Saint Mary's University of Minnesota

Schools of Graduate and Professional Programs

Minneapolis

Fall 2021

EDD823 Quantitative Research Design and Methods

3 credits

Face-to-Face

Course Dates/Hours
October 27th, November 3rd, 10th, 17th, 24th(online) December 1st, 8th, and 15th, 2021

Prerequisite or Concurrent Courses

 EDD 809, 814, 821 and a Masters-level statistics course

Faculty Contact Information –
Paul E. Kotz, Ph.D.
       612-728-5130 (office)
       651-487-3179 (home)
       pkotz@smumn.edu

Available - 1 hour before class. I am also available via email or a virtual meeting when requested. Please contact me to make an appointment.

Course Description:

This course explores quantitative research methods. It includes a general survey of descriptive statistical techniques, selection of appropriate statistical measure, development of samples or databases, and analysis of findings. Computer application and use of statistical programs to develop, manipulate and analyze data will constitute an integral part of the course.

Student Learning Objectives:

Upon completion of this course, the student should be able to:

1. Analyze and evaluate the application of various quantitative methods.

2. Evaluate quantitative research.

3. Evaluate quantitative sampling and statistical power analysis.

4. Evaluate results/interpretation techniques.

5.   Apply and evaluate research ethics to a quantitative research design.

6.   Evaluate quantitative data analysis.

Blackboard Access
Blackboard may be accessed here at <u>courses.smumn.edu</u>

Required Textbook

Jackson, S.L. (2016). *Research Methods and Statistics – A Critical Thinking Approach*.
     Boston, MA: Cengage Learning. ISBN 13-978-1-305-25779-5

Suggested Texts:

Black, T. (1999). *Doing quantitative research in the social sciences*. London, UK: Sage.
     ISBN 0 7619 5353 1

Bernard, H. R. (2000) *Social research methods.* Thousand Oaks, CA: Sage. ISBN
0-7619-1403-X

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2011). *How to design and evaluate research in education (8th ed.).* New York, NY: McGraw-Hill. ISBN-13: 978-0-07-809785-0

You may find that the Bernard text is very good for learning about Factor Analysis.
The Fraenkel and Wallen text is very helpful for understanding reliability and validity.

Software:

Use of Excel will be necessary for coursework, but purchase of software programs such as Minitab or other programs is optional. If you go to Minitab.com, you can download a 6 month copy for $29.99 or a school version for a longer duration at $99. We will examine computer printouts and analyze data to make conclusions and recommendations for observational studies and experiments. If you can get access to a TI-83 or 84 calculator, this would help you in this course with mathematics and the use of statistical models.

** Note: Minitab will be available in our classroom for demonstrations and class work.

Other Resources

Brown, R. (2016). What I Learned About Our Healthcare System While Waiting for Hip Surgery.
Huffington Post. Retrieved from
<u>https://www.huffingtonpost.ca/rob-brown/wait-times-hip-surgery_b_8044828.html?utm_hp_ref=tw&guccounter=1</u>

Campanelli, P, Martin, E., & Rothgeb, J. (1991). The Use of Respondent and Interviewer Debriefing Studies as a Way to Study Response Error in Survey Data. *Journal of the Royal Statistical Society.* Special Issue: Survey Design, Methodology and Analysis, *40*(3), 253-264.

Casarett, D, (2006). The median is not the only message. *Annals of Internal Medicine, 145*(9),700-701.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155-159.

Gould, S. (2013). The median isn't the message. *AMA Journal of Ethics, 15*(1), 77-81.

Lehmkuhl, L.D. (1996). Nonparametric statistics: Methods for analyzing data not meeting assumptions required for the application of nonparametric tests. *Journal of Prosthetics and Orthotics, 8*(30), 105-113.

Technical Support
For technical support, contact our HelpDesk at the following:

HelpDesk Website

tchelpdesk@smumn.edu

612-728-5100: x7800, local Twin Cities

866-437-2788; Choose HelpDesk menu option

Topical/Activity Course Outline

Week/ Dates	Type of Meeting	Topics/Activities	Readings / Assignments DUE
Week 1 October 27th	face-to-face	**Topics:** Introduction to Quantitative Research **Online Learning Activities:** • Introductions • Discussion forum "Evaluating Basic Statistics"	**Readings DUE:** Jackson (2016) Chapters 1-2 Optional: Read Fraenkel and Wallen (2006) Chapters 6, 8, 9, 13 Optional: Read Bernard (2000) Chapters 1-5, 14

| Week 2

November 3rd | face-to-face | **Topics:** Descriptive Statistics and Techniques for Analysis

-Introduction and Orientation
-Learning Style Inventory
-Measures of Central Tendency
-Standard Deviation
-Scientific Method
-Deductive and Inductive
-Logic – Venn Diagrams
-Experimental Design
-Sampling
-Parametric Statistics

Learning Activities:

- Interactive presentation
- Large group discussion
- Practice activity | **Readings DUE:** Jackson (2016) Chapters 3-4 |
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| Week 3

November 10th | face-to-face | **Topics:** Normal Distributions and Skewed Data Analysis Techniques, Decision Analysis, Ethics

-Descriptive Statistics
-Box Plots – Min, Q1, Median, Q3, Max
-Measures of Variability revisited
-Probability Theory/Expected Value
-Tree Diagrams
-Measurement
-Quality Control
-Instrument Reliability and Validity
-Statistical Inference (Z-test)
-Breakeven Analysis
-Marshmallow Experiment
-Design of Experiments
-Guide for Critiquing Articles

Learning Activities:

- Interactive presentation
- Video discussion
- Practice activity | **Readings DUE:** Jackson (2016) Chapters 5 and 7

Assignment DUE: 1st Problem Set |

		Online Learning Activities: ● Quiz ● Discussion board: Critique Campanelli, Martin, & Rothgeb (2010) research article ● Proposal-in-progress journal	
Week 4 November 17th	face-to-face	**Topics:** Visual Representations of Data; What are Hypothesis Tests?; Parametric and Introduction to Non-Parametric Tests -Statistical Graphs -Tests of Hypotheses -Type I and II Errors -Formula Sheet/Symbols -Z-tests - Heights of Large Groups and Parking Spots example -Review of Concepts on Parametric Stats -Introduction to Nonparametric tests (Chi-Square, Mann-Whitney, Kruskal-Wallis)	**Readings DUE:** Jackson (2016) Chapter 5-6 Cohen, Jacob. (1992). A power primer. Lehmkuhl, L. Don. (1996) Nonparametric statistics. Optional: Read Fraenkel and Wallen (2006) Chapter 11.
Week 4	face-to-face	**Topics:** Applications of Parametric Tests for Research Studies -Parametric Tests -Standard z-score problems -2 Sample independent t-test - Fish Friends Example -Paired t-test – Manual Dexterity problem -T-tests revisited -ANOVA -Introduction to Non-Parametric tests -Chi-Square one-way tests -Probability revisited -Pearson Correlation meaning and -interpretation/Scatterplots/Regression	**Readings DUE:** Jackson (2016) Chapter 6, Chapter 8 Optional: Read Bernard (2000) Chapter 15. Optional: Read Fraenkel and Wallen (2006) Chapters 15-16.

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Week 4	face-to-face	**Topics:** One-Way/Two-Way Chi-Square Tests and Working with Nominal Data -Pizza data correlation problem -Dish detergent suds correlation/regression example -When to Use Statistical Tests -Chi-Square Two-Way table – College Education Example -Chi-Square test of Association/Independence – Job Experience and Gender -Kruskal-Wallis - Quality of Three Wines -How to Handle Likert Scale Data •	**Readings DUE:** Jackson (2016) Chapter 8, Chapter 14, Chapter 9
Week 4	face-to-face	**Topics:** Review of Parametric tests for Decision-Making; ANOVA Examples/Non-parametrics (cont.) -Z-test: Distracted Driving Example -Interpreting p-values -Chi-Square Goodness of Fit with proportions: Moose Population -Mann-Whitney – Effectiveness of Advertising -When to Use Statistical Tests -Correlation – Exercise Example/Fast Food/Fine dining/At home -Regression Analysis -Kruskal-Wallis Revisited: Tertiary Care Example -Experiments: Shrimp Example -Factor Analysis	**Readings DUE:** Jackson (2016) Chapter 11 Optional: Read Bernard (2000) Chapter 16, and pp. 582-592; 620-639
Week 4	face-to-face	**Topics:** Introduction to Hypothesis Testing in Applied Settings	**Readings DUE:** Jackson (2016) Chapter 7

		-Hypothesis testing – Chest Compressions versus MMR -Hypothesis testing - Physical Fitness tests -Type I & II errors revisited -One –Way ANOVA – Tertiary Care Hospital -Case Loads (Normal Distribution) -Mann Whitney revisited - Tertiary Care -Hospital Case Loads (Interval level/Non-Normal) -Two –Way ANOVA – Reflective Striping on Different Surfaces **Learning Activities:** • Interactive presentation • Small group practice activity • Large group discussion Practice activity **Online Learning Activities:** • Quiz • Discussion board: Critique Gould (2019) research article • Proposal-in-progress journal	
Week 5 November 24th	online	**Topics:** Hypothesis Testing Revisited **Online Learning Activities:** • Quiz • Discussion board: Critique Casarett (2006) research article • Proposal-in-progress journal	**Readings DUE:** Jackson (2016) Chapter 11 **Assignment DUE: 2nd Problem Set**
Week 6 December 1st	face-to-face	**Topics:** Correlation Analysis with Likert Data, Scatterplots, & Regression -Pearson versus Spearman Correlation **Online Learning Activities:** • Quiz	**Readings DUE:** Jackson (2016) Chapter 12 **Assignment DUE: Journal article critique** by Sunday, 12/5 @ 11:59pm (CT)

		• Discussion board: Critique Lehmkuhl (1996) research article • Proposal-in-progress journal • **Final Exam Practice Review**	
Week 7 December 8th	face-to-face	**Topics:** Discussion of Power; Parametric vs. Nonparametric Hypothesis Testing - Use of ANOVA versus Mann Whitney & Kruskal-Wallis tests **Online Learning Activities:** • **No quiz** this week • Discussion board: Critique Cohen (1992) research article • Mann Whitney application activity "Coffee Example" • Kruskal-Wallis application activity "Wine Tasting" • Proposal-in-progress journal	**Readings DUE:** Jackson (2016) Chapter 8 **Assignments DUE:** **Final exam** by Sunday, Dec 12th @11:59pm (CT)
Week 8 December 15th	face-to-face	**Topics:** Final Presentations: Draft, Peer Review, Polish, and Submit **Online Learning Activities:** • Discussion board: Proposal presentation peer review & polish	**Readings DUE:** none **Assignments DUE:** **Proposal Presentation & Executive Summary** by Sunday, Dec 19th @ 11:59pm (CT)

Course Time Standards

Doctoral courses

Courses in the doctoral degree programs require a minimum of either 13 contact or instructional hours per credit. In addition, it is suggested that students invest three hours per contact hour in outside study.

Synopsis of Assignments

1. **Journal Article Critique**- Each student will select two academic journal articles that are located in our Blackboard course site for a critique. Each critique must address one

article that contains a parametric statistical model and one that has a nonparametric statistical model. For each article, the student is expected to follow the approach posted by Dr. Kotz in their Research Reports. Each critique should follow APA style guidelines, and demonstrate adherence to the university's Social and Ethical guidelines described in the student handbook. The paper should include *both* critiques and be 7-9 pages not including the title page and reference page. The student should prepare these assignments so that he or she can readily identify which sections pertain to each learning objective. Please see the <u>rubric</u> for further details.

(SLO 1-6) 40 points DUE: Sunday, 12/5 by 11:59pm (CT)

2. **Research Proposal Presentation & Executive Summary-** Each student will provide a non-narrated presentation of a research proposal which uses quantitative analysis. The presentation can be created by using Powerpoint software or Google Slides. A 2-page executive summary should be developed as well that describes the proposal in a concise and complete manner. The completed presentation and executive summary should be posted to the assignment tool in Blackboard. Students will be expected to peer review 2-3 classmate's presentations (in your assigned groups) during week 8 and provide *productive* and *valuable* feedback. Please see the <u>assignment guide</u> and the <u>Executive Summary rubric</u> and <u>Proposal Presentation rubric</u> for further details.

(SLO 1-6) 60 points (40 points presentation; 20 executive summary)
DUE: Sunday, Dec 19th at 11:59pm(CT)

3. **One Final Exam-** Each student will take a final exam which assesses quantitative research concepts in this course. The main focus will be on distinguishing the difference between parametric and nonparametric tests, the use of correlation and regression analysis techniques, and appropriate hypothesis testing The exam contains multiple-choice and open-ended questions. A preparation exam will be given to help master the concepts during week 4.

(SLO 1-6) 20 points DUE: Sunday, Dec. 12th by 11:59pm (CT)

4. **Online Learning Activities:**

a. **Online Discussion Forum: Research Article Critiques-**

During the online weeks 3 through 7, a discussion forum will be provided to give students the opportunity to discuss in small groups their understanding of quantitative research design. Each discussion forum will provide a brief research article for students to critique in their designated small group. Each group will post their critique on the discussion board **by Friday at 11:59pm (CT)**. Everyone, individually, should then read the article critique posted by the other groups and reply with comments or questions. Be

sure to read the comments and questions your group receives as well. **The forum will end on Sunday at 11:59pm (CT).** All students are expected to participate and use proper netiquette: be professional, considerate, respectful, avoid sarcasm, and do not share comments and work from classmates with anyone outside the class.

(SLO 1-6) 4 points each X 5 = 20 points

b.   Online Quizzes-

During the online weeks (3-6) a brief quiz will be provided to assess students' knowledge of the concepts for the week. The quiz can be taken twice and the highest score will be recorded. The quiz needs to be **completed by Sunday at 11:59pm (CT).**

(SLO 1-6) 5 points each X 4 = 20 points

c.   Online Proposal-in-Progress Journal-

During the online weeks (3-7) students will draft their thoughts and ideas regarding various elements of their research proposal presentation and executive summary which is due at the end of week 8. Students are expected to post their responses to the instructor-provided questions in the journal tool **by Sunday at 11:59pm (CT).**

(SLO 1-6) 2 points each X 5 = 10 points

d. Problem Sets-

During class, each student is required to complete two problems sets that demonstrate use of different statistical models covered in the course. We will go through examples during our residency meetings. Students will need to demonstrate what they know and apply their knowledge in the problem sets.

(SLO 1-6)
Problem Set #1 20 points DUE: November 10th
Problem Set #2 30 points DUE: November 24th

Student Expectations
To be successful in this course, students must be present and engage in the course during the online weeks and during our residency. Students must complete all assigned reading materials in a timely manner, monitor and participate in any asynchronous discussions, complete the proposal-in-progress journals, and take the online quizzes by the designated due dates. The role of the instructor is to guide the thinking of the students as a facilitator of learning and to keep the instruction "on task." The process of learning takes place in the mind of each student. The

goal of the instructor to facilitate learning using appropriate questioning and dialogue techniques.

All discussions are expected to focus on professional issues associated with the course and should not concern personal issues.

The goal of this course is to make each student think in new and different ways about research. It is expected that students will adopt a global perspective on all issues that at least recognizes the discussions in class as well as the assigned readings.

All course assignments are due on the designated due dates. If a 2-3 day extension beyond the due date is needed, contact the instructor for permission. No extensions beyond the due dates will be granted for the online learning activities.

Assessment of Student Performance/Grading Policies

Journal Article Critique		40 points
Research Proposal Presentation		40 points
& Executive Summary		20 points
Final exam		20 points
Activities		
Discussion Forums	4 X 5 =	20 points
Quizzes	4 X 5 =	20 points
Proposal-in-Progress	2 X 5 =	10 points
Problem Sets	20 + 30 =	<u>50 points</u>
		220 points

Graduate Grading Scale		
A	90-100%	198-220 pts
B	80-89%	176-197 pts

| C | 70-79% | 154-175 pts |
| NC | below 70% | Under 154 pts |

Access Services for Students with Disabilities
Saint Mary's University is committed to ensuring that students with documented disabilities have access to equal educational programs and activities at the university. If you have, or believe you may have, a disability that may interfere with your ability to participate in the activities, coursework, or assessments of this course, you may be entitled to accommodations. Please contact Laura Lanning at accessservicessgpp@smumn.edu, as early in the semester as possible to arrange a confidential discussion about your need for accommodations.

Student Ratings of Teaching and Learning
Students are expected to provide feedback about teaching and learning in the course. Near the end of the course, find a link to the student rating of teaching and learning in your SMUMN email and on your course site in either Blackboard or Engage. Please be assured the system records responses anonymously.

University Conduct and Academic Policies
See the course Blackboard site for a direct link to all University policies.

Writing Center and Library Services
See the course Blackboard site for direct links to these departments.