

### 1. ERMA 7300

#### Design and Analysis I

3 credit hours

### 2. Semester Fall 2010

Meeting Time: 4:30 – 7:20

Room: Haley Center 2204

Instructor: Margaret E. Ross  
4018 Haley Center

(334) 844-3084 [rossma1@mail.auburn.edu](mailto:rossma1@mail.auburn.edu) (the first 1 = one)

Office Hours: Monday 10:00 am – 4:00 pm

Tuesday 1:00 pm – 4:00 pm

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### 3. Resources

Ross, M. E. & Shannon, D. M. (2008). *Applied Quantitative Methods in Education*. Kendall/Hunt, Publishing Company, Dubuque, Iowa.

Shannon, D. M. & Davenport M. A. (2000). Using SPSS to Solve Statistical Problems: A Self Instructional Guide. Merrill Prentice Hall, Upper Saddle River, New Jersey.

Publication Manual of the American Psychological Association (any recent edition). Washington D.C., American Psychological Association.

(also see attached bibliography for other suggested texts and resources)

### 4. Course Description

This course is designed to provide students the understanding of statistical methods pertaining to the design and analysis of experiments in educational research. Descriptive statistics will be reviewed and inferential statistics used to analyze the relationship between one or more categorical variables and a continuous variable will be studied. This course emphasizes the conceptual application of statistics with little emphasis placed on the mathematical derivation of the formulas. Emphasis will be placed on conceptual understanding of t-test and ANOVA designs, correctly identifying the proper statistical test, and interpreting the output using SPSS for Windows.

### 5. Course Objectives

Students will:

- Gain an understanding of inferential statistics.
- Apply knowledge of inferential statistics by analyzing research problems and making decisions about the appropriate use of inferential procedures.
- Apply knowledge of inferential statistics using SPSS to determine significance.
- Apply knowledge of inferential statistics by interpreting results of statistical analyses.
- Interpret the results of the analyses in terms of the research hypothesis

## **6. Tentative Course Content and Schedule**

### **Class 1 Aug. 24**

Cohort Welcome

### **Class 2 Aug. 31**

Review

Topics

- Introduction to the Course

- Basics of Statistics

- Introduction to Research Design

- Measures of Central Tendency (review)

- Measures of Variability (review)

- Distributions

- Overview of T-test and ANOVA designs

- Authentic School Based **Project (a ‘real’ problem or issue in a school that needs to be addressed)**

Authentic Project Team Formation (4 per team)

Readings and Assignment

- Introduction

- Chapters 2 and 3

- Computer Activity/Lab

### **Class 3 Sept. 7**

Review

Topics

- Validity and Reliability

- Internal/External validity

Readings and Assignment

- Chapter 15

- Prepare for Exam

### **Class 4 Sept. 14**

***Exam 1***

Authentic Project Team Project Planning/Guidance

Assignment

- Outline of Team Project

- Possible Project Questions

### **Class 5 Sept. 21**

Class Discussion of Team Projects (project questions, data collection, analyses)

Topics

- Z-test and Hypothesis Testing (an eight step approach)

- One-sample t-test

Project Planning/Guidance

Readings and Assignment

- Chapter 4

- Lab Activity

- School Based Research Article/Z-test or One-sample t-test

**Class 6 Sept. 28**

Review and Article Discussion

Topics

One-way ANOVA

Independent Samples t-test

Authentic Project Planning/Guidance

Readings and Assignment

Chapters 5

Lab Activity

School Based Research Article/Independent Samples t-test

**Class 7 Oct. 5**

Review and Article Discussion

Rubrics for authentic project proposal distributed/discussed

Planned Comparisons (follow-up)

Post-Hoc Comparisons

Authentic Project Planning/Guidance

Readings and Assignment

Chapter 6

Lab Activity

School Based Research Article/One-Way ANOVA with post-hoc Analyses

**Class 8 Oct. 12**

Test Preparation

**Class 9 Oct. 19**

*Exam 2*

Authentic Project Planning/Guidance

**Class 10 Oct. 26**

Review and Article Discussion

Topics

Two-way ANOVA/Three-way ANOVA

Follow-up analyses to multi-way ANOVA

(simple effects, interaction contrasts)

Authentic Project Planning/Guidance

Readings and Assignment

Chapter 7

Lab Activity

School Based Research Article/Two-Way ANOVA

**Class 11 Nov. 2**

Review and Article Discussion

Topics

Paired Sample t-test

Within Subjects Designs

Mixed designs

Non-parametric analyses...Chi Square and Binomial

Authentic Project Planning/Guidance

Readings and Assignment

Chapter 8

Lab Activity

School Based Research Article/Paired Sample t-test or Within Subjects Design

*Authentic Project Plan DUE*

**Class 12 Nov. 9**

Review and Article Discussion  
Preparation for exam

**Class 13 Nov. 16**

*Exam 3*

**Nov. 23 Thanksgiving Break****Class 14 Nov. 30**

Authentic Project Presentations

**7. Course Requirements and Evaluation***Learning Methods*

Lectures, discussions, readings, class exercises and lab assignments.

*Student Assessment\**

Three Tests	65% (10% test 1, 20% test 2, and 35% test 3)
Authentic Research Project	15%
Presentation**	15%
Assignments	5%

Sometimes the lab will double as an assignment and must be turned in at the end of the lab session. In this case, you will need to have the output printed. You can work in pairs on lab assignments and turn in one lab assignment per pair if you wish. *You CANNOT make up more than two lab assignments.*

See next page for authentic research project outline

### *Authentic Project*

#### *Introduction (no more than 1 page)*

- A. Statement of Problem
- B. Significance of problem (based on stated needs of school personnel and literature review)
- C. Specific research questions to be answered.
  1. Are they clearly stated?
  2. Are they feasible/legitimate?
  3. Does it lend itself to t-test or ANOVA procedures?

#### *Methodology (approximately 1 to ½ pages)*

- A. Full description of participants
- B. Instrumentation (Validity and Reliability important here!)
- C. Procedures (detailed description of what you did – step by step)
- D. Data processing and analysis (how will you analyze the data and why)?

#### *Results (approximately 1 page)*

- A. Are **all** appropriate statistics clearly stated in APA style?
- B. Are tables or graphs appropriately used?

#### *Discussion (approximately ½ page)*

- A. Results in words
- B. Recommendations
- C. Limitations discussed

A more detailed rubric will be handed out closer to the time the proposal and presentation are due.  
The paper is to be written in APA style.

### *Grading Scale*

- A: 90 – 100% and excellent attendance (absent no more than two classes)  
B: 80 – 89% and good attendance (absent no more than three classes)  
C: 70 – 79%  
D: 60 – 69%  
F: below 60%

## **8. Class Policy Statements**

### *Attendance Policy*

- Excellent attendance is required in order to earn an A (no more than two absences) and good attendance is required in order to earn a B (no more than 3 absences). Being 20 minutes late or more for class will count toward absences. For example, if you are 30 minutes late for 6 classes, this will count as one class absence.
- I will start class on time so if you are late you will need to get notes from another student.
- I will allow only two lab make-ups. If you miss more classes you will not be able to earn the points for the lab.

### *Late Assignments Policy*

- Assignments turned in late will receive a 2% reduction in earned points per day. The only exception will be in the case of emergency.
- Except for work requiring calculations, 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.

### *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 10th class day with no grade assignment. From the 10th 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 is 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 accommodations are asked to arrange a meeting with me as soon as possible. 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. Bring a copy of your Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have an Accommodation Memo but need accommodations, make an appointment with The Program for Students with Disabilities, 1244 Haley Center, 844-2096.

## Bibliography

The following text books provide excellent overviews of analyses covered in this class. These texts are also useful for further study in statistics and research design and/or as reference books. You might check for later editions of the books.

Gravetter, Frederick J. & Wallnau, Larry B. (2002). Essentials of Statistics for the Behavioral Sciences. Wadsworth.

Keppel, Geoffrey & Zedeck, Sheldon (1998). Data Analysis for Research Designs. W. H. Freeman and Company, New York.

Maxwell, Scott E. & Delaney, Harold D. Designing Experiments and Analyzing Data: A Model Comparison Perspective. Lawrence Erlbaum Associates, Publishers, Mahwah, New Jersey

Shavelson, Richard (1988). Statistical Reasoning for the Behavioral Sciences. Allyn and Bacon, Inc. Boston.