ERMA 7300 Design and Analysis I

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# Course Description

Basic methods of descriptive and inferential analysis including t-tests, between and within subjects ANOVA, mixed ANOVAs, hierarchical designs and chi-square tests as they are utilized in educational research. Emphasis is placed on developing a solid foundation in statistical reasoning, including the assumptions, limitations, and common mistakes in using statistical methods.

# Course Objectives

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

* explain the process of hypothesis testing and apply it to research problems
* identify different types of research designs and variables found in published articles
* describe the strengths and limitations of different research designs
* identify applications of a wide variety of statistical procedures
* solve educational research problems using statistical tests of significance
* make accurate interpretations of statistical findings
* use data analysis software (SPSS) to solve statistical problems
* review published research literature to examine the application of measurement, design, and analysis procedures
* prepare a written summary of data analysis results in APA format

# Textbooks

## Required

Privitera, G. J. (2014). *Statistics for the Behavioral Sciences*. 2nd ed. Sage Publications.

## Suggested

American Psychological Association (2010). *Publication manual of the American psychological association sixth edition*. Washington: American Psychological Association.

## Additional Resources

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. 4th ed. Sage.

Field, A, J. Miles and Z. Field (2012). *Discovering Statistics Using R*. Sage.

# Course Requirements and Evaluation

*Learning Methods:* Lectures, demonstrations, discussions, readings, class exercises, and assignments.

## Grading Policy

*Student Assessment*

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| --- | --- |
| Assessment | percent of grade |
| Homework Assignments | 25% |
| Quizzes | 35% |
| Examinations | 40% |

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| Grade | Scale |
| A: | 90 – 100% |
| B: | 80 – 89% |
| C: | 70 – 79% |
| D: | 60 – 69% |
| F: | below 60% |

### Homework Assignments (25%)

There will be 3-4 homework assignments throughout the semester. These assignments will focus primarily on the application of statistical software to perform procedures addressed in class. All methods required to complete homework will be illustrated prior to assignment. I will illustrate and use SPSS in class. SPSS is loaded on several computer labs on campus (LRC, Wallace, etc..) and is available for purchase at a student rate. You are free to use other software available to you, but note that I am not able to help with software issues for programs which I am not familiar with (I know R and am familiar with Stata).

### Quizzes (35%)

There will be 2 quizzes over the duration of the semester. These quizzes will assess conceptual understanding of the topics explored in class and reading assignments. These are to be completed without the assistance on any resources (e.g. no textbook, notes, or help from others). Quizzes will be done outside of class and can be started anytime during the week between classes, but once started students have two hours to complete.

### Exams (40%)

There will be two examinations. These exams will be take-home and you will have one week to complete them. You are encouraged to use materials from class (handouts, readings, etc.) as you work on these exams, but are expected to complete the work without help from others (e.g. fellow students other faculty members).

## Class Policy Statements

### Attendance and Participation Policy

* Excellent attendance is expected. If you miss class, you will need to get notes from another student.
* I will start class on time, so if you are late you will need to get notes from another student.

### Late Assignments Policy

* Assignments turned in late will receive a 3% reduction in earned points per day. The only exception will be in the case of emergency.
* All work must be typed or it will not be graded. Late penalty will be applied to work completed in writing and then turned in late in typed format for a grade.

### Honor Code Policy

* All portions of the Auburn University Honesty Code will apply to this class.
	+ [Auburn University Honor Code](https://sites.auburn.edu/admin/universitypolicies/Policies/AcademicHonestyCode.pdf)
* In addition, each student will be required to read and sign the following Honor Pledge when submitting class quizzes and exams.
	+ **Honor Pledge** – On my honor as a student, I have neither given nor received assistance on this assignment.

### Computer Classrooms

The Computer classrooms have a no food and drink policy. There is an exception for bottled water, which should remain sealed when not being consumed. If laptops are present, bottled water should be kept away from laptops. This policy is to ensure the room remains free from liquid stains and food crumbs that result in room repairs or the expense of spraying for roaches. With the room being a technology room, it falls under OIT policy and violators can lose campus computer privileges (e-mail & Internet access) if not adhering to this policy. If accommodations are needed, please inform the LRC staff. Thank you for your cooperation.

### Incompletes and Withdrawals

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 $10^{th}$ class day with no grade assignment. From the $10^{th}$ class day to mid-quarter 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.

Note that a new incomplete grade (IN) policy is in effect. The new policy requires that students complete a form requesting that an IN grade be assigned. If this form in not completed and given to the instructor of the class, a grade will be assigned with a score of zero (0) for work that has not been completed and turned in by the time the instructor reports grades.

### Academic Misconduct

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.

### Disability Accommodations

Students who need special accommodations in class, as provided for by the American Disabilities Act, should arrange a confidential meeting with the instructor during office hours the first week of classes - or as soon as possible if accommodations are needed immediately. You must bring a copy of your Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have these forms but need accommodations, make an appointment with the Program for Students with Disabilities, 1244 Haley Center, 844-2096.

# Class Schedule

Students must read the following before class session. Important: class readings are subject to change, contingent on mitigating circumstances and the progress we make as a class. Students are encouraged to attend lectures and check the course website for updates.

## Week 01, 08/21 - 08/25: Introduction

* Course overview
* Research Problems, Questions, and Variables

### Readings

Privitera Ch. 1

[Article:](http://journals.sagepub.com/doi/abs/10.1111/j.1467-9280.2008.02147.x) Shook, N. J. and R. H. Fazio (2008). "Interracial roommate relationships: An experimental field test of the contact hypothesis". In: *Psychological Science* 19.7, pp. 717-723.

## Week 02, 08/28 - 09/01: Visualizing and Describing Data

* Frequencies

### Readings

Privitera Ch. 2

[Article:](http://journals.sagepub.com/doi/abs/10.1518/001872000779656444) Morrell, R. W, C. B. Mayhorn and J. Bennett (2000). "A Survey of World Wide Web Use in Middle-Aged and Older Adults". In: *Human Factors* 42.2. PMID: 11022878, pp. 175-182. DOI: 10.1518/001872000779656444.

## Week 03, 09/04 - 09/08: Visualizing and Describing Data

**Monday is Labor Day**

* Central Tendency
* Variability

### Readings

Privitera Ch 3-4

Article: TBA

## Week 04, 09/11 - 09/15: Probability and Sampling Distributions

* Basics of Probability

### Readings

Privitera Ch. 5

Article: TBA

## Week 05, 09/18 - 09/22: Probability and Sampling Distributions

* The normal distribution
* *z* scores

### Readings

Privitera Ch. 6

## Week 06, 09/25 - 09/29: Probability and Sampling Distributions

* Sampling distributions

### Readings

Privitera Ch. 7

## Week 07, 10/02 - 10/06: Hypothesis Testing and the *t* test

* Introduction to hypothesis testing
* One-sample *z* test
* Power

### Readings

Privitera Ch. 8

## Week 08, 10/09 - 10/13: Hypothesis Testing and the *t* test

**Thursday and Friday are Fall Break**

* Testing means - one sample *t* test
* Two sample *t* test
* Effect size

### Readings

Privitera Ch. 9

## Week 09, 10/16 - 10/20: Hypothesis Testing and the *t* test

* Related sample *t* test
* Confidence intervals
* Point estimation

### Readings

Privitera Ch. 10-11

## Week 10, 10/23 - 10/27: Hypothesis Testing and the *t* test

* two-sample t-test

### Readings

Privitera Ch. 9-11

## Week 11, 10/30 - 11/03: One-way ANOVA

* Assumptions of ANOVA
* Planned comparisons

### Readings

Privitera Ch. 12

## Week 12, 11/06 - 11/10: One-way ANOVA

* Within subjects ANOVA

### Readings

Privitera Ch. 13

## Week 13, 11/13 - 11/17: Factorial ANOVA

* Factorial ANOVA

### Readings

Privitera Ch. 14

## Week 14, 11/20 - 11/24: Thanksgiving

* No Class

## Week 15, 11/27 - 12/01: Factorial ANOVA

* Factorial ANOVA

### Readings

Privitera Ch. 14

## Week 16, 12/04 - 12/08: Factorial ANOVA

* Factorial ANOVA

### Readings

Privitera Ch. 14

## Week 17, 12/11 - 12/15: FINAL EXAMS