Educational Statistics

**EPSY 480, Sections EB, OB, & B (CRNs 62337, 58155, and 59824)**

## Assignments due Tuesdays and Sundays 9:00 p.m.

**Lecture videos posted Tuesdays and Thursdays by 5:30 p.m.**

**Spring, 2016 POT A 1/19/2016-3/11/2016**

Instructor: Dr. Cromley, Associate Professor

Office: Rm. 10D Education Building—basement level 6th & Peabody

E-mail: jcromley@illinois.edu (by far the best way to reach me)

Telephone: (217) 300-1092 Fax: (217) 244-7620

Office hours: Cromley: Wed 3:00 pm – 5:00 pm in person or electronically via Skype (handle: jennifer.cromley) or other web conference (please email me so I know to log on). First come, first served (no appointments possible). Other times available by appointment.

#### Course Description (from Graduate Catalogue):

Designed for terminal value for professional training of students not intending to pursue advanced graduate work, and for introductory value for students continuing graduate study in education; descriptive statistics, introduction to correlation and regression, the normal curve, statistical inference, and the presentation and interpretation of statistical data in educational literature.

**Course Outline**

This course is designed to introduce educators, counselors and other social service professionals, administrators, and future researchers to the fundamentals of educational statistics. Educational statistics provide us with powerful tools for answering questions about how students learn and develop and how effective various educational techniques are. For example, educational statistics can help answer questions such as

* How does children’s knowledge grow as they develop?
* How does the relationship of word reading and reading comprehension change as children become better readers?
* Does using computers increase students’ motivation?
* Do the answers to the questions above differ for students at different ages? In different school subject areas? With different levels of prior knowledge? In other words, what works for whom, when, and under what circumstances?[[1]](#footnote-1)
* How well do high school grades, test scores, and extracurricular activities predict success in college?
* After controlling for grades from the previous year, how do differences in math instruction affect achievement for the current year?

and many, many other questions.

The emphasis for this course is on understanding appropriate uses and the common misuses of educational statistics, not on memorization.

**What I expect from you:**

You will engage in six types of activities to build your understanding in this intensive 8-week course:

1. Textbook and other readings (1.75-3.75 hrs./Week.)
2. Viewing recorded lectures and doing exercises that accompany the lecture. **Please check Blackboard for new postings at least twice a week.** The course is listed on Compass 2g/Blackboard as EDUCATIONAL STATISTICS EPSY 480 SEC EB(4.5-6 hrs./Week.)
3. Completing statistical analysis homework assignments (5.5-11.25 hrs./Week.)
4. Completing article homework assignments (1.75-3.75 hrs./Week.)
5. Preparing for and taking periodic online quizzes and in-class paper tests (1.75-3.75 hrs./Week.)
6. Practicing applying statistical concepts taught in the recorded lectures

These activities all reinforce each other. If you expect to learn this material well and succeed in this class, you will need to budget *at least* 17 hours per week for this compressed 8-week course. **Most of your learning will take place out of class meetings.** Only 5 hours/Week are lecture; you need to spend at least twice that amount of time studying outside of class. Practice in using and interpreting statistics is key to learning and understanding it. Unlike most math-related classes you have taken, memorization will only occasionally be helpful. I expect you to apply what you learn; this means doing some thinking on your own, not just going through a series a steps that I give you.

**What you should expect from me:**

1. I will be in my office for office hours, and you can schedule other times to meet in person or via Skype or other web conferencing if you can't make it to in-person office hours.
2. I will answer email promptly, usually within 2 hours but always within 24 hours. I will answer questions to clarify a topic, help with homework, or other questions or obstacles to your learning.
3. I will post clarifications or hints to Blackboard if students are having difficulty (or had difficulty) with an assignment or assessment.
4. I will return on-time assignments to you by the next class session via email. You should keep all graded assignments (except for the midterm and final exams, which I need to keep—we can schedule online meetings to review them).
5. I will grade assignments with a high level of attention to detail. Some of you will be carrying out analyses at some point in your career that can have very serious consequences (e.g., trials of therapy techniques for suicidal patients).
6. I will also be humane in my grading; if no one in the class answered a question correctly, then I did not teach it well and I will take responsibility for that.

**Course objectives:**

At the end of this course, with the aim of becoming a better consumer and user of educational statistics, students will be able to:

1. Using the SPSS computer program, produce and interpret basic descriptive statistics and graphs for a data set.
2. Conduct and interpret a *z* test, independent and dependent samples *t* tests, correlation, simple and multiple regression, and chi square test on a data set.
3. Given a data set and a research question, choose the appropriate statistic to conduct.
4. Be able to identify common errors made when conducting and interpreting the above-mentioned statistical tests.
5. Be able to report results of the above tests in APA style.

**Text, readings, and software:**

The textbook for the course is Aron, A., Coups, E., & Aron, E. N. (2011). *Statistics for the Behavioral and Social Sciences, 5th Ed.* Pearson Education (US). ISBN-13: 9780205797257, ISBN: 0205797253, list price for the print book is $178.80 (often available from online retailers at a discounted price) and for the ebook is $72.00. Other editions of the same text will be fine.

You must have access to SPSS software. This software is available for $70 from the UIUC web store; the license will expire 8/1/2016.

A second required reading should be downloaded from Blackboard: Onwuegbuzie, A. J., & Daniel L. G. (2003, February 19). Typology of analytical and interpretational errors in quantitative and qualitative educational research. *Current Issues in Education [On-line], 6*(2).

An additional article for later in the semester, available from UIUC library e-reserves, is Daniel, L. G. (1998). Statistical significance testing: A historical overview of misuse and misinterpretation with implications for the editorial policies of education journals. *Research in the Schools, 5* (2), 23-32.

A third additional article is also available from UIUC library e-reserves: Sun, S., Pan, W., & Wang, L. L. (2010). A comprehensive review of effect size reporting and interpreting practices in academic journals in education and psychology. *Journal of Educational Psychology, 102*(4), 989-1004.

An optional reading on validity for week 6 is also available from UIUC library e-reserves: Cizek, G. J., Bowen, D., & Church, K. (2010). Sources of validity evidence for educational and psychological tests: A follow-up study. *Educational and Psychological Measurement, 70*(5) 732–743.

**Access to computers:**

This course **requires** access to the following computer resources, together with basic computer literacy skills (e.g., downloading and saving a file, opening and printing files):

*Blackboard/Compass 2g*—access via the Internet from home; a good Internet connection is necessary for replaying recorded lectures (the free Google Chrome browser is recommended). A poor Internet connection is no excuse for poor performance.

*SPSS*—a license purchased from UIUC web store and downloaded onto your own computer

A *printer* if you wish to print PowerPoints

#### Class Attendance and Participation

Students should view each class and participate in in-class exercises. Course content, instruction in using software, and other material that is not in the assigned readings will be covered in class. There are no specific requirements for participation.

I will record every class lecture and post the MP4 recording via the class Blackboard site using a program called Camtasia. **You may download videos to your own computer; you may not post or share them (or any part of them) with anyone outside of class.** Emailed student questions are a really important part of the class even though it is asynchronous; if you have question, chance are other students do as well. Please don’t let anything get in the way of asking!

**Students with Disabilities:**

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES you may visit 1207 S. Oak St., Champaign, call 333-4603 (V/TDD), or e-mail a message to [disability@uiuc.edu](mailto:disability@uiuc.edu).

To insure that disability-related concerns are properly addressed from the beginning, students with disabilities who require assistance to participate in this class are asked to see the instructor as soon as possible.

**Academic Integrity:**

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: http://education.illinois.edu/edpsy/about/academic-integrity. Please note that you are responsible for reading this policy. Ignorance is not an excuse for any academic dishonesty. Plagiarism or fair use violations will be dealt with without exceptions. <http://education.illinois.edu/edpsy/academicintegrity>. Students may work on the **second** draft of a homework assignment together, but absolutely no cutting and pasting (i.e., verbatim copying) is allowed. Working together on a **second** draft also means that you may not “share” the work of locating articles for the article assignment; any pair of students submitting the same article on more than one assignment will be presumed to have violated this rule**. A consistent pattern of paraphrased exam answers between any pair of students—regardless of the score given for each answer and regardless of when the exams are taken—will be treated as prima facie evidence of academic dishonesty. Do not sit with your friends to take an exam. Do not paraphrase from your friends’ answers on an exam. Do not share your answers to exam questions.**

The Illinois Student Code should also be considered as a part of this syllabus. Students should pay particular attention to Article 1, Part 4: Academic Integrity. Read the Code at the following URL: <http://www.admin.uiuc.edu/policy/code/>

**Evaluation:**

Student grades will be earned by students’ achievement on the following assignments. Please see the weekly schedule for due dates:

Statistical analysis homework assignments (6 x 5% ea.) 30%

Completing article homework assignments (5 x 1% ea.) 5%

Quizzes (5 x 2% ea.) 10%

Midterm examination 25%

Final examination 30%

TOTAL 100%

*No Extra Credit:*

Your course grades are based only on the above information. There will be no extra-credit opportunities. Please do not ask for exceptions.

#### Assignments

**1) Statistical analysis homework assignments (6 x 5% ea.).**

The goal of these assignments is to help you understand different statistical techniques by carrying them out on data sets that are posted on Blackboard; all homeworks for the semester are in one large Word file on Blackboard. Homework must be typed (**or neatly handwritten and scanned)** and submitted via Blackboard. **Please pay close attention to detail when you are answering questions.** Please attach all relevant parts of the printout, and be sure to include the SPSS commands (I will explain this in the video lecture). Unless prior arrangements are made, 5% of the grade for that assignment will be deducted for each day assignments are submitted late; the “day” begins at 9:00 pm on the respective Tuesday or Sunday (see pages 7-8 for the deadlines); the Blackboard submission link will disappear after the due date and time, so late submissions need to be emailed to me, **and** **please put your full name in the filename of any file you email**.

In order to encourage mastery of the material, if you wish to revise an SPSS homework assignment based on my comments, you may do so **by emailing me the revision within one week of receiving feedback from me—please put your full name in the filename of any file you email, and also indicate in the document AND in the filename that it is a revision**. Your grade will be based on the best score of the two submissions—original and revised. In my experience, students who receive a poor grade almost invariably neglected to revise homework assignments.

If you have not used Blackboard before for your courses, helpful information will be found at [Link to UIUC Compass 2g for students](https://www.cites.illinois.edu/illinoiscompass/studentresources.html)

Optional online computation exercises (0%)

The goal of these assignments is to help you practice calculations that you may need to be able to do, and do quickly, on quizzes and exams. These are completed online so that you can get immediate feedback. You may re-take them as often as you wish.

2) Completing article homework assignments (5 x 1% ea.)

The goal of these assignments is to help you, in small steps, learn how to critically read some of the statistics in published journal articles in your field. All of these homeworks must be submitted by 9:00 PM on the respective Tuesday or Sunday (see pages 7-8 for the deadlines). Article homework assignments **may not be revised for a higher grade**. Unless prior arrangements are made, 5% of the grade will be deducted for each day assignments are submitted late; the “day” begins at 9:00 pm of the due date.

3) Quizzes (completed by dates shown on pp. 7-8; 5 x 2% ea. = 10%)

There will be a quiz lasting about 15 minutes shortly before every other class session (approximately). Each quiz will consist of 4-6 questions of 1-2 points each for a total of 6 points, **to be completed before class meets**. You may use a printed or handwritten crib sheet with notes of up to two sides of one 8½” x 11” sheet of paper. Please have a calculator handy for quizzes. I will supply online any needed tables or other handouts. No other papers, books, electronic, Internet, help from classmates, or other resources are permitted to be used for taking quizzes. Each timed quiz will “open” on Blackboard on the night (8:00 p.m.) after the material is covered, and will close at lecture start time on the quiz completion date (for example, the quiz to be completed for 1/26 can be begun any time between Thursday 1/21 at 8:00 p.m. and Tuesday 1/26 at 9:00 p.m.). The quiz must be completed in a single session that ends by clicking the **Submit** button (**never use the back arrow on your browser, and do not close your browser in the middle of a quiz**), and no makeup quizzes are permitted. **A major goal of the quizzes is to help you figure out what you know and what you still need to study more** (to become more metacognitive about statistics). **Please email me immediately if your computer crashes or you get any error message that leads you to believe your quiz answers were not recorded. For your own protection and for study purposes, please print your quiz before you click on “Submit.”**

4) Midterm (2/9; 25%) and Final (3/13; 30%) Examinations

There will be an online midterm examination (2 1/2 hours) due by 2/9 covering all topics up to this date, including the first class meeting. You may use a crib sheet with notes of up to 2 sides each on three 8½” x 11” sheets of paper. Please have a calculator available for exams. I will supply any needed tables or other handouts. No other papers, books, or resources are permitted on exams other than blank scratch paper.

There will be an online final examination (2 1/2 hours) due by 3/13. The final covers all topics since the midterm (and topics from before the midterm implicitly). You may use a crib sheet with notes of up to 2 sides each on three 8½” x 11” sheets of paper. Please have a calculator available for exams. I will supply any needed tables or other handouts. No other papers, books, or resources are permitted on exams other than blank scratch paper. A special grading rule is in place for the final exam—raw scores of less than 66.6% on the final exam will earn a grade of F for the final.

**Important Regulations**

Students are responsible for all information transmitted in the classroom. This includes lecture material that may or may not be included in the readings, announcements about deadlines or changes of deadlines, meeting course requirements, etc.

No makeup tests will be given without written documentation, e.g., a note from a physician on her/his letterhead.

Submission of all course requirements must be made on paper in person to the course instructor (unless otherwise noted on the assignment itself).

Please notify me in advance if any assignment deadlines conflict with a religious observance.

**Grades will be earned according to the following system**

97-100 = A+ 93-96.9 = A 90-92.9 = A-

87-89.9 = B+ 83-86.9 = B 80-82.9 = B-

77-79.9 = C+ 73-76.9 = C 70-72.9 = C-

67-69.9 = D+ 63-66.9 = D 60-62.9 = D-

#### Below 59.9 = F

# Weekly Schedule

| Date of video by 5:30 pm | Topic | Readings to complete before watching video in ACA = Aron, Coups, and Aron (2011) | Assignments due by 9:00 pm of the date |
| --- | --- | --- | --- |
| Tu 1/19  Session 1 | Introduction to the course, educational statistics and research methods, and SPSS | None—first day of class | None—first day of class |
| Th 1/21  Session 2 | The mean and other types of averages, SPSS intro., cont’d.  **Jan 25, last GRADUATE drop day for POT A** | ACA portions of Chapter 1 (2 branches, Basic concepts) & 2 (Representative values)  Onwuegbuzie & Daniel (O&D)—Introduction, Purpose, Confirmation bias, Researcher bias, Mortality. | Sunday 1/24  SPSS Homework 1  Article Homework A |
| Tu 1/26  Session 3 | Graphing  Variance  Standard deviation | ACA Chapter 1 (remainder, skip frequency polygons) & 2 (remainder)  O&D—Distorted graphics. | Tuesday 1/26  Quiz 1  (Covers previous 2 class sessions)  Optional calculation HW 1 |
| Th 1/28  Session 4 | Graphing (cont’d.)  Correlations | ACA Chapter 3 (through Possible Directions)  O&D—Correlation coefficients. | Sunday 1/31  SPSS Homework 2  Article Homework B  Optional calc HW 2 |
| Tu 2/2  Session 5 | Probability and the normal curve, z-scores | ACA Chapter 4  O&D—Summary | Tuesday 2/2  Quiz 2  (Covers previous 2 class sessions)  Optional calc HW 3 |
| Th 2/4  Session 6 | Formulating research hypotheses, Statistical significance testing  Review for midterm | ACA Chapters 5-6 (not Advanced Topic)  Daniel, 1998 (focus on pp. 27-28) | Sunday 2/7  SPSS Homework 3  Article Homework C  Optional calc HW 4  Email me two exam-type questions |
| Sun 2/7 opens | Midterm exam | None | Tuesday 2/9  Optional calc HW 5 (open until midterm)  Midterm exam  (Covers first 6 class sessions) |
| Th 2/11  Session 7 | *t* test for independent groups  Effect sizes  Statistical power  **2/12, last day to withdraw without W on transcript** | ACA Chapters 8 (skim) & 9 O&D— Independent/ Dependent Samples *t*-test, Violated assumptions, and Effect size. | None |
| Tu 2/16  Session 8 | *t* test for dependent groups | ACA Chapter 8  Sun et al. (2010) | Tuesday 2/16  Quiz 3 (Covers previous 1 class session)  Optional calc HW 6 |
| Th 2/18  Session 9 | Testing the significance of correlations  Confidence intervals  Reliability and validity | ACA Chapter 3 (Statistical significance and Appendix), 6 (Advanced Topic)  O&D—Correlation coefficients (re-read), Illusory correlation, Crud factor, and Reliability of scores. | Sunday 2/21  SPSS Homework 4  Article Homework D  Optional calc HW 7 |
| Tu 2/23  Session 10 | Simple regression | ACA Chapter 3 (Prediction) | Tuesday 2/23  Quiz 4  (Covers previous 2 class sessions)  Optional calc HW 8 |
| Th 2/25  Session 11 | Multiple regression | ACA Chapter 3 (Prediction)  O&D—Multiple regression and Multicollinearity. | Sunday 2/28  SPSS Homework 5  Article Homework E  Optional calc HW 9 |
| Tu 3/1  Session 12 | Chi square test  Neil Salkind’s 10 Commandments of Data Collection | ACA Chapter 11  O&D—Abstract and Conclusion | Tuesday 3/1  Quiz 5  (Covers previous 2 class sessions)  Optional calc HW 10 |
| Th 3/3  Session 13 | Wrapup—choosing a statistical test | ACA Chapter 12 | Sunday 3/6  SPSS Homework 6  Optional calc HW 11 |
| Tu 3/8  Session 14 | Review session for final exam | None | Tuesday 3/8  Optional calc HW 12  ***Review: In-person time TBA (recorded).*** You may wish to have your crib sheet |
| Th 3/10 opens  Week 8 | Final Exam | None | Sun 3/13 closes  Final exam  (Covers 7 class sessions since Midterm) |

**Student Profile**

(Please complete this page and the next page and email to me at jcromley@illinois.edu)

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Program (M.Ed./Ph.D., etc; Department): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_

Advisor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Preferred e-mail address: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Phone number (in case email does not work): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What year of graduate school are you in? (if first semester, write 1st; if part-time, count 18 credits as one year)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What type(s) of research are you interested in reading or doing, now and/or in the future?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What school subjects/domains are you most interested in? (e.g., English, Social Studies [History], Science [Biology, Chemistry, Physics, Earth/Environmental Science], Math, Physical Education, TESOL, Special Ed., etc.)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What ages/grades are you most interested in? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What courses (if any) have you already taken in:

Area Topic (software used, if applicable) Year taken (approx.,

e.g., 2005)

Statistics

Psychology

Research methods

**CONTINUED**

**Your research question**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Write down one or more research questions that would require counting something. These questions could be for a study you would like to do or for a study someone has done (for example, a research article you have read or heard about).

1. Paraphrased from Vanderbilt University, downloaded from the World Wide Web on June 22, 2005 from http://www.vanderbilt.edu/lsi/expert/overview.php [↑](#footnote-ref-1)