CEP 933

CEP 933 Quantitative Methods in Educational Research II

Please note: Provided as a sample only

The following is provided to you as a sample syllabus for the course. Please note that instructors and dates are subject to change. Course contents, readings and assignments are likely to be updated and may vary. Please check with the current course catalogue http://reg.msu.edu/ for details and contact the instructor of record should you have any questions.

Syllabus
CEP 933: Quantitative Methods in Educational Research II

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Course Content:

This course introduces students to techniques of data analysis and statistical inference commonly used in educational and psychological research. Students will conduct analyses with SPSS statistical software, using several datasets. The major topics are multiple regression, one- and two-factor analysis of variance with multiple comparisons and interactions, analysis of repeated measures, and analysis of covariance. Knowledge of basic algebra is required, as is an understanding of the fundamental principles of descriptive statistics and hypothesis testing (as taught, for example, in CEP 932 or equivalent). Knowledge of calculus is not required.

Course Objectives:

1. By the end of the course, the student should have demonstrated the ability to:
2. identify continuous and discrete (or categorical) variables as either dependent or independent, and choose appropriate statistical procedures for their analysis;
3. describe relationships between independent variables and a continuous outcome variable;
4. calculate point estimates, confidence intervals and hypothesis tests for regression slopes;
5. delineate assumptions of linear statistical models and examine data to evaluate their conformity to those assumptions;
6. formulate and interpret multiple regression models appropriate for various research problems and interpret computer output relevant to those models;
7. formulate one- and two-factor between-groups analysis-of-variance models, estimate their parameters, and test hypotheses about those parameters, including the following:
    a. identifying the assumptions underlying parametric and nonparametric ANOVA,
    b. differentiating between fixed and random effects models,
    c. identifying situations in which various transformations are appropriate for ANOVA,
    d. computing and interpreting effect size indicators for the analysis of variance,
    e. completing power calculations for the analysis of variance.
8. design and implement tests of specific a priori and post hoc contrasts in the context of analysis of variance models; specifically
    a. identifying and differentiating between comparison and familywise error rates,
    b. describing when a priori and post hoc comparisons are appropriate,
    c. computing planned and post hoc comparison procedures, and
    d. identifying the various post hoc comparison procedures (Tukey's HSD, the Ryan procedure, the Scheffe test, Dunnett's tests), and conditions wherein each procedure is appropriate.
9. recognize similarities and differences between regression and analysis-of-variance models;

10. identify and control sources of error through experimental design and statistical adjustment;
11. identify observations which may be dependent, and explain the limitations of ordinary techniques for these data;
12. write coherent summaries and interpretations of data analyzed by the above procedures.

Prerequisite Knowledge:

The prerequisite for this course is CEP 932. The instruction of this course assumes that you have completed CEP 932 or have equivalent knowledge, and that you are familiar and can use the knowledge and skills learned as a part of that experience. While all the material covered in CEP 932 is drawn upon in CEP 933, you should be especially familiar with levels of measurement, descriptive statistics, t-tests, bivariate regression, and variance testing. If you feel that you need to revisit these topics, material from CEP 932 is available on Angel for your convenience; you can also reference a course syllabus there. Review of CEP 932 topics will not covered in this course.

Additional Course Requirements:

Due to the format of this course there are several additional requirements, many related to technology requirements.

1. *SPSS Software: Access and Proficiency*. Since the course requires statistical analysis, you will be required to have access to the statistical software SPSS to complete the analyses (see the section on Statistical Software, below). It is also assumed that you have proficiency with the SPSS software package to the extent of that required for work completed as part of CEP 932. If you do not have this level of proficiency, you will need to independently develop these skills. Possible resources for skill develop are provided in the section on Statistical Software, below).
2. *Dependable High-Speed Internet Access*. As this is an online offering of the course, you will also be required to have dependable high speed internet access that will handle video and will allow you access to all course material.
3. *Computer That Can Play Flash Video.* You also need capability to handle Flash video and components. Access of some components of the Angel course management system depends on this capability (for instance, parts of Angel can be accessed using an Ipad, but scrolling through pages on Angel will not be possible nor will you be able to send email through the Angel system). Some of the course videos may use flash and therefore would not be accessible by computers without capability to handle flash. If your computer does not have this capability, one solution may be to use publicly-available computers available at a library.
4. *Angel Course Management System (CMS): Access & Proficiency.* The Angel CMS will be the portal for all course materials. It is assumed that you know how to access and operate within Angel. If you do not have these skills, you will need to develop them using the Help Resources provided on the Angel website (angel.msu.edu).
5. *Capability to Create and Upload Electronic Documents*. Work to be completed for assignments must be contained in an electronic document and uploaded to the Angel. Acceptable electronic documents include *.DOC or *.DOCX (Microsoft Word), *.PDF (Adobe PDF, other PDF software), and *.TXT (Text Documents created using Wordpad or Notepad). Before submitting a document not listed here, contact the instructor for approval.
6. *Agreement with Integrity Statement***.** As a substantial portion of the measurement of your performance in this course asks you to complete assessments that are to be completed in an non-proctored setting, participation in this course requires that you state your agreement to adhere to an Integrity Statement. The content of the Integrity Statement do not supersede the MSU University's policy concerning academic integrity (see Academic Integrity section, below). The statement contains specific rules that are consistent with the university's policies, but due to the online format of the course, stated in terms that are contextual. If you cannot agree with all points of the Integrity Statement, you should immediately contact the instructor. Access to assessments on Angel is conditional on your agreement with the statement. Please see the course schedule for the due date by which you must submit a completed *Integrity Statement*.

If you cannot meet all of these requirements, successful completion of this course will be impeded. If you know that one or more of these requirements cannot be met, or if you suspect meeting them all may be challenging, please contact the instructor immediately to determine if a work-around can be arranged (however, there is no guarantee that a work around is possible). In the event that you cannot meet these requirements and an acceptable solution cannot be found, it will not be possible to complete this course.

Coursework:

Coursework will consist of weekly assignments and assessments.

Assignments

Assignments will typically involve applying what you have recently learned to one or more problems. Typically, the assignments will ask you to perform statistical analyses using provided datasets and SPSS software to complete tasks and respond to questions. These assignments may be completed individually or as a group effort in groups of no more than three students. Groups should turn in one copy of the assignment and all members will receive the same grade (see section on group work for more details regarding management of groups). Assignments will be made available on Angel. The completed assignment needs to be electronically submitted on Angel in the appropriate Dropbox by the specified date and time. Late assignments will not be accepted—due dates will be strictly enforced. You may want to upload your assignment early to avoid computer/network woes close to the deadline.

Exercises

Exercises are provided to help prepare you for the assessments. Exercises will generally draw upon the corresponding assignment. You will be provided with exercise questions and the solution to these questions. You are encouraged to complete the exercise before taking the assessment. Exercises will not be graded.

Assessments

Seven assessments will be given (one for roughly each week of the course). Assessments may include items of the following formats: 1) short answer, 2) multiple choice, 3) true/false, 4) fill in the blank, and 5) matching.

Assessments will be timed and available only on Angel. You will provide responses to the assessment items only through Angel. An assessment will be available to access during a time span that will include several days (specific days and times are indicated in the course schedule) to allow you flexibility in scheduling. Once you access an exam, you will only be allowed to provide responses a specified time interval (45 minutes; plan on 40 minutes to complete the assessment and 5 minutes to check your work and submit it). You should plan on completing the assessment in one sitting (you cannot access the assessment more than once and you cannot stop the timer once the assessment is accessed). Inability to complete the exam due to low-quality internet access, or other difficulties with technology will not be factored into the score you receive on the assessment.

Assessments are open-book and open-notes. However, since the assessment is timed, it is wise to prepare a one-page summary of material covered prior to the assessment that you can reference during the assessment. The content covered on assessments will be cumulative, but will focus on content covered since the last assessment.

You are to complete these assessments individually and not receive help from any other person. You are also expected to not provide help to any of your fellow classmates. Please note that the availability of the assessment over a several-day period is a courtesy offered to the class. Provision of this courtesy requires that you not share the contents of the assessment with other classmates in any way. If this request cannot be honored, this courtesy will be eliminated and it will be necessary to schedule assessments during specific dates and times.

Your grade on assessments will be based on your performance on six of the seven exams, with the lowest exam grade dropped.

Grading:

Grades are criterion-referenced. That is, grades will be assigned based on the percent of the total possible points that you receive. The grade scale is:

4.0 > 90%
3.5 > 80%
3.0 > 70%
2.5 > 65%
2.0 > 60%.

The scores for exams and assignments are weighted as follows:

25% - Assignments
0% - Exercises
75% - Assessments (best 6 of 7)

Total 100%

Required Textbook:

The required textbook for the course is the textbook that was required for CEP 932, *for the semester you took it*. In the past year, these textbooks have included:

Hinkle, D.E., Wiersma, W., and Jurs, S.G. (2003). *Applied Statistics for the Behavioral Sciences* (5th ed.). Boston, MA: Houghton Mifflin Co.

Ott, R.L. and Longnecker, M. (2001). *An Introduction to Statistical Methods and Data Analysis* (5th ed.). Pacific Grove, CA: Duxbury

If you used a different textbook in your course, please contact the instructor via email for approval. The required textbook is either one of these two textbooks or an alternate textbook, as approved by the instructor. If you do not have a textbook from a prior course and need to obtain one for use in this course, either of these two textbooks would suffice.

Statistical Software

You will be required to use SPSS software to complete work for this course. SPSS is available on MSU microlab computers if you are near the main MSU campus or at some MSU satellite locations. SPSS is a Windows package that is primarily menu-driven and is the software that will be used to illustrate analyses during the lectures. The current version of SPSS is IBM SPSS 20.0; versions of SPSS 15.0 or later would suffice, but when in doubt contact the instructor. SPSS software can be rented for a fee. The version to rent is the IBM® SPSS® Statistics Standard GradPack 20 for Windows or Mac. These packages can be found on sites such as www.onthehub.com ((-month rental costs about $55).

It is assumed that you are proficient in SPSS to the level required by the completion of CEP 932. If you need to brush up or learn more about SPSS, there are a number of resources that you may find helpful:

Field, Andy (2009). *Discovering Statistics Using SPSS* (3rd ed.). Thousand Oaks, CA. (Please note that this book is recommended on the basis of the statistical and technical content. However, this book and its accompanying website have non-statistical content that some may consider offensive. Recommendation of this content does not mean that the instructor necessarily endorses the non-statistical content).

Green, Samuel B. and Salkind, Neil J. (2010). *Using SPSS for Windows and Macintosh: analyzing and Understanding data* (6th ed.). Prentice Hall.

Pallant, Julie (2010). *SPSS Survival Manual: A step by step guide to data analysis using SPSS*. Open University Press.

UCLA Academic Technology services webpage: http://www.ats.ucla.edu/stat/spss/

Group Work:

If you wish, you may work on assignments with up to three of your classmates. These groups are organized by students and do not have to maintain a consistent membership roster. In other words, your decision to complete assignments individually or in a group can be changed back and forth over the course of the semester. If you do decide to work on an assignment with one or more of your classmates, you must submit a single assignment for all members of your group; the assignment must list the names of all group members. All those who worked together on a given homework assignment will receive the same grade for that assignment. Management of group dynamics is the responsibility of the group's members.

Additional Resources:

Students over the past semesters have recommended a number of books that they found helpful. Most of these books could be considered to be a more 'big picture' introduction to statistics. In general, these resources give a broad overview of the subject but do not go into any single topic deeply. While none of these resources would be a

substitution for the course textbook, you may find them useful as additional sources. Many are available in the library, either the editions listed here or earlier editions.

Gonick, L. & Smith, W. (1994). *The Cartoon Guide to Statistics*. Harper Resource.
Kranzler, J.H. (2002). *Statistics for the Terrified (3rd ed.)*. Prentice-Hall.
Levine, D.M. & Stephan D.F. (2004). *Even You Can Learn Statistics: A Guide for Everyone Who Has Ever Been Afraid of Statistics.* Prentice-Hall.

Academic Integrity:

Participation in this course assumes that you 1) indicated agreement with the course *Integrity Statement*, available online on Angel and 2) you will adhere to the statements set out in the statement as well as the University Policy on academic integrity. MSU's policy is covered in the *Spartan Life* handbook, found on the *Spartan Life* web site at: http://splife.studentlife.msu.edu.

If the instructor suspects a student has violated the University policy on academic integrity or the *Integrity Statement*, the instructor will proceed as guided by University policy. The student will be approached by the instructor. For advisory purposes, the instructor may also consult faculty members who serve on departmental, College or University committees that address academic integrity, the department chairperson, the academic dean, or the Ombudsman; in all of these interactions, the instructor will keep the student's identity confidential. The goal of these consultations is for the instructor to seek guidance to aid her in arriving at a decision about whether the suspicion merits an allegation of academic misconduct. The student may or may not be informed that the instructor is seeking advisement pertaining to a situation involving the student (the student's identity will not be disclosed).

If the instructor makes an allegation that a student has committed academic misconduct, the student will be informed by the instructor. The University policy specifies that the initial action to be taken is at the discretion of the instructor and could include receiving a penalty grade for assignments or the entire course and recommendation for an academic disciplinary hearing (recommended to and initiated by the student's academic dean). If the instructor assigns the student a penalty grade, the instructor is required to report details of the allegation and penalty grade to the student's academic dean (for more details about this, as well as the right of students to an academic grievance hearing, see *Integrity of Scholarship and Grades* at Spartan Life Online – www.splife.studentlife.msu.edu).

The online format and conduct of this course creates an environment in which you are asked to engage in high-stakes assessment independently and without a formal proctor. In this context, as in any other course, you are expected to maintain academic integrity according to the University policy, which covers all instruction regardless of format. However, after consulting the University policy and *Integrity Statement*, there may still remain details that you may have questions about or need further clarification about how these principles and procedures apply specifically to the online format. You are encouraged to seek answers to your questions from an appropriate source. For more information on the *Integrity Statement*, consult with the instructor. For more information on the University policy, first consult the online handbook. If you have any remaining questions and the instructor cannot adequately address them, the instructor will refer you to a knowledgeable source. The Office of the Ombudsman is a knowledgeable and neutral source (and students may post confidential inquiries with this office, see https://www.msu.edu/~ombud/ for more details), and can also serve as a point of first contact. Please note that the instructor will not penalize a student for asking for clarification on whether an action or behavior is considered to be in violation of policy, *if* that action or behavior has not been committed.

Accessibility:

Michigan State University seeks to ensure that its programs are accessible to all persons. Students in need of special assistance or an accommodation regarding any of the course requirements as outlined in the syllabus and other course content are advised to notify the instructor immediately. We will meet privately to discuss a resolution of your matter, which may or may not include an appropriate referral. Confidentiality will be maintained regarding these discussions. For more information on University policy and accommodations, please consult the Resource Center for Persons with Disabilities: www.rcpd.msu.edu.