

Research Design and Analysis II

EDUC – 7610

Spring 2018



Course Instructor:

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Course Time and Location:

Education Room 272
Wednesday 4:30-7:15

Purpose of Course

Research Design & Analysis II is designed to provide the student with a practical, applied approach to the application of fundamental behavior and educational research design and statistical principles. Students will learn to differentiate between various statistical methods to evaluate data to assess their research questions. This course will focus primarily on fitting and interpreting general and generalized linear regression models. Additionally, students will learn how to use statistical packages such as SPSS, and potentially R, to analyze data and 2) interpret and communicate the output using the guidelines of the publication manual of the American Psychological Association.

Prerequisite

EDUC/PSY 6600 (or approved equivalent) must be successfully completed prior to enrolling in EDUC/PSY 7610.

Framework for this Course

- Describe the role of systematic research in improving educational and psychological practice.
- State how interpretation of statistics depends on design and measurement
- Understand the role of randomness in research design and statistical analysis as well as its strengths and limitations
- Interpret results of statistical significance testing
- Demonstrate ability to represent data and results of statistical analyses using APA appropriate tables and graphics.

IDEA Standards:

- Gaining factual knowledge (terminology, classifications, methods, trends)
- Developing specific skills, competencies, and points of view needed by professionals in the field most closely related to this course
- Learning to apply course material (to improve thinking, problem solving, and decisions)

Course Resources:

- Course Website – We will be utilizing Utah State University’s Canvas system for course management. Assignments, readings, and grades will be posted on Canvas.
- In addition to the readings listed below. Most weeks additional readings will be assigned which provide applied examples of the analysis.
- Free access to SPSS: apps.usu.edu
 - Purchase student license: https://usu.service-now.com/usu/catalogs_home.do - \$70

Readings:

- Cohen, J., Cohen, P., West, S. G., & Aiken, Leona S. (2003). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences, 3rd edition*. Newark, NJ: Lawrence Erlbaum Associates.
- DeVellis, R. F. (2011). *Scale development: Theory and application, 3rd edition*. Los Angeles: SAGE Publications.
- Field, A. (2018). *Discovering statistics using SPSS, 5th edition*. London: SAGE Publications. [book website: <http://www.sagepub.com/field4e/>] (Previous version is acceptable)
- Groves, R. M., Fowler, F. J., Couper, M. P., Lepkowski, J. M., Singer, E., & Tourangeau, R. (2009). *Survey Mythology, Second Edition*. Hoboken, NJ: John Wiley & Sons, Inc.
- Keith, T. Z. (2006). *Multiple Regression and Beyond*. Boston, MA: Pearson.
- Kleinbaum, D. G., Kupper, L. L., Nizam, A., & Muller, K. E. (2008). *Applied Regression Analysis and Other Multivariable Methods, 4th Edition*. Belmont, CA: Thomson Higher Education.
- Moore, D. S., McCabe, G. P., Craig, B. A. (2009). *Introduction to the Practice of Statistics, 6th edition*. New York, NY: W.H. Freeman and Company.
- Menard, S. (2010). *Logistic Regression: From Introductory to Advanced Conceptions and Applications*. Thousand Oaks, CA: Sage Publications Ltd.
- Smithson, M. & Merkle, E. C. (2013). *Generalized Linear Models for Categorical and Continuous Limited Dependent Variables*. Boca Raton, FL: Taylor & Francis Group. (Note: Available for Free online through the USU library.)
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using Multivariate Statistics, 6th edition*. Newark, NJ: Pearson.

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Overview of Course/Expectations and Procedures

Class Attendance

You should make every attempt to be at every class session. I hope that you will find the activities, discussions, and demonstrations helpful and insightful. Furthermore, the class lectures and activities will be absolutely essential for you to meet the requirements of some of the

assignments in this course. However, as human beings, we sometimes get sick or have extenuating circumstances. Please remember, if you are feeling ill to contact the appropriate health services organization.

Class Participation

You are also expected to participate in class activities and discussions. Research demonstrates that the quality of the classroom environment depends on the interaction of the students and the teacher. This class will be highly interactive and discussion-based.

Assigned Readings

You are expected to read all required assignments for the week before class. Class discussions and participation in the group activities will not be effective unless readings are completed.

Assignment Deadlines

Assignments are due on the date they are listed in this syllabus unless officially changed by the instructor. All changes in assignment due dates will confirmed via e-mailed to all students. **No late work will be accepted.** If you have an extenuating circumstance, please notify the instructor prior to due dates. (Note: Some writing assignments may require multiple submissions. The new date listed on the feedback will count as the next deadline for that assignment.)

Grading Return Rate on Assignments

Because the professor believes in Mastery Learning, students are encouraged to resubmit papers to demonstrate complete and full understanding of the content material. As a result, the grading and feedback in this course may be quite demanding on the professor. As a result, please allow 2-3 weeks to receive completed grades on major assignments.

USU Policy and Procedures

Academic Freedom and Professional Responsibilities

Academic freedom is the right to teach, study, discuss, investigate, discover, create, and publish freely. Academic freedom protects the rights of faculty members in teaching and of students in learning. Freedom in research is fundamental to the advancement of truth. Faculty members are entitled to full freedom in teaching, research, and creative activities, subject to the limitations imposed by professional responsibility. Faculty Code Policy #403 further defines academic freedom and professional responsibilities: <http://personnel.usu.edu/policies/403.htm>.

Academic Integrity – "The Honor System"

Each student has the right and duty to pursue his or her academic experience free of dishonesty. The Honor System is designed to establish the higher level of conduct expected and required of all Utah State University students. The Honor Pledge: To enhance the learning environment at Utah State University and to develop student academic integrity, each student agrees to the following Honor Pledge: "I pledge, on my honor, to conduct myself with the foremost level of academic integrity." A student who lives by the Honor Pledge is a student who does more than not cheat, falsify, or plagiarize. A student who lives by the Honor Pledge:

- Espouses academic integrity as an underlying and essential principle of the Utah State University community;
- Understands that each act of academic dishonesty devalues every degree that is awarded by this institution; and
- Is a welcomed and valued member of Utah State University.

Plagiarism

Plagiarism includes knowingly "representing, by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes the unacknowledged used of materials prepared by another person or agency engaged in the selling of term papers or other academic materials." The penalties for plagiarism are severe. They include warning or reprimand, grade adjustment, probation, suspension, expulsion, withholding of transcripts, denial or revocation of degrees, and

referral to psychological counseling.

Grievance Process (Student Code)

Students who feel they have been unfairly treated [in matters other than (i) discipline or (ii) admission, residency, employment, traffic, and parking - which are addressed by procedures separate and independent from the Student Code] may file a grievance through the channels and procedures described in the Student Code: http://studentlife.tsc.usu.edu/stuserv/pdf/student_code.pdf (Article VII. Grievances, pages 25-30).

Sexual Harassment

Sexual harassment is defined by the Affirmative Action/Equal Employment Opportunity Commission as any "unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature." If you feel you are a victim of sexual harassment, you may talk to or file a complaint with the Affirmative Action/Equal Employment Opportunity Office located in Old Main, Room 161, or call the AA/EEO Office at 797-1266.

Students with Disabilities

The Americans with Disabilities Act states: "Reasonable accommodation will be provided for all persons with disabilities in order to ensure equal participation within the program. If a student has a disability that will likely require some accommodation by the instructor, the student must contact the instructor and document the disability through the Disability Resource Center (797-2444), preferably during the first week of the course. Any request for special consideration relating to attendance, pedagogy, taking of examinations, etc., must be discussed with and approved by the instructor. In cooperation with the Disability Resource Center, course materials can be provided in alternative format, large print, audio, diskette, or Braille."

Withdrawal Policy and "I" Grade Policy

Students are required to complete all courses for which they are registered by the end of the semester. In some cases, a student may be unable to complete all of the coursework because of extenuating circumstances, but not due to poor performance or to retain financial aid. The term 'extenuating' circumstances includes: (1) incapacitating illness which prevents a student from attending classes for a minimum period of two weeks, (2) a death in the immediate family, (3) financial responsibilities requiring a student to alter a work schedule to secure employment, (4) change in work schedule as required by an employer, or (5) other emergencies deemed appropriate by the instructor.

Course Fees

Courses that utilize course fees are required to identify the amount of the course fee and explain the purpose of the course fee on the syllabus given to students. Course fee information not included on the syllabus will result in the course fee automatically being deleted.

WRITING EXPECTATIONS

This course assumes graduate level competency in expression through writing. The course requires students to demonstrate proficiency in writing content and mechanics. Peer review and proofing among students is encouraged. *All assignments are expected to be word-processed.*

COURSE ASSIGNMENTS and EXPECTATIONS

	Percent of Final Grade
Participation and Professionalism	10
Weekly Reviews (12)	24
Mid-term examination	20
Scenarios (13)	26
Final Examination	20
TOTAL	100

ASSIGNMENT DESCRIPTIONS

Participation and Professionalism

Attendance and in class participation are important. However, occasions arise where other activities take priority. If you plan to miss a class, please contact the instructor prior to class (unless it is an emergency). Frequent absences will be dealt with on a case-by-case basis. Assignments due on expected absences are still due on that due date. Excessive absences and lack of in class participation will result in an up to 10% reduction in professionalism. *Class participation and keeping up with course content is important. There may be times when in-class exercises will be assessed or (short) pop quizzes are given.*

Weekly Reviews

Each week the students should review the required materials prior to the class and prepare a statement or question to facilitate deeper conversations within class. These could include areas that the student does not understand or some insight into how the method or content may be relevant to research. These should be no longer than a paragraph and submitted on the discussion board on canvas.

Scenarios

In class, you will be provided with a data set and an objective to accomplish based on our content covered for that day. Sometimes solo or with a research team, you will evaluate your data based on the given scenario and report your findings to the large group. The assignment can be submitted up to a week after the assigned class; however, the team should have something to report by the end of the period. Relevant output should be saved in a word file and submitted on canvas.

Examinations

This course will have two examinations. The first will take occur at the mid-point of the semester and the second will be a final comprehensive examination.

GRADING SCALE (Percent)*

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%

COURSE OUTLINE AND SCHEDULE

Course schedule is subject to change due to availability of resource persons and students' learning needs.

Wk.	Date	Class Objective/Topic	Readings and Assignments
1	January 10	Course Introduction <ul style="list-style-type: none"> • Introduction to latent constructs • Quantitative Analysis Review 	DeVellis 2 <i>Scenario Assigned</i>
2	January 17	Data Screening <ul style="list-style-type: none"> • Examples of research designs • Introduction to SPSS/R Code • Missing data analysis • outliers • assumptions • Examining & Transforming Data 	Tabachnick Ch. 4 <i>Weekly Review Due Scenario Assigned</i>
3	January 24	Bivariate correlation & regression <ul style="list-style-type: none"> • Diagnostics • Data Manipulation • Power Analysis • Correlation: Multiple, Partial, and Multiple Partial 	Cohen Ch. 2 (Overview) Kleinbaum Ch. 10 <i>Weekly Review Due Scenario Assigned</i>
4	January 31	Additional Techniques <ul style="list-style-type: none"> • Robust/Bayesian regression • Clustered standard errors • Bootstrapping • Jackknife • Multiple Imputation 	Field Ch. 6 Moore Ch. 16 <i>Weekly Review Due Scenario Assigned</i>
5	February 7	Confounding variables and Interactions <ul style="list-style-type: none"> • Interactions among continuous variables 	Kleinbaum Ch. 11 Keith Ch. 8 Cohen Ch. 7 <i>Weekly Review Due Scenario Assigned</i>
6	February 14	Interactions continued <ul style="list-style-type: none"> • Interactions with categorical variables 	Cohen Ch. 9 <i>Weekly Review Due Scenario Assigned</i>
7	February 21	Analytic Strategies <ul style="list-style-type: none"> • Answering research questions with correlation and regression • Connection theory to research to discussion • Mid-term Review 	Cohen Ch. 5 <i>Weekly Review Due Scenario Assigned</i>

8	February 28	Mid-Term Examination	
9	March 7	• Spring Break	
10	March 14	Polynomial regression <ul style="list-style-type: none"> • Curvilinear Relationships • Transformations 	Kleinbaum Ch. 15 Cohen Ch. 6 <i>Weekly Review Due Scenario Assigned</i>
11	March 21	Regression Alternatives <ul style="list-style-type: none"> • Selecting the “best” regression model • Non-parametric models 	Kleinbaum Ch. 16 Moore Ch. 15 <i>Weekly Review Due Scenario Assigned</i>
12	March 28	Logistic Regression <ul style="list-style-type: none"> • Multinomial Logic Regression 	Smithson Ch. 2, 3, 4 <i>Weekly Review Due Scenario Assigned</i>
13	April 4	Poisson Regression	Smithson Ch. 5 <i>Weekly Review Due Scenario Assigned</i>
14	April 11	Survival Analysis	Smithson Ch. 7 Tabachnick Ch. 11 <i>Weekly Review Due Scenario Assigned</i>
15	April 18	Reporting Findings and building an argument <ul style="list-style-type: none"> • Theory and Empirical Findings • APA format • Graphics – “Nobody Enjoys Regression Tables” 	 <i>Weekly Review Due Scenario Assigned</i>
16	April 25	• Final Examination Review	
F	May 2	Final Examination	

** check Canvas weekly for additional readings