

NORTH DAKOTA STATE UNIVERSITY
EDUC 793: Intermediate Statistical Concepts in Education
Course Syllabus – Spring 2011
3 Credit Hours

Course Instructor: Chris M. Ray, Ph.D.
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Office Hours: By Appointment

Prerequisite(s)

Admission to doctoral program, completion of Master's degree, and/or instructor approval.

NDSU Catalog Description of Course

This course is designed for faculty and doctoral-level students who need a significant familiarity with those statistical techniques known collectively as “structural equation modeling.”

Course Description

The purpose of this course is to acquaint students with several statistical analysis methods commonly utilized in the analyses of quantitative data and to create an environment for students to conceptualize, within methods of science, various issues in the analysis of research data. The practice of skills related to understanding, appropriately utilizing, and reporting results from various analytical methods will be an additional outcome of this course. This is a doctoral level course of study with commensurate expectations (i.e., this is not intended to be an introductory course in basic statistics).

Course Objectives

The purpose of this course will be accomplished by the following objectives:

1. To recognize situations where various intermediate and advanced statistical techniques (e.g., univariate and multivariate analysis of variance, linear regression, structural equation modeling, etc.) may be useful in research;
2. To understand the limitations of the various statistical methods covered;
3. To use available software in analyzing statistical data; and
4. To critique the use of various statistical techniques in published research

Course Materials

Textbooks (*Required*):

Coughlin, M. A. (2005). *Applications of intermediate/advanced statistics in institutional research*. Tallahassee: Association for Institutional Research.

Stevens, J. P. (2007). *Intermediate statistics: A modern approach*. New York: Lawrence Erlbaum Associates.

Reference Materials (*Recommended*):

American Psychological Association. (2009). *Publication manual of the American Psychological Association*. (6th ed.). Washington, D.C.: American Psychological Association.

Additional Readings:

The above texts are only intended to provide an overview of the topics covered in the course. Supplemental readings will be assigned periodically, which may include recent research.

Additional Materials:

A calculator with a square root function is required. Cellular phones and other two-way communication devices cannot be used on in-class exams. Additionally, access to a statistical software package of your choice (e.g., SPSS, SAS, etc.) will be required for completion of course projects.

Course Structure

The course will be taught primarily face-to-face using the IVN system and may be supplemented with online work using Blackboard and Wimba Classroom. Additionally, course materials including assignments and supplemental readings will be posted on Blackboard, and all projects are expected to be submitted using the Blackboard drop box. The schedule will be posted separately on Blackboard.

IVN Broadcast And Video Streaming

This course serves students across North Dakota, Minnesota, and beyond. Therefore, live videoconference connections (IVN) are provided to students in remote locations. By attending this course, students imply consent for their image and voice to be recorded and broadcast via IVN and online video-streaming for later playback. Class recordings are streamed live and will be maintained for approximately one week. Recordings can be accessed online at <http://www.ndivn.nodak.edu/web/streaming.asp>. The password to access the course recordings will be provided by the instructor.

Those attending this class at an off-campus site are responsible for arriving 5-10 minutes before the start of class to participate in the technical roll call. This ensures equipment, audio, and video are functioning properly when class begins. Should you experience difficulties during the class, please call the host site at (701) 231-8523. You should also ensure that you know how to mute/unmute the microphone, maneuver the camera, and how to restart the equipment if asked to do so.

Course Website

A course website has been created on the Blackboard learning system. You can log in to Blackboard at: <http://bb.ndsu.nodak.edu>. The most current version of the course schedule will be maintained on this site, so it is important that you check the site regularly. You will also be responsible for announcements and assignments made available via Blackboard and will be required to submit assignments to this website for instructor feedback and grading. *The instructor is only responsible for grading assignments that are submitted properly through the Blackboard dropbox.* You will also be able to access a number of other potentially useful resources such as internet links, copies of course documents and other resources, and a Wimba classroom.

Style of Teaching

Conducted as a lecture course, most of the class sessions will be an in-depth presentation of the statistical techniques discussed in the readings, supplemented with individual and group activities as appropriate, both

in and out of class. Additional discussion will be based on student-generated concerns and responses to focused questions developed by the instructor on the content of the course.

This course is structured so that you have the freedom to learn as deeply and as broadly as you choose. You will be invited to collaborate in the process of student evaluation and will have an opportunity to continue to improve any professional product you are developing for this class.

Course Learning Opportunities

I. Attendance and Participation

Expectation: You are expected to prepare for and attend all class sessions and to participate in class discussions. Should you find an extreme circumstance that prevents you from attending class, arrangements must be made before class begins. Appropriate make-up work is mandatory or any absence will result in one letter grade lower than the grade you normally earned per absence.

Invitation: As you consider the wide range of possibilities for understanding quantitative data analysis in various integrated ways, you are invited to bring in relevant topics, cognitive connections, or articles of new knowledge and understanding to present to the class members. This is not graded but is a necessity for collegiality, collaboration and other professional skills of researchers and practitioners in education.

II. Demonstration of Competencies Learned and (Breadth of Learning Content)

Expectation: You are expected to complete a pretest exam to demonstrate your preparation for this course, as well as two exams to demonstrate your mastery of the breadth of the course content. The exams may be comprised of short answer and applied questions, true-false, multiple choice, and essay questions as necessary to further demonstrate content mastery. Additional information concerning each exam will be provided during the class period immediately preceding the exam. The exams are worth 100 points each.

Invitation: While we will cover numerous statistical designs using analysis of variance, regression, and structural equation modeling techniques, we will be unable to cover all designs and procedures, and some that are covered will be done so only in a cursory manner. As such, you are strongly encouraged to explore more fully these and other statistical techniques that are of professional interest to you, some of which may be found in the text or in journal articles in your respective field. Should you choose to do so, the instructor will be glad to provide additional resources for your review.

III. Depth of Learning Content (Integrative and Creative Thought)

Expectation: You are expected to complete four projects throughout the semester based upon performing the statistical analyses required with a data set provided by the instructor and presenting a draft results section in APA (6th ed.) style. The assignments cover the basic statistical designs as discussed in class and are worth 50 points each.

Expectation: You are expected to complete a reflective essay at the completion of the course, which should address each of the following:

- The course description and objectives;
- The overall content of the course;
- The significant authors or resources you examined, including citations and references;
- The assignments you completed; and
- The significance of the course to your degree program, work experience, and/or professional goals.

This reflective essay will be ungraded, but failure to submit it will result in a 5% deduction of the total course points, thus resulting in a final grade that is a half-letter grade lower than you otherwise earned.

Invitation: You are strongly encouraged to identify and explore additional data sets that are both personally and professionally meaningful during this course, including data that can be used as the basis for future productive, scholarly endeavors. Should you wish to pursue analysis of such data sets outside of the course, the instructor will provide additional guidance and feedback upon request.

Grading and Other Significant Details

- Course grades can be calculated as follows: An A is 90.00% or above of all possible points with no unexcused absences and high quality work. A B is 80.00 to 89.99%. A C is 70.00 to 79.99%. A D is 60.00 to 69.99%. An F is less than 60.00% of all possible points and typically indicates a semester in which you didn't have the time or energy to devote yourself to learning the depth and breadth of the course topics. The specific contribution of each requirement to the grade is as follows:

“Pre-Test”	100
Project 1: One-Way Analysis of Variance	50
Project 2: Factorial Analysis of Variance	50
Midterm Exam	100
Project 3: Multiple Regression	50
Project 4: Path Analysis	50
Final Exam	100
Course Reflection*	0

* While not graded, your final course grade will be lowered 5% if the reflection is not submitted

- As the students in this course are typically working toward a Ph.D. in Education, the course readings and products utilized for assessment are intended to be authentic to the professional experience of such individuals after graduation. Thus, the products are primarily intended to promote the development of skills related to conducting independent research and/or the development and modification of theory. If you are not pursuing a Ph.D. in Education, the instructor will gladly work with you on an individual basis to develop products that will be meaningful to your professional goals. Any substituted course products must require similar levels of student effort and an agreement between the instructor and student must be finalized, in writing, by the end of the third week of class.
- Although self-evaluation is a significant portion of your growth and development in doctoral studies, the instructor does final grading of the assignments and exams in this course.
- Use a realistic estimate when predicting the time you will need to complete the course activities and requirements. Although the option of taking an incomplete (“I”) is available to you at the end of the semester should you encounter an emergency or other unexpected events, it may mean that you will receive one letter grade decrease in your course grade.

If you find that you are falling behind or are experiencing difficulty in completing course assignments, please discuss the situation with the instructor as soon as possible so that mutually-negotiated accommodations can be made that will enable you to fulfill the requirements of the course and to avoid having to take an incomplete. University policy dictates that incomplete grades can only be given if at least two-thirds of the course requirements have been completed by the end of the grading period.

- As all work in this class is expected to utilize APA (6th edition) style, learn and practice it early.

Drop and Add Policy

The standard drop/add policy for classes will be followed as determined by the Office of Registration and Records (<http://www.ndsu.edu/bisonconnection/registration/policies/registration/>).

Intellectual Property Policy

Words and ideas are the intellectual property of the individuals who originated them. Thus, whenever you quote more than three words in sequence from any single source, you must enclose those words in quotation marks. Cite in parentheses the author of the book or article, the year of publication, and the number of the page on which the words were written (e.g., Fink, 2008, p. 25). Include the complete citation of the source in your references at the end of your paper. Failure to follow these procedures will result in loss of points on any paper in which such failure occurs. Furthermore, failure to follow these procedures may be viewed as plagiarism and, thus, a violation of university policies that pertain to academic integrity.

Academic Integrity

All work in this course must be completed in a manner consistent with standards suitable to members of an academic community. The following specific policies apply:

- “Right and Responsibilities of Community: A Code of Student Behavior (2008, August) available from the dean of Student Life (MU 250) or on the NDSU Student Life website (http://www.ndsu.edu/fileadmin/studentlife/PDF_Files/CodeofStudentBehavior.pdf);
- The College of Human Development and Education’s Professional and Academic Honor Codes (http://www.ndsu.edu/fileadmin/hde/undergraduate/HDE_Honor_Code.pdf); and
- NDSU University Senate Policy, Section 335: Code of Academic Responsibility and Conduct (<http://www.ndsu.edu/policy/335.htm>).

Notice: The instructor reserves the right to report academic integrity violations and assign a grade of “F” for the assignment or for the entire course as appropriate.

Students with Disabilities

Any student with disabilities or other special needs who needs special accommodations in this course is invited to share these concerns or requests with the instructor as soon as possible.

Sexual Harassment

Please see the following link to review university policy and procedures regarding sexual harassment: <http://www.ndsu.edu/policy/162.htm>

Course Outline

The course will be structured as follows:

- **Part I** will focus on the analytical techniques collectively known as analysis of variance;
- **Part II** will focus on regression techniques, including multi-level/hierarchical linear modeling; and
- **Part III** will introduce advanced analytical techniques referred to as structural equation modeling.

Tentative Course Schedule

Session	Topic	Readings & Due Dates
1 – January 12	Welcome & Introduction	None
2 – January 19	Review of Basic Statistics	Stevens, Ch. 1 Pre-Test Due by 5:00 p.m.
3 – January 26	One-Way Analysis of Variance	Coughlin, Ch. 2; Stevens, Ch. 2
4 – February 2	Post-Hoc Testing & Power Analysis	Stevens, Ch. 3
5 – February 9	Factorial Analysis of Variance	Stevens, Ch. 4; Project 1 Due
6 – February 16	Repeated Measures Analysis of Variance	Stevens, Ch. 5
7 – February 23	Analysis of Covariance	Stevens, Ch. 7; Project 2 Due
8 – March 2	Multivariate Analysis of Variance	Coughlin, Ch. 5; TBA
9 – March 9	Midterm Exam	None
<i>March 16</i>	<i>Spring Break – NO CLASS</i>	
10 – March 23	Simple Linear Regression	Coughlin, Ch. 3; Stevens, Ch. 6
11 – March 30	Multiple Regression	Stevens 6, TBA
12 – April 6	Logistic Regression	TBA; Project 3 Due
13 – April 13	Hierarchical Linear Modeling	Coughlin, Ch. 4; Stevens, Ch. 8;
14 – April 20	Path Analysis	Coughlin, Ch. 6; TBA
15 – April 27	Factor Analysis	TBA; Project 4 Due
16 – May 4	Structural Regression Modeling	TBA
17 – May 11	Final Exam	None

Possible Changes in the Syllabus

This syllabus is your contract for production in the course. Any changes to the course will be announced in class and posted on the course website as soon as possible. No changes increasing requirements will be made without unanimous consent of the entire class as these might adversely affect your grade.