CEP 932 – Quantitative Methods in Education Research I  
Spring, 2014

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Course Description and Goals: This course provides an introduction to data analysis and statistical inference. Students learn to describe data (quantitatively and graphically), to select and compute statistical estimates and hypothesis tests, to use software to accomplish these tasks, and to interpret and write about the results of the estimates and tests. General topics covered in class include: probability, descriptive statistics, commonly used distributions, sampling, statistical inference, hypothesis testing, linear regression, and ANOVA.

Class meetings: Class will meet on Tuesdays from 4:10pm to 7:00pm in Berkey 120.

Office Hours: Imberman: Tuesdays 10:00am – 12:00pm or by appointment in 25E MAH.  
Li: Mondays 4:50pm – 6:50pm in the Graduate Student Lounge, Erickson 1st Floor.

Requirements and grading:

Your grade in this course will be calculated using two formulas and your final grade will be the higher of the two:

Method 1:  
Problem Sets – 45%  
Midterm Exam – 25%  
Final Exam – 30%

Method 2:  
Problem Sets – 25%  
Midterm Exam – 35%  
Final Exam – 40%

Note that if you have a question or concern regarding your grade on any assignment you need to bring it up within one week after it is returned. After that I will not entertain any requests for grade changes.

Descriptions of the course requirements are as follows:

Exams – There will be two exams in the course. The midterm will cover the first half of the course while the final will cover material in the second half of the course. Thus the final is not cumulative for the whole course but keep in mind there will be concepts in the first half that become part of the more advanced concepts from the second half (hence the reason the final exam counts slightly more towards your final grade).

Exams will consist of short answer and computation problems and may also include multiple choice and true/false items. In some cases the problems will have multiple parts and/or include a written portion. It is recommended that students have a calculator for the exams. Students may use a 4-function or scientific calculator without any graphing or note-taking abilities. Graphing calculators and calculators that allow for any written comments are not permitted. Calculators will be checked before the exam. Students will be permitted to use one letter size (8 ½ by 11 inch) sheet of paper with notes and formulas on the front and back during the exam.

Problem Sets – There will be set of seven take-home assignments to be done during the semester. You are welcome to work in groups of up to three people but each student should submit his or her own copy. Late problem sets will not be accepted. Instead I will drop your lowest two problem set scores. Problem sets will be due at the start of class one week after they are posted on D2L. You may handwrite or type your answers but make sure they are legible. If the grader cannot read your answer you will get no credit for it. Please staple your pages together. DO NOT USE A PAPER CLIP.

SPSS Software – A number of the problems in the problem sets will require the use of statistical software. Thus you must have access to SPSS software. SPSS is available on MSU Microlab computers (see http://tech.msu.edu/computerlabs/floor-plans.php for a list of available labs; check lab schedules for open times) if you are near the main MSU campus or at some MSU satellite locations. SPSS is a Windows/Mac package that is primarily menu-driven. The current version of SPSS is IBM SPSS 22. You may use an earlier version if you already own it. SPSS software can be rented for a fee. The version to rent is the IBM® SPSS® Statistics Standard GradPack 22 for Windows or Mac. These packages can be found on sites such as www.onthehub.com/spss (a 6-month rental costs about $56).

It is not assumed that you are proficient in SPSS but that you will gain the necessary skills by studying the material in the textbook and in the lecture notes. If you need to learn more about SPSS, there are a number of resources that you may find helpful:


UCLA Academic Technology services webpage: http://www.ats.ucla.edu/stat/spss/
Note that I have not used or read any of these books and I am only passing them on upon the recommendation of others so please do not ask me about any of the content in these guides.

(5) Desire2Learn (D2L) Course Management – Communication in the course will be conducted through D2L at http://d2l.msu.edu. I will provide course materials, including problem sets, through D2L. For help using D2L see http://help.d2l.msu.edu/

Academic Honesty: Students are expected to abide by the academic honesty requirements set forth here https://www.msu.edu/~ombud/academic-integrity/index.html. Any academic dishonesty will not be tolerated and is subject to referral to the appropriate review process.

Incompletes: Incompletes are only provided in extraordinary circumstances and at the instructor’s discretion. The MSU Registrar’s office provides the following rules for the application of incomplete grades: “The I-Incomplete may be given only when: the student (a) has completed at least 6/7 of the term of instruction, but is unable to complete the class work and/or take the final examination because of illness or other compelling reason; and (b) has done satisfactory work in the course; and (c) in the instructor’s judgment can complete the required work without repeating the course”

Accommodations: University policy requires that reasonable accommodations be made for students with disabilities, and absences due to religious holidays and athletic competitions. Students who are absent for religious holidays or athletic competitions will not have their attendance grade affected by those absences, nor will they count to your two permitted absences, provided that you inform me in advance. Further, reasonable accommodations will be made for students who are absent for exams due to religious holidays or athletic competitions provided you inform me at least one week prior to the exam. Students who are ill will be permitted to make up the exam only if they provide documentation of their illness from a health professional or health care institution. Note that the documentation must attest that the student was too ill to take the exam. A note that simply states the student visited a clinic is insufficient. Whether accommodations for other reasons for missing exams will be provided are to be decided by the instructor on a case-by-case basis. Failure to provide reasonable documentation of your excuse or provision of an insufficient excuse could result in receiving a reduced grade or zero on the missed exam. Students with disabilities that require extra time for an exam or other accommodations must provide me with a Verified Individualized Services and Accommodations (VISA) document at least one week prior to the first exam at which point I will work with you to make alternative arrangements.

Social Media Policy: As members of a learning community, students are expected to respect the intellectual property of course instructors. All course materials presented to students are the copyrighted property of the course instructor or the publisher and are subject to the following conditions of use:

1. Students may record lectures or any other classroom activities and use the recordings only for their own course-related purposes.
2. Students may share the recordings and other course materials only with other students enrolled in the class. Students receiving recordings and other course materials from a classmate may use them only for course-related purposes.
3. Students may not post the recordings or other course materials online or distribute them to anyone not enrolled in the course without the advance written permission of the course instructor and, if applicable, any students whose voice or image is included in the recordings.
4. Any student violating the conditions described above may face academic disciplinary sanctions.

**Course Outline:**

This outline is preliminary and may change if the class goes too fast or too slow. I reserve the right to make changes to the syllabus and schedule as necessary. Students will be notified in advance of any change and the revised schedule will be posted on D2L. Readings from the textbook are provided in bold.

- Week 1 – Jan 13 – Introduction, Sampling and Data, *(Textbook: 1, 2, 3.1)*
- Week 2 – Jan 20 – Descriptive and Graphical Statistics *(Textbook: 3.2 – 3.7, 4.1)*
- Week 3 – Jan 27 – Probability and Introduction to SPSS *(Textbook: 4.1)*
- Week 4 – Jan 3 – The Normal and Some Other Probability Distributions *(Textbook 4.2 – 4.3)*
  
  *Problem Set 1 due.*

- Week 5 – Feb 10 – Sampling Distributions and Confidence Intervals around a Mean *(Textbook: 4.4 – 4.7, 5.1, 5.3 – 5.4)*
- Week 6 – Feb 17 – Inference around a Single Mean; *(Textbook: 6.1 – 6.2)*
  
  *Problem Set 2 due.*

- Week 7 – Feb 24 – Single Mean Inference, continued. Type I and Type II Errors; P-Values *(Textbook: 6.4 – 6.5)*
  
  *Problem Set 3 due.*

- Week 8 – Mar 3 – Midterm

**Spring Break – Mar 10 (No Class)**

- Week 9 – Mar 17 – Inference with Two Means *(Textbook: 7.1, 7.3 – 7.5)*
Week 10 – Mar 24 – Inference for Proportions and Chi-square Tests (Textbook: 5.2, 6.3, 7.2, 8.1 – 8.4)

Problem Set 4 due.

Week 11 – Mar 31 – One-Way Anova (Textbook: 12.1 – 12.2)

Week 12 – Apr 7 – Least Squares Predictions and Correlations (Textbook: 9)

Problem Set 5 due.

Week 13 – Apr 14 – Linear Regression with Two Variables (Textbook: 9)

Week 14 – Apr 21 – Linear Regression with Two Variables continued (Textbook: 9)

Problem Set 6 due.

Week 15 – Apr 28 – Introduction to Multivariate Regression (Textbook: 10)

Problem Set 7 due.

Final exam – Thursday, May 7, 5:45pm – 7:45pm.