EDUC/PSY 7610

Research Design & Analysis II

Tuesday & Thursday 4:30 - 5:45 pm
Room: EDUC 170

Instructor
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Office Hours: T/TH 3:00 – 4:15
Office: EDUC 453 or 456

Teaching Assistant
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Office Hours: TH 2:00 – 4:00 (email prior to attending)

Course Purpose

Research Design & Analysis II is designed to provide the student with a practical, applied approach to the application of fundamental behavioral and educational research design and statistical principles. Students will learn how to differentiate and appropriately select the best statistical methods for use in various research designs and analytical problems. This course will mostly focus on the general linear model, the building block of nearly all analyses discussed in EDUC/PSY 6600.

Two Prerequisites

1) Completion of **EDUC/PSY 6570** *'Introduction to Educational & Psychological Research'* (approved equivalent)
2) Completion of **EDUC/PSY 6600**

These prerequisites are **mandated** by the *College of Education & Human Services* to ensure that each student has the necessary background knowledge to be successful in this course. Both EDUC/PSY 6570 and EDUC/PSY 6600 must be completed with a passing grade **prior** to enrolling in EDUC/PSY 7610, precluding concurrent enrollment.

Course Structure

This is a lecture and applied skills course. Students will be expected to demonstrate their learning via *classroom participation, assignments,* and *examinations.* The purpose of class lectures is to elaborate on interesting or difficult material presented in the text, conduct skill-building exercises and demonstrations, and to provide a forum for discussion.

Required Materials

- Darlington, R.B. & Hayes, A.F. (2017). ***Regression Analysis and Linear Models: Concepts, Applications, and Implementation.*** New York: The Guilford Press.
- **Canvas** (**my.usu.edu**) Please check Canvas frequently for course updates, assignments, & grades.
- **R** and **RStudio** software (both are free; downloading and installing are discussed in class)
- **G*Power** software (free for PC or Mac at **www.gpower.hhu.de**)
- (Optional) Scientific or statistical **calculator** (may be a graphic calculator, but NOT a cell phone, iPod, tablet, etc.)

Note: it is advantageous to bring a laptop to class, but not required.

Preparation & Attendance

The nature of this course ***requires*** regular class attendance and participation. The student is therefore expected to read assigned chapters and any assigned readings **BEFORE** each class session in order to be prepared for classroom activities and discussion (see 'Summaries' below). Please note that this is a 3-credit course in a 15-week period, requiring an average of approximately 9 **HOURS of time outside of class EVERY WEEK** devoted to reading and homework for students who are adequately prepared for this course. Students should **not miss class lectures** as some material covered in class will not be covered in the text. All information covered in the text and lectures can be used for examination questions.

Three Components of Your Grade

I. Discussions, 30% of grade

By design, lectures are to enhance your understanding and experience with statistical concepts, rather than present them the first time (this is not an introductory course). It is of upmost importance that students read the material **PRIOR** to the designated lecture, as well as read through the associated homework assignment. This ensures class time may be more valuably spent on answering higher level questions and preparing students for assignments, but more importantly for conducting your own research. To facilitate this, a chapter **discussion point** of the assigned readings is due on the day the material is covered in class before the lecture time begins. This discussion point is to be posted on canvas and should include a summary of ideas from the chapter, questions that you have regarding the material, or ways in which you can use the material in your research. Further, each student must respond to at least one other student's point.

We will cover all 18 chapters in this course. You will need to provide a summary for all the chapters except for chapter 1. Each student must compose his or her own. Discussion points must NOT be a copy of the lecture notes. Discussion points will be turned in electronically by **4:00 pm** on the due date (see course schedule) via **CANVAS,** but preferably much earlier so as to allow fellow students to comment on or answer your discussion point.

II. Assignments, 35% of grade

Five equally weighted unit assignments and a Final Project form the basis for learning the practice of statistics at the level required by this course. The unit assignments make up 75% of the points in the assignment category while the Final Project is the remaining 25%. The Final Project will end up being a combination of many of the assignments throughout the class in a coherent, concise form. More information regarding the Final Project will be discussed in class. There is some flexibility to what the Final Project will look like and I recommend that you use it to help with theses, dissertations, or research articles.

The units are outlined on the course schedule. Details regarding what is required for each assignment will be available on Canvas and will be discussed in class. Assignments require the manipulation or analysis of data and professional communication of results. Each of the assignments will require analysis in R and RStudio and subsequent interpretation of the output. Additional reading of provided articles may be required, too. Instead of focusing on factual understanding (this will be tested on the examinations—see below), the assignments will provide students the opportunity to apply the material and communicate the results in a manner that will aid them in their research. Students may (and are encouraged to) work together; however, each student must turn in his or her own work, **not photocopies or identical replicates**.

All assignments are required: **no** scores will be dropped. Assignments are due by **11:59pm** on the due date (see course schedule). All of the examples in the lectures will be directly applicable to the assignments so it is prudent to bring the current assignment to each lecture. Further, time at the beginning of each lecture will be given for questions regarding the assignments.

III. Examinations, 35% of grade

Three equally weighted examinations will be given during this course (see schedule). Examinations will be given **IN CLASS** and will require **approximately 30-45 minutes**. Examinations will cover material discussed in class and in the readings. All formulas needed will be provided on examinations (rarely will be needed, if at all). Calculators may be used (but unlikely to be needed), but not any electronic device that may transmit/receive, such as cell phones, iPods, tables, etc.

Your lowest score on the exams will be dropped. Because of this, no exams will be made up unless the University requires that you be given an exception. In the event of an emergency the student must contact the instructor immediately and

BEFORE the examination. Examinations will focus on the factual understanding of the methods and approaches discussed in class through multiple-choice questions and some short essay questions. Students may use the **printed discussion points**, **homework, and other notes** during examinations. Only **45 minutes** will be given, so be prepared.

*NOTE: No exam is **comprehensive**, however all prior material can be used on every exam.

Grading Criteria

The standard grade breakdown 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:

	B+ 87-89%	C+ 77-79%	
A 93-100%	B 83-86%	C 73-76%	D 60-69%
A- 90-92%	B- 80-82%	C- 70-72%	F < 60

Advice for Success

Many of you will learn to appreciate, and may even develop a deep interest in, statistical analysis over the course of our semester together (hopefully!). You will likely see that statistical methods are tools in the social scientist's toolkit, which will help you to better interpret and understand the applied research of your given field and will be of great value to you in conducting your own research.

However, I understand that many of you are concerned about any math required in the course. Although statistics is a branch of mathematics, in this applied course we keep the level of mathematics to a minimum – arithmetic and high school algebra. So, please do not let a fear of mathematics prevent you from excelling in this course. Some of you may also fear work on the computer. The practice of modern statistics relies almost exclusively on computer software. I believe that learning a statistical computing language or syntax is key to the learning of statistics. However, you should expect some frustration as you begin to use the statistical software in this course, but as you gain experience you will come to appreciate the power of statistical software as a tool for discovery. So, be patient with yourself and the material, and keep finding answers to your questions.

A final word of warning: **Beware of technology misbehaving near deadlines**. All summaries and assignments are to be turned in before the strict deadlines. Additionally, most assignments require some use of R or other software to complete them. It is never reliable to count on technology to come through in time crunches.

R and RStudio

In this course, we will use R and RStudio for the computation of all statistical techniques discussed in class. Both R and RStudio work together to make our statistical life easier. We use both for R is, metaphorically, the engine while RStudio is the pedals and steering wheel. That is, once R is installed, we will only need to open RStudio to do everything we'll need to do. Both programs are free and, in general, can do much more with data and analyses than other programs. R can be downloaded from https://cran.cnr.berkeley.edu/. RStudio can then be downloaded from https://www.rstudio.com/. Although the R syntax can be intimidating at first, we will cover all the syntax that you will need. My hope is that you will begin to feel comfortable using R to the point of using it in your own research.

Notably, there are many sources for learning more about R online, including several free books (e.g., tysonbarrett.com/Rstats). The reason this software was chosen for this class is because of its ability to reproducibly and succinctly run any analyses that you will be needing throughout your research and/or analytic career.

* Note: An introductory R course is being offered concurrent to this course, Thursdays at 1pm.

Selected Policies & Procedures

Changes in Assignments and Schedule

The instructor reserves the right to make changes to this syllabus at any time. Changes will be announced in class and posted on Canvas.

Students Needing Assistance with the English Language

Several assignments in this course require English composition. If you feel you need assistance, please visit the USU Writing Center. They have tutors available to help: http://writingcenter.usu.edu.

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;
- 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.

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

Qualified students with disabilities may be eligible for reasonable accommodations. 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 voice, 797-0740 TTY, or toll free at 1-800-259-2966; Room 101 of the University Inn), 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. In such cases an 'I' will be submitted as the grade for the semester. 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.

Syllabus for Fall 2018 – EDUC/PSY 7610

Date	Day	Discussion Due by 4:00pm	Lecture Topic	Unit	Assignment Due by 11:59pm
Aug 28	Tues		Syllabus, Textbook, and R/RStudio	0	
Aug 30	Thur	Ch 1	Statistical Control & Linear Models (and more R)		
Sep 4	Tues	Ch 2	The Simple Regression Model	1	HW 1
Sep 6	Thur	Ch 3	Partial Relationship & Multiple Regression		
Sep 11	Tues	Ch 4	Statistical Inference in Regression		
Sep 13	Thur	Ch 5	Extending Regression Principles		
Sep 18	Tues	Ch 6	Statistical vs. Experimental Control		
Sep 20	Thur		Exam 1		
Sep 25	Tues	Ch 7	Regression for Prediction	2	HW 2
Sep 27	Thur	Ch 8	Assessing the Importance of Regressors		
Oct 2	Tues				
Oct 4	Thur	Ch 9 & 10	Multi-categorical Regressors		
Oct 9	Tues				
Oct 11	Thur	Ch 11	Multiple Tests		
Oct 16	Tues		Exam 2		
Oct 18	Thur	Ch 12	Nonlinear Relationships	3	HW 3
Oct 23	Tues	Ch 13	Linear Interaction		
Oct 25	Thur				
Oct 30	Tues	Ch 14	Probing Interactions		
Nov 1	Thur	Ch 16	Diagnostics (Detecting Irregularities)		
Nov 6	Tues	Ch 17	Miscellaneous topics	4	HW 4
Nov 8	Thur				
Nov 13	Tues		Catch Up Day		
Nov 15	Thur		Exam 3		
Nov 20	Tues		THANKSGIVING (No Class)		
Nov 22	Thur				
Nov 27	Tues	Ch 18	Logistic Regression	5	Final Project
Nov 29	Thur				
Dec 4	Tues		Generalized Linear Models		
Dec 6	Thur	Ch 15	Mediation Analysis		
Dec 11	Tues		Final Week (No Class)		