Course Description and Syllabus for CMU 36-309/749
Experimental Design for Behavioral and Social Sciences

Howard Seltman Fall 2015

Class Schedule	Tuesdays 12:00-1:20 DH2210
	Lab Section A: Thursdays 12:00-1:20 BH 140 C and 140 F
	Lab Section B: Thursdays 1:30-2:50 BH 140 F
	Lab Section C: Fridays 12:00-1:20 ???
	Lab Section D: Fridays 1:30-2:50 BH 140 F
Professor	Howard Seltman 232H Baker Hall (x8-3938) (hseltman@stat.cmu.edu)
Office Hours	Mon. 3-4, Tue. 4-5, Wed. 8:30-9:30AM and by appointment
Lab TAs	A: LeShaun Jones, Michael Rosenberg, Carmen Khoo, B: Shane Campbell,
	C: Emily Helfer, Isabelle Tseng, Brandon Sherman, Kate Monoskey , D: Francois Ban
TA Office Hours	Porter Hall 117, Brandon Sherman Mon 5-6, Kate Monoskey Tue 4:30-5:30
36-749 TA	Carmen Khoo
Textbook	Free at http://www.stat.cmu.edu/∼hseltman/309/Book/
Software	SPSS, browser, Adobe Reader, (Microsoft Word)
Information	Announcement, handouts & homework at http://www.cmu.edu/blackboard
	(Backup is http://www.stat.cmu.edu/∼hseltman/309/)
Midterm Exam	Tuesday Oct 20, 12:00-1:20, location TBA
Final Exam	TBA

Course Objective

At the end of this course you will be able to design an experimental study with cognizance of the competing risks and benefits of available choices, carry out an appropriate statistical analysis of the data, and properly interpret and communicate the analyses. You will also be able to recognize under what circumstances analyses beyond those learned in this class are more appropriate, and therefore you will need to seek additional help.

Scope

You will learn about the most important techniques for the design of experiments and the analysis of the resulting behavioral data using examples drawn directly from the psychological and social science literature. Our goal will be to develop a broad understanding of the choices one can make, the consequences of those choices, methods for detecting inappropriate choices and making better choices, and interpretation of results including any limitations placed on the conclusions.

CMU Statistics 36-201 or comparable experience is a pre-requisite for this course. Review http://www.cmu.edu/oli/ if you don't remember the main ideas and/or math.pdf Blackboard under Course Documents if your math skills are rusty.

Textbook

The textbook is a free self-published pdf-format book Please e-mail me with corrections and suggestions.

Home Page

The course home page can be found under Blackboard (http://www.cmu.edu/blackboard). If Blackboard is down, you will find data, homework assignments, and solutions at http://www.stat.cmu.edu/∼hseltman/309/ on the World Wide Web. The Blackboard page is the main repository for information about the course, including grades, logistic information, course handouts, and data sets. I strongly suggest that you visit this web page frequently throughout the semester, including reading all Announcements. If you notice something missing or incorrect, please let me know as soon as possible.

Course Outline

Dates	**Topic**
Week 1 Sep 1-4	Review; Intro to SPSS
Week 2 Sep 8-11	Statistical concepts illustrated using one way analysis of variance
Week 3 Sep 15-18	Experimental design concepts
Week 4 Sep 22-25	Regression
Week 5 Sep 29-Oct 2	ANCOVA and multiple regression
Week 6 Oct 6-9	2 way ANOVA and interaction
Week 8 Oct 13-16	Review (office hours replace labs)
Week 8 Oct 20	In class exam (no labs)
Week 9 Oct 27-30	Power
Week 10 Nov 3-6	Contrasts
Week 11 Nov 10-13	Repeated Measures
Week 12 Nov 17-20	Categorical outcomes
Week 13 Nov 24	Grad student project discussion (no labs, UG optional)
Week 14 Dec 1-4	Mixed/Hierarchical Models
Week 15 Dec 8-11	Review for final exam (office hours replace labs)

Weekly Course Flow

Each week will focus on one or two coordinated topics. The efficient learning approach is: read assigned textbook material before or after lecture, attend lecture Tuesday, read "Lab Preview" before lab, attend lab, read lab solutions after lab, begin homework within a day or two of the lab, ask questions of the instructor or TAs as needed, turn in homework by 3:00 PM Wednesday (in lecture or to BH132L), and read homework solutions Wednesday.

Other than lab handouts, it is your responsibility to print documents from Blackboard. In particular, you will learn more in lecture if you bring a copy of the notes and write comments on them during lecture.

Computer Labs

The labs will convene in the computer clusters in Baker Hall rooms 140 C and F. The goal of these sessions is to facilitate a more interactive class environment and enrich the material discussed in

lecture. **You should read the "Lab Preview" before lab; you will not have time to both read it and complete the lab during lab time.**

A teaching assistant and I will attend each lab to assist you in any way we can. Labs will mostly consist of data analysis problems worked using SPSS. The lab activities are an essential part of the course, and you will be learning new material during these sessions. I will collect selected responses to questions at the end of each lab; these will count towards your lab portion of the grade based on "good effort", but the labs will not be graded or returned to you. Your lab responses will help me assess areas that need additional clarification in lecture, and will give you practice writing exam type responses. Lab solutions will be available on Blackboard Fridays at 3:00. If you need to miss an occasional lab for a valid reason, see me to discuss doing the lab on your own and getting credit.

Due to space limitations, you may not switch lab sections without discussing it with me first.

Note that the exams, homeworks, and Lab Exercises will all be similar in content and format.

Homework

Homework will be assigned once per week. It is your responsibility to download it from Blackboard. Homework assignments will be available mid-week, and they are designed to allow you to solidify and demonstrate your understanding of the week's topics. **You will find that it will save a great deal of time to do most of the homework shortly after the lab.**

The assignments will contain both data analysis exercises to be worked using a computer and concept questions that challenge your understanding of the key ideas. The goals of the homework are to give you hands-on experience in analyzing real data sets using the methods that we discuss in class and to give you a chance to think about some of the issues that arise in designing experiments and interpreting data.

Unless you happen to own SPSS (or want to buy the student version (not "base only") for about $70), you will need to do your assignments in the computer clusters (BH140) or via Virtual Andrew. **Do not wait until the last minute because you may not find a free computer.**

Clear writing and presentation are important parts of the assignments. Statistical analyses are useless without clear explanations. Thus, **you should not include raw computer output in your reports**. Points will be taken off for inclusion of irrelevant material. You may, of course, extract relevant displays (e.g., plots and tables) and include them where appropriate in your write-up. For instance, you can "cut and paste" displays into your report or append them as clearly labeled attachments to which you refer in the text (e.g., "the boxplot shown in Figure A"). Keep in mind also that the grader needs to be able to read what you have written in order to grade effectively.

You must write up your homework on your own. It is OK to talk to other students about the problems, if your SPSS analysis and write-up are done by you. I will not accept homework that has been copied from someone else; see the section below on Plagiarism for more details, and feel free to ask if you have questions about this. It is important, both for the exams in this course and for later in your career, to gain practice actually performing the analyses and interpreting the results

in your own words. I have never seen a student who can learn the required material in this course without doing the homework!!

All assignments will be **due by 3:00 PM on Wednesdays** (approximately one week after it each is available for download), although homework will always be accepted early. You may turn in your assignment to me before lecture or put it in the designated box in Baker Hall 132L (Margie Smykla's office) in the statistics department. (If the door to 132L is closed, you can either slip the assignment under that door.) **Do not put assignments in anyone's mail box or in the handout carousels in the Statistics Department lobby. Also be sure to mark 36-309 or 36-749 on your homework.**

The 3:00 PM homework deadline is strict so that the TA's can grade efficiently and so I can release the solutions at that time. Late homework will not be accepted for a grade. Illness, family problems, travel problems, last minute computer problems, etc. are not an acceptable excuse for handing in homework late. Rather, **the lowest three homework grades will be dropped. Since there are no excuses for turning in homework late, save the three dropped homeworks for emergencies!**

It is your responsibility to check your homework answers against the solutions. You may find better ways to do what you got correct, and you may find more extensive discussion and solutions for what you got wrong. Do not rely only on the comments on your assignment. Solutions will be made available on the web page by 3:30 PM on Wednesdays. Homework will be graded within a week, and I will bring graded homeworks to class and lab, or you may stop by my office to pick it up.

Check the gradebook in Blackboard regularly. Claims of incorrect entries must be made within a week of the entry. Please ignore Blackboard information other than your actual scores; the means for an assignment are incorrect because they include zeros for missing data, and your total is incorrect because it does not make use of the complex dropping and weighting scheme used in this class. If you disagree with grading, put the homework with an attached note in my BH232 mailbox.

Exams

There will one 80 minute exam during the semester and a three-hour final exam during the exam period. Both exams will be SPSS based (at least of portion of the exam will require analysis of SPSS output), but not actually at the computer. The exams will be modeled after the homework exercises, so doing the homework is the best way to prepare for the exams.

The date, time, and location of the final will be announced in class as soon as it is available from the registrar. No makeup examinations will be given. In particular, **do not make travel plans for the end of the semester that may interfere with the final.** If you miss an exam for a medical reason, you must provide *documented* evidence of medical incapacitation. This means a note from a doctor explaining why you had to miss the exam. A record of a visit to the health center is not sufficient. Any other reasons for missing an exam must be discussed with me *at least 24 hours before the exam* and will be decided on a case-by-case basis. If a student misses an exam with a valid excuse, an oral examination will be given as a substitute for the written exam. Otherwise, a

missed exam is graded as zero.

Participation and Attendance

You are actively encouraged to participate in class discussion. This helps you become more comfortable with the material, and, at the same time, gives other members of the class the benefit of your ideas and perspective. In particular, you should ask questions whenever you have them. Your questions show me both what I have made clear and what needs to be clarified and, consequently, they help me to teach more effectively.

If you do not attend any particular class, it is your responsibility to check with another student to find out what you missed.

Grading

Grades on different components of the course are weighted as follows:

Homework	20%
Midterm Exam	30 or 25%
Final Exam	40 or 45%
Labs and Participation	10%

The lowest three homework grades will be dropped in computing the homework average. The higher exam gets more weight.

Any student who attends less than 7 labs or turns in less than 7 homeworks on time with scores of at least 50% each will automatically fail the course.

36-749: Students registered for the 12 unit graduate version of the course will have some additional or alternate homework and exam problems. The above grading scheme covers 75% of your grade. The remaining 25% will be for a 5-10 page (excluding tables and graphs) paper discussing how what you learned in this course applies to your own research: how you will, should have, or did plan, conduct, and/or analyze your research. This is due on the last day of class. A brief written and oral report is due Nov 24.

Getting in touch with me

The easiest and most reliable way to get in touch with me is by email. Feel free to send mail at any time to `hseltman@stat.cmu.edu` (mail sent to `hseltman@cmu.edu` will be forwarded to the right place as well). I will respond as soon as I can. Alternatively, you can leave a note for me with the Statistics Department receptionist in 132 Baker Hall. **Please do not e-mail the TAs except for clarification of specific conversations you have had with them in lab.**

I will hold regular office hours during the week in 232H Baker Hall. You are also welcome to stop by my office any time to discuss the class. Please understand that I may not be free to talk to you at that time, but, in that event, we can make an appointment for a later time.

Plagiarism

Feel free to talk to me if you have any questions or comments about what constitutes plagiarism. See the official CMU policy at http://www.cmu.edu/policies/student-and-student-life/academic-integrity.html.

Copying answers (even incorrectly) from another student, allowing another student to copy from you, or any other form of cheating are typically grounds for course failure. I am obliged in these situations to report the incident to the appropriate University authorities. This applies to exams and homeworks alike.

Physically disabled and learning disabled students

The Office of Equal Opportunity Services provides support services for both physically disabled and learning disabled students. For individualized academic adjustment based on a documented disability, contact Equal Opportunity Services at eos@andrew.cmu.edu or (412) 268-2012.