EDUC 7312-01 Research III Advanced Design and Methods

University of Mary Hardin-Baylor

Fall 2020

1 Concact Information

Instructor: Aaron R. Baggett, Ph.D.
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Office Location: Wells 140
Office Hours: MWF: 9:00 AM–11:00 AM; MW: 1:00 – 3:00 PM; TR: 1:00 PM – 3:00 PM, and by appointment

> NOTE: All student meetings for the Fall 2020 semester will occur via Dr. Baggett's personal Zoom ID

1.1 Description

The purpose of Research III is to explore both quantitative and qualitative methods with an emphasis in data analysis. Topics include inferential statistics, triangulation of data, and rigor. Students will develop a research proposal. SPSS software will be used for quantitative analysis.

1.2 Meeting

Dates:

Students enrolled in EDUC 7312: Research III Advanced Design and Methods will meet together a total of five times throughout the Fall 2020 semester between 8:30 PM–12:00 PM in the Parker Academic Center (PAC) room 222

1. Saturday, September 12, 2020, PAC 222
2. Saturday, October 03, 2020, PAC 222
3. Saturday, October 24, 2020, PAC 222
4. Saturday, November 14, 2020, PAC 222
5. Saturday, December 05, 2020 (written qualifying exam), PAC TBD

Course Website: myCourses

1.3 Advanced Academic Activity

Doctoral courses contain appropriate advanced academic activity reflected in the areas of content, process, and product. The advanced activity is facilitated through the dimension of critical thinking, synthesis and integration of materials, depth of engagement of materials, and contribution to scholarship. The purpose of advanced academic activity is to demonstrate a higher level of sophistication and to emphasize separation from masters level courses.

1.4 Course Objectives

Upon completion of this course, you should be able to:

1. Understand basic to intermediate principles of statistics needed to both consume and conduct educational and social science research.
2. Communicate and present statistical ideas clearly in oral and written forms using appropriate technical terms and deliver data analysis results sufficient for both a technical and non-technical audience.

1.5 Student Learning Objectives

Upon completion of all course modules, you should be able to:

1. Module 1: Introduction to Data

    1. Identify variables as numerical and categorical and further classify based on the nature of the
    2. Define associated variables as variables that show some relationship with one another. Further categorize this relationship as positive or negative association, when possible.
    3. When describing the distribution of a numerical variable, mention its shape, center, and spread, as well as any unusual observations.
    4. Identify the shape of a distribution as symmetric, right skewed, or left skewed, and unimodal, bimodal, multimodal, or uniform.

2. Module 2: Foundations for Statistical Inference

    1. Define the standardized (Z) score of a data point as the number of standard deviations it is away from the mean:
    $$Z = \frac{x - \mu}{\sigma}$$
    2. Use the Z-score to determine the corresponding percentile score of a data point as well as to assess whether or not a particular observation is considered to be statistically unusual ($\pm$ 2 standard deviations away from the mean)
    3. Assess whether or not a distribution is nearly normal using the 68-95-99.7% rule or graphical methods such as a normal probability plot.
    4. Define sample statistic as a point estimate for a population parameter, for example, the sample proportion is used to estimate the population proportion, and note that point estimate and sample statistic are synonymous.
    5. Recognize that point estimates (such as the sample proportion) will vary from one sample to another, and define this variability as sampling variation.

3. Module 3: Statistical Inference for Numerical and Categorical Data

    1. Define population proportion p (parameter) and sample proportion $\hat{p}$ (point estimate).
    2. Calculate the sampling variability of the proportion, the standard error, as:
    $$SE = \sqrt{\frac{p(1-p)}{n}},$$
    where p is the population proportion.

- Note that when the population proprtion, p, is not known (amlost always), this can be estimated using the sample proportion, $SE = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$.

3. Use the t-distribution for inference on a single mean, difference of paired (dependent) means, and difference of independent means.
4. Explain why the t-distribution helps make up for the additional variability introduced by using s (sample standard deviation) in calculation of the standard error, in place of σ (population standard deviation).
5. Use a t-statistic, with degrees of freedom $df = n - 1$ for inference for a population mean

4. Module 4: Simple and Multiple Regression

1. Define the explanatory variable as the independent variable (predictor), and the response variable as the dependent variable (predicted).
2. Produce scatterplots of response variables (y) against explanatory variables (x).
3. Fit a simple linear regresion model using statistical software.
4. When describing the association between two numerical variables, evaluate direction and strength.

1.6 Credit Hour(s)

For online, hybrid, and other nontraditional modes of delivery, credit hours are assigned based on learning outcomes that are equivalent to those in a traditional course setting; forty-five (45) hours of work by a typical student for each hour of credit.

1.7 Readings

Students are required to obtain a copy of the following required textbook.

Diez, D. M., Çetinkaya-Rundel, M., & Barr, C. D. (2019). *OpenIntro statistics* (4th ed.). OpenIntro.

All other assigned readings will be provided on the `course website` under the `Readings` tab.

1.8 Required Software

Any data and statistical analyses in EDAD 7312 will be conducted using IBM® SPSS® Statistics. During class meetings, students may access local SPSS® installations on campus computers. However, you may consider purchasing at least a 6-month license to download and install SPSS® on your own computer(s). Below are a few online educational software retailers who offer heavily discounted versions of IBM® SPSS® Statistics for students.

Note: As of August 25, 2020, the latest version number is 27 However, versions 23, 24, 25, and 26 should also be compatible for all data analyses conducted throughout this course. Keep in mind previous versions sell for the same price as the current version. Prior to purchasing SPSS® be sure you are selecting the versions compatible with your particular computer's operating system (i.e., Windows, macOS, etc.). IBM® SPSS® Statistics is not compatible with iOS, iPadOS, or Chrome OS.

How to purchase SSPS:

> NOTE: IBM® SPSS® Statistics Standard GradPack will be sufficient for EDUC 7310. No need to purchase the Premium GradPack.

1. `OnTheHub`
    1. Select Students buy now.
    2. Scroll down until you find your computer's operating system (i.e., Windows, macOS, etc.) and your desired rental duration (i.e., 06- or 12-month).
    3. Add to Cart.
2. `journeyEd`

1. Scroll to approximately one-third of the way down the page and look for IBM SPSS Statistics Standard Grad Pack 27.0 Academic.
2. Select the link applicable to your operating system.
3. Note: only 12-month licenses are available from journeyEd.

1.9 Academic Integrity

UMHB's policy on Classroom Expectations and Ethics will be strictly upheld in this course. If you have not read it and all subsequent sections, it is your responsibility to do so. You may find it online here: Classroom Expectations and Ethics. The omnibus policy outlines University requirements concerning Christian citizenship, students' responsibilities, class attendance, academic decorum, and academic integrity.

1.10 Disabled Student Services and Accomodations

It is the student's responsibility to request disability accommodations. Students requesting an accommodation for a disability, must contact the UMHB Counseling, Testing & Health Services as early as possible in the term. The Course Catalog, Student Handbook and UMHB website provide more details regarding the process by which accommodation requests will be reviewed.

For more information, please contact:

Blayne Alaniz, Director of Student Disability Services and Testing Services
UMHB Box 8437
900 College Street
Belton, Texas 76513
Office: (254) 295-4739
Fax: (254) 295-4196
Email: balaniz@umhb.edu

1.11 Course Structure

All assignments and other coursework are completed individually. However, during and between certain class meetings you may either be assigned to or asked to form small groups in order to collaborate on data analysis projects and/or presentation(s) You will be guided through the following course learning modules. See Section 1.5 for corresponding student learning outcomes per learning module.

1.11.1 Learning Modules

EDAD 7312 is divided into four (4) learning modules:

1. Introduction to Data
2. Foundations for Statistical Inference
3. Statistical Inference for Numerical and Categorical Data
4. Simple and Multiple Regression

1.12 Course Communication

1.12.1 Email

Most all course communication outside of class will take place via email. I will routinely email you course updates and announcements to your UMHB-assigned email address. Thus, you should check your email frequently. Likewise, due to the nature of this class and the corresponding assignments, you will likely need to contact me with questions. I am committed to responding as quickly as possible to your questions via email. As a result, you can expect me to respond, on average, within several hours of your email—often sooner. However, in some circumstances, a personal visit during office hours or other scheduled appointment may be more efficient than

email. You are welcome to call me on my office line: (254) 295-4553. This can be an even more efficient method for quick troubleshooting inquiries.

1.12.2 Remind

There may be occasions when alerting you to course-related updates may be most effective in real-time. In these situations, I will communicate with you through a free, safe, and one-way messaging service called Remind. To sign up for these alerts, text **@educ7312** to 81010 and follow the instructions. If you have trouble with this method, try texting **@educ7312** to (254) 296-8301. Additionally, although not likely, there may be extenuating circumstances which require me to delay and/or cancel a class or other meeting.

2 Course Requirements

2.1 Individual and Team Assignments

2.1.1 Journal Article Critique

The purpose of this assignment is to read and examine critically all sections of a peer-reviewed journal article. As a student of educational research, it is imperative that you gain familiarity and comfort with the structure/purpose of the scientific literature. A detailed submission template and grading rubric are available `here`.

For each critique, you will select one quantitative research article published within the last five years in a peer-reviewed journal. You are free to select any article from any reputable, peer-reviewed journal under the following conditions:

1. The topic of research and theoretical framework are *unrelated* to your planned dissertation research.[1]
2. However, the author(s) utilized quantitative methodology similar to or identical to that of your own planned research, as you currently understand it.

Journal article critiques are due on the following dates:

1. Sunday, September 27, 2020
2. Sunday, October 11, 2020

2.1.2 Special Topics Team Presentation

This assignment consists of small groups of students presenting one or more special topics from a section(s) of assigned readings from the respective module. Teams should prepare a thorough lecture with accompanying slides, handouts, etc. You should use no fewer than three additional academic resources, not counting the textbook, to supplement your presentation. Lectures should be organized, rigorous, and comprehensive. You should assume the burden of responsibility for providing your peers everything you can in order to ensure they have as complete an understanding about your assigned topic(s) as you and your partner. They will do the same.

See `Special Topics Presentations` under Files in the course Canvas page for your team's assigned topics.

Team numbers and student pairs were generated using a random sampling permutation method. Based on the team number, chapter assignments and dates were implemented by the instructor.

[1] The purpose of forcing you to branch outside of your own topic/theoretical framework is to allow you to, hopefully, experience different approaches to your own planned quantitative methodology. For example, various disciplines use a variety of nomenclature to describe the elements of research methods and design. Assume you have committed to learning how to play classical piano. All you listen to, practice, and perform are arrangements from the classical greats. However, imagine the perspective you might gain by listening to a jazz pianist improvise? The point is to expose you to various ways in which your methodology is implemented in other "genres" of research outside of you own. The more familiar you can be with your methodology now, the better off you will be both during your oral qualifying exam as well as your dissertation proposal presentation.

Table 1: Special Topics Team Presentation Dates

Team	Students	Topics	Presentation Date
1.	Darla Forsberg Jeanette Jacobs	Ch. 1	Saturday, September 12, 2020
2.	Katy Trotty Julia Venghaus	Ch. 2	Saturday, September 12, 2020
3.	Athina Katseyeanis Douglas Schroder	Ch. 4	Saturday, October 03, 2020
4.	Deena Cornblum Eugenie Snaith	Ch. 5	Saturday, October 03, 2020
5.	Ashley Bernard Devita Jo Joy	Ch. 6	Saturday, October 24, 2020
6.	Gara Alexander Allison Younger	Ch. 6	Saturday, October 24, 2020
7.	Heather Metzgar Danielle Whitehead	Ch. 7	Saturday, November 14, 2020
8.	Damon Adams Amber Thompson	Ch. 7	Saturday, November 14, 2020

2.1.3 Individual Data Analysis Lab Assignments

Individual lab assignments will feature a series of guided, application-based, statistical analysis prompts that you will complete using IBM® SPSS® Statistics. These assignments require you to apply what you learn within each of the course modules. Each lab assignment will include a detailed set of directions available on the course website. Additionally, you will be provided a skeleton-like lab report template for each of the lab assignments. More details on completing the lab assignments will be provided in class. Table 2 below contains the topic and due date for each lab assignment. *Note*: These are individual assignments. All elements of the academic integrity policy will be upheld.

Table 2: Individual Lab Assignment Dates

	Topic	Due
1.	Introduction to Data	09-20-2020
2.	The Normal Distribution	10-04-2020
3.	Sampling Distributions and Confidence Intervals	10-18-2020
4.	Inference for Categorical Data	11-01-2020
5.	Inference for Numerical Data	11-08-2020

2.2 Grade Calculation

2.2.1 Individual and Team Performance

Table 3 below lists all assignments, their point value, and proportion of weighted total. See Table 4 for final grade calculation and letter grade distribution.

Table 3: Individual Assignments and Point Values

Assignment	*n*		Points		Total	Prop.
Journal Article Critiques	2	×	100	=	200	.30
Special Topics Team Presentations	1	×	100	=	100	.20
Individual Lab Assignments	3	×	10	=	30	.20
Attendance	5	×	1	=	5	.05
Individual Performance Total				=	435	1.00

2.2.2 Final Grade Calculation

All course grades will be posted in the gradebook in myCourses. All point totals and proportional weights listed in Table 2 are reflected in myCourses. Thus, your current grade in myCourses should reflect your actual grade. Table 4 below describes the point range required to achieve a given letter grade.

Table 4: Final Grade Point Range Requirements

Grade	Point Range	Percentage	Grade Points
A	391.50 – 435.00	90 – 100	4.0
B	348.00 – 232.00	80 – 89	3.0
C	304.50 – 347.00	70 – 79	2.0
D	261.00 – 303.50	60 – 69	1.0
F	000.00 – 260.00	00 – 59	0.0

3 Policies

3.1 Attendance

Your regular attendance and participation in this course is expected. I will record and maintain attendance records for each student. Attendance is worth 5% of your final grade. In other words, if you attend 050% of the scheduled class meetings you will earn the complete 5% attendance total. Any University- or otherwise-excused absence will not count toward this total. At the conclusion of the semester, the percentage of class meetings you attended will be multiplied by 0.05 to obtain your attendance grade.

3.2 Late Work

All assignments are considered late if submitted after the date and time specified in the syllabus and/or course website. This policy will be enforced in the event that assignment deadlines are revised during the course of the term. Assignments submitted late will result in a penalty of 20 percentage points per day.\

For example, if an assignment is due on March 22, 2020 and is submitted within 24 hours of the due date and time that assignment will result in an automatic deduction of 20 percentage points from the assignment raw score. In other words, if you submit an assignment worth 10 points on March 23, 2020, and the assignment was originally due March 22, 2020, and you score a 9.5/10, then your new score would be:

$$9.5 - (9.5)(0.20) \times 100 = 7.6. \tag{1}$$

Assignments submitted more than five calendar days late will receive a grade of zero. To ensure fairness, this policy will be strictly enforced. Exceptons are made at the discretion of the instructor and may include, but are not limited to:

1. Death in the immediate family (parent, spouse, sibling, child)

2. Unforeseeable medical emergency affecting yourself, your spouse, or your child (e.g., automobile accident, major sickness, et al.).
3. Participation in an official UMHB-sponsored event

Note: Routine medical appointments or clinical visits related to minor illnesses do not qualify as an unforeseeable medical emergency. Likewise, conflicts with a work schedule or trips not related to official UMHB events do not qualify for assignment absolution.

4 Disclaimer

Syllabus is subject to change at instructor's discretion.

5 Course Calendar

Module	Week	Date	Reading
Introduction to Data	1	Saturday, September 12, 2020	Chs. 01–02
Foundations for Statistical Inference	2	Saturday, October 03, 2020	Chs. 04-05
Statistical Inference for Numerical and Categorical Data	3	Saturday, October 24, 2020	Ch. 06-07
Simple and Multiple Regression	4	Saturday, November 14, 2020	Ch. 08
Written Qual. Exams	5	Saturday, December 05, 2020	–

6 Calendar of Due Dates

Month	Date	Due
January	Friday, January 31, 2020	Team 1 Presentation
	Friday, January 31, 2020	Team 2 Presentation
	Friday, January 31, 2020	Team 3 Presentation
February	Sunday, February 09, 2020	Article Critique #1
	Sunday, February 16, 2020	Lab 01
	Friday, February 21, 2020	Team 4 Presentation
March	Sunday, March 08, 2020	Lab 02
	Sunday March 29, 2020	Article Critique #2
April	Sunday, April 05, 2020	Lab 03
	Sunday, April 05, 2020	Chapter 3 in a Nutshell