**DESIGN AND ANALYSIS IN EDUCATION I**

 **(ERMA 7300)**

**FALL 2021**

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Class hours: Mondays, 5-7:50PM Email: kks0013@auburn.edu

Office hours: By appointment (use provided link) Office Address: 4018 Haley Center

# COURSE DESCRIPTION:

Basic methods of descriptive and inferential analysis including *t*-tests, between and within subjects ANOVA, mixed ANOVAs, and hierarchical designs as they are utilized in educational research.

# COURSE OVERVIEW:

The purpose of this course is to acquaint students with the process of research design and statistical analysis in education. A specific emphasis of this course section is on quantitative methods for equity and justice in education. This class begins with basic concepts in quantitative research, then focuses on univariate group comparisons. My goal for this course is that you will understand quantitative group comparisons in educational research, apply those analyses to real-world research problems, develop the skills to be an independent researcher, learn to work collaboratively on research problems, and develop long-range interest in critical quantitative educational research. In addition, my goal for this course is that you will critically reflect on your own philosophy of knowledge and research, your own positionality, and how those interact with the assumptions and practice of quantitative research methods.

# LEARNING OBJECTIVES:

On completion of the course, with an emphasis on equity and justice-oriented research, you will be able to:

1. explain the process of hypothesis testing and apply to research problems;
2. identify different types of research designs and variables found in published articles;
3. describe the strengths and limitations of different research designs;
4. identify applications of a variety of statistical procedures;
5. solve educational research problems using statistical tests of significance;
6. understand and apply various effect size estimates;
7. make accurate interpretations of statistical findings;
8. use data analysis software to assist in solving statistical problems;
9. prepare a written summary of data analysis results in APA format.

# REQUIRED COURSE MATERIALS:

You will need one of two textbooks for this course. The textbooks are very similar in their approach and content, but one teaches and demonstrates SPSS software, and the other the free, open-source, R-based software package jamovi. If you plan to pursue a career as a researcher, you may want to consider the SPSS book. If you plan to pursue a non-research career, you may want to consider the jamovi book (as the software is free, so might be beneficial in a career with fewer research resources). However, both jamovi and SPSS will be demonstrated in class and you will be familiar with both packages. The two book options are:

Strunk, K. K., & Mwavita, M. (2020). *Design and analysis in educational research: ANOVA designs in SPSS*. Routledge.

Strunk, K. K., & Mwavita, M. (2020). *Design and analysis in educational research using jamovi: ANOVA designs*. Routledge.

You will also need access to supplemental online materials, which are available as free downloads from Routledge (and exist only in digital format), and include:

Strunk, K. K., Mwarumba, M., & Hoover, P. D. (2020). *Design and analysis in educational research: ANOVA design case studies for teaching race, racism, and Black Lives Matter.* Routledge.

Data files for case studies are available for download as a .ZIP file.

You will also need access to the APA Style Publication Manual, 7th edition, which is the style in which all course assignments must be written:

American Psychological Association. (2019). *Publication manual of the American Psychological Association* (7th ed.). Author.

Other course readings may be required and will be posted on Canvas.

You are also required to have access to either IBM SPSS Statistics or jamovi. You can access SPSS in the classroom, or via the virtual lab at <https://horizon.auburn.edu/> (using your AUAccess credentials and Duo two-factor authentication). You may also choose to purchase or rent a license for SPSS. If you do so, you need to purchase the GradPack Standard or Premium (**do not** buy the “Base” GradPack as it does not have several of the functions we will use in this class). The jamovi software is available for free from <https://www.jamovi.org/>. Both software packages will be demonstrated in class, and many students may benefit from being familiar with both. However, you are free to complete and submit assignments in either software package.

# COURSE ASSIGNMENTS:

1. **Projects:** Throughout the course, you will complete projects designed to expand your understanding of design and analysis concepts, and apply them to educational research problems. Directions for these projects are provided separately, but involve a real-world research problem described in a literature review, a real data set described in a methods section, and an incomplete manuscript. Using the information provided, and a worksheet to guide your analytic process, you will complete an APA style research manuscript, writing a Results and Discussion section. You are **not** encouraged to ‘work ahead’ as each project builds on concepts learned in class during the assigned week. Each project will be worth 100 points, and there will be a total of six projects.

**Group Work:** Students are encouraged to work on projects in groups of 2-4 (limited circumstances may warrant a larger group). You will self-assign to groups in Canvas, and you can change groups at any time. However, note that group memberships are ‘locked’ per assignment once a submission is turned in. So, changing groups only affects future assignments. Groups will turn in only one assignment for the group, and all group members will be assigned the same grade. This process models the experience of co-authoring research manuscripts with peers and may help you improve your skills via collaboration. However, you may also choose to do all of your projects individually (to be a ‘group of one’).

1. **Exams:** There are two exams in this course, each worth 200 points (20% of the final course grade). Exams will be administered on Canvas. You may use your textbook, notes, copies of your projects, and feedback from the instructor. However, group work on exams is absolutely disallowed, as is any kind of collaboration or sharing of materials. Any collaboration, sharing, copying, or ‘helping’ on exams will result in be regarded as academic misconduct. The exams are timed, and allow for 180 minutes (the duration of a class period) and close at 11:59PM on the day the exam is due. This means you must begin the exam by 8:59PM the day it is due in order to have the full 180 minutes available to you. Exams closely mirror in-class and out-of-class work, and involve theoretical questions about course content, calculations of statistical estimates, and interpretation of statistical findings. Exam content will be reviewed in the week prior to each exam during a brief review session, but roughly follows the content of the course, and will include multiple-choice, fill-in-the-blank, and essay items. **Exams must be completed individually without help from classmates or group members.**

# GRADING STRUCTURE/REQUIREMENTS:

There are a total of 1000 points in the course, which means you can take your total points and divide by ten to determine your percentage grade in the course. The grading structure is as follows:

|  |  |
| --- | --- |
| **Assignment Type** | **Total Points Possible** |
| Projects | 600 |
| Exams | 400 |
| **TOTAL POINTS** | **1000 points** |

The course is graded as follows: A = 1000-900, B = 899.9-800, C = 799.9-700, D = 699.9-600, F < 600.

# CLASS PREPAREDNESS:

Students are expected to be prepared for required coursework and to engage in a timely manner. Class activities that may require the use of the textbook, spare paper, a calculator, and copies of out-of-class assignments. A standard, inexpensive calculator is all that is needed – any calculator that includes the square root (√) function is sufficient. Most cell phones have an adequate calculator built in (on iPhone, rotate the phone to landscape to show the square root function). You may also wish to print copies of class notes that are pre-posted to Canvas to aid in understanding/note-taking.

## **CLASS ATTENDANCE:**

Class attendance is a key component of success in graduate-level coursework. As allowed by university policy, it is possible to earn course grade of failing due to excessive absences. Students with three or more absences (other than university-approved excused absences) will receive a grade of failing due to excessive absences, regardless of scores on course assignments. Refer to the university attendance policy for information on attendance requirements and university-approved excused absences. Retain all documentation of university-approved excused absences – this documentation will only need to be turned in if you exceed three total absences.

For the purposes of this class, **all students must wear a proper face covering or face mask** **at all times**. Appropriate facial coverings include surgical masks, KN-95 or N95 masks, or cloth face masks made of a minimum of two layers of fabric. Your facial covering or face mask must fully cover your nose and mouth at all times when in the classroom. The instructor may revisit this policy if the public health situation substantially changes, and this classroom policy is in place regardless of whether and campus-wide, local, or state mask mandate are in place.

# LATE WORK POLICY:

Late work is generally not acceptable in graduate work. However, if you find that you are falling behind in your coursework, it is of the utmost importance that you immediately contact your instructor. As soon as you know there is any problem, immediately contact the course instructor. This is the best way to stay caught up with the course, and to achieve the highest possible grade.

If you find that you need to submit late work **it is required that you contact the instructor before submitting any late work.** Any late work submitted without first contacting the instructor to discuss the work and form a plan for getting caught up to date with coursework will not be accepted. This is to make sure that you receive all information you need about which assignments will take priority in getting caught up, and what, if any, credit can be given to late work before beginning. Communication is the key in getting caught up if you find yourself behind on work, so call, email, or stop by, whatever you need to do to get in contact!

If any late work is accepted following communication with the instructor and establishment of a written plan, it will be worth a maximum of 50% of its graded point value. The exact percentage will be established in the written plan you make with the instructor. However, in general, a 24- to 36-hour extension will be granted once in the semester without any grade penalty.

**Course Calendar:**

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| --- | --- | --- | --- |
| **Week** | **Readings** | **Content** | **Project** |
| 108/16/21 | Ch. 1, 18; Canvas reading 1A, 1B | Course overview; Equity and Justice in Quantitative Methods; Epistemology; Research ethics | None |
| 208/23/21 | Ch. 2 | Research problems & questions; Variables; Sampling; Design; Visual Displays | None |
| 308/30/21 | Ch. 3 | Central tendency; Variability; Normality; Standard scores (*z*-scores) | NoneCITI Training Due (optional) |
| 409/06/21 | None | **Labor Day Holiday****No Class Meeting** | None |
| 509/13/21 | Ch. 4, 5 | Probability theory; Sampling distributions; Hypotheses; One-sample *Z* test |  |
| 609/20/21 | Ch. 5, 6, 7 | One Sample and Independent Samples *t*-tests | None |
| 709/27/21 | Ch. 8, 9 | One-way ANOVA | Project 1 Due |
| 810/04/21 | Ch. 8, 9 | One-way ANOVA | None |
| 910/11/21 | Ch 10, 11 | Two-way ANOVA | Project 2 Due |
| 1010/18/21 | **Exam One** | **Exam One, 10/22/20 by 11:59PM****No Class Meeting** | Project 3 Due **Exam One Due**  |
| 1110/25/21 | Ch.12, 13 | Paired samples *t*-test | None |
| 1211/01/21 | Ch. 14, 15 | Within-subjects ANOVA | None |
| 1311/08/21 | None | **No Class Meeting (AESA and ASHE Conferences)** | Project 4 Due |
| 1411/15/21 | Ch. 16, 17 | Mixed ANOVAs |  |
| 1511/22/21 | **No Class** | **Thanksgiving Break****No Class Meeting** | Project 5 Due**No Class** |
| 1611/29/21 | Canvas reading 16A | Nonparametric statistics – chi-square | Article critiques due (optional) |
| 1712/06/21 | **Exam Two** | **Exam Two Due 12/10/21 by 11:59PM****No Class Meeting** | Project 6 Due**Exam Two Due** |

*Note.* All readings other than the textbook can be found on Canvas listed under the number of the week. Other outside readings may be added to this schedule as needed.

**Possible Changes to the Syllabus:**

If changes are made to the syllabus, they will be posted on Canvas and announced in class or by email. No changes increasing requirements will be made.

**Additional Information and Policies:**

Graduate study requires a high level of independence, accountability, and conscientiousness in order to achieve success both in their program and in careers that require graduate study. As such, a number of guidelines are helpful that make clear the expectations of graduate students.

1. The Student Policy eHandbook applies to this course. Please review the eHandbook at http://www.auburn.edu/student\_info/student\_policies/
2. Grades associated with incomplete course work or withdrawal from class will be assigned in strict conformity to University policy (see Auburn University Bulletin). If you wish to drop this course you may do so by the 10th class day with no grade assignment. From the 10th class day to mid-semester a W (withdrawn-passing) grade will be recorded in your transcripts. After this period withdrawal from the course will only be granted under unusual circumstances and must be approved by the Dean of the College of Education.
3. The Department of EFLT recognizes university policy regarding academic misconduct. Violations include, but are not limited to: plagiarism, unauthorized assistance during examinations, submitting another’s work product as your own, using another’s words as your own without appropriate citation, sharing unauthorized materials with another that contain questions or answers to examinations, altering or attempting to alter assigned grades. In accordance with University policy regarding academic misconduct, students may be subject to several sanctions upon violations of the Student Academic Honesty Code. See the Tiger Cub publication for the current year for specifics regarding academic misconduct as well as student’s rights and responsibilities associated with the Code.
4. Students who need accommodations are asked to electronically submit their approved accommodations through AU Access and to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately. If you have a conflict with my office hours, an alternate time can be arranged. To set up this meeting, please contact me by e-mail. If you have not established accommodations through the Office of Accessibility, but need accommodations, make an appointment with the Office of Accessibility, 1228 Haley Center, 844-2096 (V/TT). **Note:** If you need any accommodation but are, for any reason, not able to go through the university process (for example because of the time it takes or financial barriers), contact the course instructor to discuss options.
5. Students are expected to be in class for the entire class period every class meeting. If there is an unavoidable conflict (such as a professional conference that coincides with a class meeting) this should be communicated with the instructor as early as possible. In the event that you have a legitimate emergency that prevents you from attending class, you should: 1) contact the instructor by email immediately upon learning you will be unable to attend class (this should be before the class meets), 2) take appropriate steps to catch up with in-class learning opportunities, 3) ensure that all of your work that was due during that class meeting makes it to the instructor before the class meeting ends (email it, have a friend drop it by the office, etc.). Failure to be in class during an exam without agreement from and prior arrangements with the course instructor will result in a grade of zero on the exam.
6. Students are responsible for checking their student email account regularly for course announcements and course-related communications.
7. This course uses Canvas as a tool to manage course readings and other materials not included in the required texts for this course and for online course discussions. Students are expected to have a working knowledge of Canvas in order to access materials and participate in online course discussion.
8. My lectures and course materials, including power point presentations, tests, outlines, and similar materials, are protected by copyright. I am the exclusive owner of copyright to those materials I create. You may take notes and make copies of course materials for your own use. You may not and may not allow others to reproduce or distribute lecture notes and course materials *publicly* (whether or not a fee is charged) without my express written consent. Similarly, you own copyright to your original papers and exam essays. If I am interested in posting your answers or papers on the course web site, I will ask for your written permission.
9. Except in the case of an approved disability accommodation (see number 4 on this list), students **are not** **permitted** to audio or video record any portion of class. This policy, prohibiting the recording of class sessions, helps preserve an inclusive, friendly, and safe learning environment. However, there will be portions of class recorded and posted on Canvas for your reference via Panopto. In most cases, for example, software demonstrations and write-up processes will be recorded and posted. Those recordings are only for use within the class context and may not be shared with others for any reason.