Fall 9-1-2008

C&I 486.01: Statistical Procedures in Education

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THE UNIVERSITY OF MONTANA

SCHOOL OF EDUCATION

DEPARTMENT OF EDUCATIONAL LEADERSHIP AND COUNSELING

C&I /HHP 486

STATISTICAL PROCEDURES IN EDUCATION

Fall 2008

August 27 – December 10

Section 1
2:30 p.m. – 5:00 p.m.

Section 2
5:10 p.m. – 7:30 p.m.

Class Location: ED 315

Instructor: Dr. Merle J. Farrier
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Office Hours: By Appointment
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243-5623

C&I/HPP 486: STATISTICAL PROCEDURES IN EDUCATION

TEXT

Statistical Methods for Psychology
David C. Howell (2008). Duxbury Press Belmont, CA 94002
Note: This text is not required; you may use any suitable statistics text or other source of statistics that you have available.

COURSE PURPOSE

The purpose of this course is to present the necessary statistical theory and practice so as to ensure the student is capable of both analyzing and conducting formal quantitative research in an exemplary manner.

COURSE OF OBJECTIVES

To help the student:

1. understand statistical concepts and terminology,
2. understand the philosophical and logical basis of research,
3. become critical readers of research,
4. develop an ability to conduct action and formal research,
5. use computer technology in numerous components of research,
6. utilize statistical research as a means to build a personal knowledge base, &
7. utilize statistical research to contribute to an appropriate knowledge base.

COURSE OUTLINE (Depending upon time and need, the course of study will select from the following topics.)
Topics:

1. Logic and Philosophy of Research
   - Primary assumptions
   - Relationship between human thought and research methodology
   - Definition

   Activities/Assignments

   Students will be introduced to philosophical concepts and principles underlying statistical analysis.

2. Basic Concepts of Statistical Procedures
   - Primary assumptions
   - Descriptive
   - Inferential

   Activities/Assignments

   Students will be introduced to broad statistical considerations and assumptions about populations, samples, data, and statistical validity.

3. Quantity, Quality, and Measurement
   - The distinction between quantity and quality
   - The meaning of measurement
   - The use of measurement in statistics

   Activities/Assignments

   Students will work on problems and give class presentations.

4. Measurements about the Center of Data for Samples and Populations
   - Mode
   - Median
   - Means, arithmetic, harmonic, geometric, and quadratic
   - Range
   - Quartiles
   - Standard deviation
   - Variance

Activities/Assignments

Students will work on problems in class using calculators and take problems home. Report on kurtosis and Pearson's coefficient skewness.

4. Hypothesis Testing and Elementary Procedures

Hypothesis design and Type I/II error
Statistical reliability
Standard error of the mean & confidence intervals
Degrees of freedom & critical values

Activities/Assignments

In class work on appropriate statistics. Class to report on Type III, IV, and V errors.

Available technology will be maximized

5. Comparison of means

Parametric & nonparametric considerations
Z test
t-tests and necessary assumptions for each type
F distributions
Sign test & Wilcoxon matched pairs (Optional)

Activities/Assignments

In class work and homework on appropriate statistics.

Available technology will be maximized.

6. Association between variables

Pearson
Spearman
Point biserial
Phi correlation coefficient, etc.

Activities/Assignments

In class work and homework on appropriate statistics.

Available technology will be maximized.

7. Prediction

Regression terminology and assumptions
Linear regression
Other single dependent variable regressions
Multiple regression -- cross validation
Discriminate function analysis

Activities/Assignments

In class work and homework on appropriate statistics.
Available technology will be maximized.

8. Graphs

Bar graphs, histograms, and other statistical graphing

Activities/Assignments

In class work and homework on appropriate statistics.
Data will be expressed by computer in all graphical formats.

9. Multiple Levels - One and Two Independent Variables

One-Way ANOVA
Homogeneity of variance - Bartlett, Hartley, Cochran, Levene
A priori vs post hoc
Follow-up tests - Newman, Tukey, Scheffe

Activities/Assignments

In class work and homework on appropriate statistics.

INSTRUCTIONAL METHODS

Instructional methods will utilize "hands on" as the primary means of learning. Lectures, student presentations, cooperative learning, discussions, and individual/group research will also be employed.

EVALUATION CRITERIA

1. Class participation -- 20% -- Students will be expected to attend all classes, interact verbally, and develop discussion beyond the level of the text and/or presentations.

2. Assignments -- 50% -- Students are expected to complete all assignments in a timely manner. Assignments are to be turned in reflecting very high quality of thought and content. All writing assignments are to be word processed using APA format.

3. Final Examination -- 30% -- The final examination will be on the Wednesday of final week. All papers not turned in should be turned in by the Friday, December 5th 2008.

4. Warning… ask about the warning.

ASSIGNMENTS

1. Complete weekly assignments by class time of the next class.

2. Find and critically review a published quantitative research article/paper that should have never been published and prepare a written report that specifically identifies statistical, methodology, logical, and/or other research errors.

3. Prepare a five chapter research paper in which you discuss a research problem, data collection, null hypothesis, and statistical procedures as discussed in class. Students will then generate dummy data, run statistical analyses of the data, report the findings, make a decision regarding your hypothesis, and formulate your conclusion.

4. The final examination will be taken on a computer. There may be a take-home section handed out a week or two before the last class. This part of the exam, if we have a take-home section, will be due on the last class.

5. Written assignments must be presented in APA format.

IMPORTANT NOTICE

Students may work together or independently on assignments. However, all work turned in must be original. Assignments that are duplicates or, in my judgement, clones, will be returned without credit or grade. No work may be plagiarized. If you are quoting another source, you must cite the source. Much of what is to be learned in this class is learned by attending class and participating in the discussions. It is important to attend all classes if you are working for an A. Please let me know if you must miss class.

Please do not use the computer for email, solitaire, etc. during class time. Doing so will result in lowering your course grade.

REFERENCES

Borg, W. R. & Gall, M. D. (1988). Educational research. Longman.

Huck, S. W. (1974). Reading statistics and research. Harper and Row.

Kazmier, L. J. (1988). Business statistics. McGraw Hill.

Keppel, G. & Zedeck, S. (1989). Data analysis for research design. Freeman and Company.

Moore, D. S. & McCabe, G. P. (1991). Introduction to the practice of statistics. Freeman and Company.

Software (Utilized in the Course)
Excel
GB-STAT

Other Software
SPSS 16.0

Contact me at:
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e-mail merle.farrier@umontana.edu
Office: Room 202
Office hours by appointment. Off campus on all Tuesdays.

PROFESSIONAL STANDARDS FOR STUDENT PERFORMANCE

Graduate Students in the Department of Educational Leadership at The University of Montana are expected to:

- Demonstrate professional vision in the practice of educational administration
- Accept responsibility and accountability for class assignments in their role as members of the class
- Demonstrate growth during the period of their graduate career
- Demonstrate good decision making and an awareness of organizational issues from a variety of perspectives
- Demonstrate imagination and originality in the discussion of educational leadership issues
- Understand the relationship between theory and practice and the value of reflective leadership
- Demonstrate a moral, humanistic, ethical and caring attitude toward others
- Demonstrate an ability to build trust and positive relationships with others
- Demonstrate a tolerance for diversity and a warm acceptance of others regardless of their backgrounds or opinions
- Demonstrate emotional stability and an ability to work well with other members of the class, including the instructor
- Demonstrate an ability to express himself/herself well in speech and writing, and
- Demonstrate mastery of fundamental knowledge of course content and an understanding of its application

FAILURE TO DEMONSTRATE THE AFOREMENTIONED QUALITIES ON A CONSISTENT BASIS MAY RESULT IN REMOVAL FROM CLASSES AND/OR THE EDUCATIONAL LEADERSHIP PROGRAM.

EMERGENCY PREPAREDNESS AND RESPONSE

As members of a learning community we all have responsibilities for each other that extend beyond the teaching/learning experience and transcend our roles in that dimension. We are, as human beings, responsible for the protection and well-being of other members of our group, and one dimension of our individual and group responsibility in that area relates to how we prepare for, and respond to, emergencies. Toward that end, the following are important:

- In the event we need to evacuate the building, our primary route will be down the stairs and out the building's east doors. If that route is blocked, our secondary route will be down the hall to the west stairs, down the stairs to the first floor, and out the building's west doors.
- If you hear an alarm or are told to evacuate, always assume the emergency is real. Be sure to take coats, backpacks and valuables since the building may be closed for some time.
- Everyone should report to either the designated outdoor rally point or the indoor rally point (should conditions make it necessary to seek shelter in another building). Our outdoor rally point is in the area to the south of the School of Education – at least 300 feet from the building exit. Our indoor rally point is in McGill Hall Lobby. McGill Hall is east of the School of Education across the grass of Memorial Row. We should reconvene as a group at the appropriate rally point so we can determine if anyone is missing.
- Do not use elevators as a means of evacuating, and do not use cell phones until safely away from the building.
- As the instructor of this course, I would ask students who feel they may require assistance in evacuating to privately inform me of that need. Together we will preplan appropriate assistance.
- I would also request that students with a medical condition that could present an emergency privately inform me of that situation. Again, this notification is so we can preplan an appropriate response should an emergency occur.
- As soon as the class roster stabilizes, I will route a sign-up sheet for students to identify whether or not they possess current first aid and/or CPR certification. This information will be passed on to the Facility Emergency Coordinator for use should a need for first aid expertise arise.