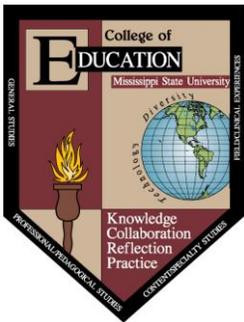


MISSISSIPPI STATE UNIVERSITY  
COLLEGE OF EDUCATION

DEPARTMENT of COUNSELING and EDUCATIONAL PSYCHOLOGY  
COURSE SYLLABUS

<b>Course Prefix and Number:</b>	EPY 9213
<b>Course Title:</b>	Advanced Analysis in Educational Research
<b>Credit Hours:</b>	Three (3) semester hours
<b>Type of Course:</b>	Lecture
<b>Catalog Description:</b>	(Prerequisites: EPY 6214 and EPY 8214 or equivalent course work.) An examination of quantitative problem-solving methods, with special emphasis on modern techniques for investigating multivariable research problems in education.

**College of Education Conceptual Framework:**



The faculty in the College of Education at Mississippi State University are committed to assuring the success of students and graduates by providing superior learning opportunities that are continually improved as society, schools, and technology change. The organizing theme for the conceptual framework for the College of Education at Mississippi State University is educational professionals - dedicated to continual improvement of all students' educational experiences. The beliefs that guide program development are as follows:

1. **KNOWLEDGE** - Educational professionals must have a deep understanding of the organizing concepts, processes, and attitudes that comprise their chosen disciplinary knowledge base, the pedagogical knowledge base, and the pedagogical content knowledge base. They must also know how to complement these knowledge bases with the appropriate use of technology.
2. **COLLABORATION** - Educational professionals must continually seek opportunities to work together, learn from one another, forge partnerships, and assume positions of responsibility.
3. **REFLECTION** - Educational professionals must be willing to assess their own strengths and weaknesses through reflection. They must also possess the skills, behaviors, and attitudes necessary to learn, change, and grow as life-long learners.
4. **PRACTICE** - Educational professionals must have a rich repertoire of research-based strategies for instruction, assessment, and the use of technologies. They must be able to focus that array of skills on promoting authentic learning by all students or clients, while exhibiting an appreciation and commitment to the value and role of diversity.

**Course Objectives:**

1. Given a set of univariate or multivariable data in raw or summary form, the student will (CFPO: 1, 4. 5. 11. 13. 14):

Generate plausible hypotheses for a given research question.

- a. Identify and, where appropriate, verify, the assumptions required to test such hypotheses.
  - b. Select, perform, and interpret the results of an appropriate analysis method.
  - c. Estimate selected parameters, in point or interval form.
  - d. Compare the relative merits of alternative methods of analysis for the given data set.
2. Given a description of a study or set of results and conclusions, or both, the student will (CFPO 1, 4, 5, 10, 11, 13, 14):
- a. Judge the appropriateness of the selected procedures.
  - b. Judge the appropriateness of the results or conclusions.
  - c. Write a set of results or conclusions for the study.
  - d. Explain alternative approaches that would be more suitable for the given study than those described.
3. Explain the methods for sampling of variables or subjects (CFPO 13, 14).
4. Compare the merits and assumptions of different techniques for aggregating results within and across studies (CFPO 13, 14).

**Topics to be Covered:**

Fundamentals, Data Inspection and Summary (6 hrs; Assignments 1-2)

Exploring Data (3 hrs)

Presenting Data

Checking Assumptions; Transformations

Appropriate and Inappropriate Display of Data (3 hrs)

Multivariate Presentation Techniques

Outliers and Missing Data

Multiple Regression (12 hrs; Assignments 3-6)

Assumptions and methods for testing assumptions (3 hrs)

Methods

Spurious and Curious Effects in Regression (3 hrs)

Multiple Regression (continued):

Partial and semipartial correlations (3 hrs)

Nonlinear and multivariable regression.

Interpretation; experimental design considerations

Logistic regression. (3 hrs)

MANOVA and Discriminant Analysis (9 hrs; Assignments 7-9)

MANOVA vs. repeated measures ANOVA (3 hrs)  
Assumptions and methods for testing assumptions

Methods (3 hrs)  
Comparing models

Interpretation; experimental design considerations (3 hrs)  
Discriminant function vs. MANOVA

Cluster Analysis (3 hrs; Assignment 10)

Applications in behavioral, social sciences  
Comparing clustering methods  
Interpretation

Canonical Correlation (3 hrs; Assignment 11)

Relationship to other parametric methods  
Assumptions and methods for testing assumptions  
Methods  
Interpretation and application to behavioral science research.

Principal Components Analysis (PCA)  
and Common Factor Analysis (CFA) (3 hrs; Assignment 12)

Relationship of PCA, CFA  
Assumptions and methods for testing assumptions  
Extraction and rotation schemes  
Interpretation and application to behavioral science research.

Path and Structural Models (6 hrs)

Applications of structural models (3 hrs)  
Path analysis  
Interpretation and restrictions on interpretation

Latent variable models (3 hrs)

Methods (including specialized software, such as LISREL or AMOS, regression analysis) for  
generating model parameter estimates.

**Texts:**

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.).  
Upper Saddle River, NJ: Pearson/Prentice Hall. [*Required.*]

Pedhazur, E. J. (1997). *Multiple regression in behavioral research* (3rd ed.). New York: Holt, Rinehart and Winston. [*Strongly recommended, but not required.*]

### **Methods of Instruction:**

Lecture, discussion, student presentations, and take-home assignments (including computer-based activities) will comprise the principal instructional activities. With the exception of in-class presentations, outside assignments are to be the student's own work.

### **Suggested Student Activities:**

Read text chapters and review class handouts prior to class.  
Prepare in-class presentation on assigned topic with partner.  
Participate in class discussions.  
Complete in-class exercises.  
Complete weekly homework assignments.  
Identify, get approval for, and complete a data analysis project using statistical methods suitable for multivariable problems.  
Present data analysis project to class.

### **Honor Code:**

**“As a Mississippi State University student I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do.”**

The MSU honor code (<http://www.honorcode.msstate.edu/>) applies to this course; infractions will be reported to the Honor Code Office. See also comments above about copied work.

### **Technology:**

This course requires considerable use of the computer and statistical software for successful completion. As a student on campus, you may use SPSS at no cost in any of the on-campus labs. Other software that will be required may be obtained without cost, or in trial or student versions at no cost. If you obtain or lease your own copy of SPSS (available through [onthehub.com](http://onthehub.com), be sure that the version you select is the “Statistics Standard Grad Pack” or higher). Since all course handouts and lecture notes are available via MyCourses, you will also need internet access.

### **Diversity:**

*This course does not address human diversity issues directly.* Indirectly, as most studies in the behavioral sciences will show, individual differences in virtually any measure abound, and a point of inquiry is that of trying to explain some of those individual differences.

### **Disability:**

Students having special needs conditions documented through Student Support Services must contact the instructor to make arrangements for appropriate accommodations.

### **Field component:**

**Commented [11]:** Insert Student Activities section with links to Course Objectives

There is no field component as part of this course.

### Evaluation of Student Progress:

Assignments keyed to each topic or module will be used to determine the majority of the course mark (up to 36 points of 60 total). Presentations made in class can earn up to 6 points and class participation will count for up to 3 points. The course project can earn up to 15 points. Course marks will be determined on the following scale (values rounded to the nearest integer):

Total Points	Mark
53-60	A
46-52	B
40-45	C
35-39	D
34 or lower	F

Individual homework assignments are marked on a scale from zero to three. Scores are assigned following this rubric:

Score	Meaning
3	Excellent work; virtually error-free with no omissions.
2	Good work, though with several errors and no omissions, or omissions no more than 20% of total.
1	Poor work, with numerous errors and few omissions, or omissions of 21-40%.
0	Numerous omissions (over 40%), copied work, off-task responses, and/or excessively late.

*Note: Whenever you are asked to furnish a citation as part of a course assignment, failure to use correct APA style can result in an automatic, non-revisable, 1-point deduction. Misinterpretation of statistical results can also result in non-revisable deductions.*

Assignments turned in late will have 1 point deducted for each class meeting that passes after the announced due date, including the due date itself. On occasion, you may be asked to make revisions and resubmit proficiency demonstrations; the revised work will be evaluated as if it were the original, if turned in on time (the next class period). Revisions turned in after the announced due date will not be considered; the mark will be based on the original version of the work. Omissions will not be included in any requested revisions, nor will copied work (regardless of who did the copying). *Copied work includes duplication of computation, analysis, explanation, or interpretation from anyone else in the class, whether this semester or from past semesters, intentional or inadvertent. "Studying together" does not excuse copying.*

### Course Handouts:

Course materials, including handouts and assignments, are available electronically via the world wide web. Log into <http://mycourses.msstate.edu>, then select EPY 9213. You are responsible for

obtaining copies of the handouts; each will be available prior to and after the related class session.

**Attendance:**

A record of attendance will be kept during the semester. Being in attendance is defined as being present when the class roll is checked, and not departing early from class.

**Participation:**

Students are expected to keep up with the assigned work and participate as a member of the class. Attendance alone does not earn participation points. Answering questions, contributing to group exercises, and asking appropriate questions are the principal elements of participation given consideration. Presentation credit will be determined by ratings of in-class presentations by the rest of the class averaged with ratings by the instructor. Having your cell phone or beeper go off audibly during class is a sure way to lose participation credit.

**Course Project:**

Each student will select a research or data analysis project requiring some multivariable method(s) suitable to the course, obtain the data, analyze the data, and present the findings (written up in APA style and as an in-class presentation). *The topic and scope of your project must be approved in advance by the instructor. If you do not get timely approval, or if you change or do not follow the agreed-upon topic/scope, you will lose up to half the points from the maximum possible.* Depending on the size of the class, it may not be possible to schedule all of the project presentations on the final exam date; the instructor reserves the right to schedule project presentations early (any students scheduled early will be notified in advance). Late submission of the course project will result in a 1 point reduction in the points awarded for each calendar day that the project is late; none are accepted after grades are submitted for the course. See the course web site for additional information.

**Presentation:**

Students will be assigned to make a presentation to the class on a topic chosen by the instructor. A calendar outlining the assigned topics and dates will be posted on the class web site, as well as guidelines for what a good presentation should include.

**Bibliography:**

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2002). *Applied multiple regression/correlation analysis for the behavioral sciences* (3<sup>rd</sup> ed.). New York: Routledge.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39, 175-191.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G\*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41, 1149-1160.

George, D., & Mallery, P. (2013). *IBM SPSS Statistics 21 step by step: A simple guide and reference*

(13<sup>th</sup> ed.). Boston, MA: Pearson/Allyn and Bacon.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Upper Saddle River, NJ: Pearson/Prentice Hall.

Pedhazur, E. J. (1997). *Multiple regression in behavioral research* (3rd ed.). Independence, KY: Wadsworth/Cengage.

Stevens, J. P. (2009). *Applied multivariate statistics for the social sciences* (5<sup>th</sup> ed.). New York: Routledge.

Tabachnick, B. G., & Fidell, L. S. (2012). *Using multivariate statistics* (6<sup>th</sup> ed.). Upper Saddle River, NJ: Pearson.