (EDUC/PSY 6600) or an approved equivalent.

Class Preparation

This is a 3-credit course requiring an average of approximately 9 hours of time outside of class per week devoted to reading and homework for students who are adequately prepared for this course.

Class Participation

This course requires regular class attendance and participation in all class activities, which are intended to support the learning objectives. I encourage all students who have or anticipate attendance difficulties to discuss these issues with me.

Assignments: Research Papers (40 points total)

Two independent research paper assignments are required during this course. Research paper # 1 should either use one of the following methods:

- Multiple Regression Analysis involving a set of covariates (hierarchical regression)
- Mediation Analysis
- Moderation Analysis
- Non-linear regression

Research paper # 2 should either use one of the following methods:

- Moderated Mediation Analysis
- Logistic Regression Analysis
- Poisson Regression Analysis

The analysis for these papers may be done in groups of 2 or 3 and the research questions or hypotheses can be the same for all members of a group. Each student needs to hand in his or her own research papers. Each paper should be substantially different from the other members' papers (e.g., no cutting and pasting from each other's work, no paraphrasing, etc.). The paper assignments are to be uploaded to Canvas.

Each research paper should have a cover page with a title of the project, the name of the student, the name(s) of the other student(s) of the group, a short abstract (not more than 120 Words), a brief introduction, the research question(s) or hypotheses, a brief method section (including a brief sample description), a result section, and a brief discussion or conclusion. The structure of each paper should be similar to that of a short scientific article. Figures and tables should be in line with APA standards. Main Figures and Tables should be integrated in the text. Text can be single-spaced.

Part of the research papers will be presented in class by the whole group (see details below). The research papers are due to after the presentation of the last method students can chose from for the research paper (see course schedule for details).

Group Presentations

Four group presentations are required during this course. Each presentation will be about 5 minutes. The four presentations are

Presentation # 1: Multiple Regression Analysis involving a set of covariates (stepwise or hierarchical regression).

Presentation # 2: Mediation Analysis.

Presentation # 3: Moderation Analysis or non-linear regression.

Presentation # 4: Moderated Mediation Analysis or Logistic Regression Analysis.

These four presentations will not be graded.

Examinations (40 points total)

There will be 3 examinations during this course. Each examination will be worth 20 points. The better two of the three examinations will be scored. The examinations will include multiple choice questions and short answer essays. There may be some basic calculations required.

Examination #1 will cover Partial Correlation, Multiple Regressions, including the incorporation of covariates (stepwise regression), and regression diagnostics.

Examination #2 will cover mediation and moderation, non-linear regression, and moderated mediation.

Examination #3 will cover Logistic Regression, Poisson Regression.

These examinations will be open note, but not open book/internet. Notes are defined as materials that each student has created or gathered himself or herself during the course (copy-paste of materials covered in books, papers, courses, and provided on webpages is allowed). The use of a calculator is allowed.

Grading and Evaluation

The standard grade break down used by Utah State University will be followed to assign the student a letter grade. The final percentage will be determined by dividing the student's total points earned by the total number of possible points:

A	100% to 93%	C	< 77% to 73%
A-	< 93% to 90%	C-	< 73% to 70%
B+	< 90% to 87%	D+	< 70% to 67%
B	< 87% to 83%	D	< 67% to 63%
B-	< 83% to 80%	D-	< 63% to 60%
C+	< 80% to 77%	F	< 60% to 0%

There are 80 points possible in this course.

	Points
Research Paper # 1	20
Research Paper # 2	20
2 Exams (each 20 points)	40
Total	80

Course Schedule

Week	Date	Day	Topic / Reading	Group Assignment
Partial Correlation, Multiple Regression, Regression Diagnostics				
1	01/12	Tue.	Introduction	Find your group
	01/14	Thurs.	Partial Correlation I	Brainstorm topics
2	01/19	Tue.	Partial Correlation II	Chose one topic
	01/21	Thurs.	Multiple Regression and Covariates I	Regression model with covariates
3	01/26	Tue.	Multiple Regression and Covariates II	
	01/28	Thurs.	Regression Diagnostics I	
4	02/02	Tue.	Regression Diagnostics II	
	02/04	Thurs.	Group Presentation Covariate	
5	02/09	Tue.	Time for questions	
	02/11	Thurs.	Examination 1	
6	02/16	Tue.	Monday schedule (no class)	
Mediation and Moderation				
	02/18	Thurs.	Mediation I	Mediation and Moderation
7	02/23	Tue.	Mediation II	
	02/25	Thurs.	Moderation I	
8	03/01	Tue.	Moderation II	
	03/03	Thurs.	Group Presentation Mediation	
9	03/08	Tue.	Spring Break (no class)	
	03/10	Thurs.	Spring Break (no class)	
10	03/15	Tue.	Non-linear Regression	
	03/17	Thurs.	Moderated Mediation (Edwards & Lambert, 2007)	
11	03/22	Tue.	Group Presentation Moderation	
	03/24	Thurs.	Time for questions	Paper 1 due
12	03/29	Tue.	Examination 2	
Logistic Regression				
	03/31	Thurs.	Logistic Regression I	Logistic Regression
13	04/05	Tue.	Logistic Regression II	
	04/07	Thurs.	Logistic Regression III	
14	04/12	Tue.	Multinomial Regression I	
	04/14	Thurs.	Multinomial Regression II	
15	04/19	Tue.	Group Presentation	
Poisson Regression				
	04/21	Thurs.	Poisson Regression I	
16	04/26	Tue.	Poisson Regression II	
	04/28	Thurs.	Time for Questions	Paper 2 due
			Examination 3	