STATISTICS C155/CM248/ EPIDEMIOLOGY M216
APPLIED SAMPLING
Winter, 2016

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Meeting times and places:
    Lectures: Monday, Wednesday, 10:00-10:50am, Humanities A65
    Lab: Friday, 10:00-10:50am, Boelter 9413
    Section: Friday, 9:00am, Kinsey Pavilion 1240B

Overview: This course is an introduction to sampling methods used in the quantitative sciences. Here you will learn how samples are selected for studies and how sample selection affects estimates of the constructs of interest. The course emphasizes conceptual understanding of the material and practical experience; calculations require no more preparation than elementary algebra and an introductory statistics course, such as Statistics 10, 11, 12, or 13 or Biostat 100A.

Learning objectives and competencies: In this course, you will learn skills to:

Learning Objectives	*Competencies (Source in Parentheses)*
1. Describe common survey sampling methods used to generate population-based estimates of population parameters and the strengths and limitations of each approach	Epidemiology (ASPH #9 & #10): Draw appropriate inferences from epidemiologic data; Evaluate the strengths and limitations of epidemiologic reports.
2. Use Stata to create population-based samples and to derive accurate and efficient estimates of population parameters	Epidemiology (ASPH #7): Calculate basic epidemiology measures.

Text: Required:
    o Scheaffer RL, Mendenhall W, & Ott RL. Elementary Survey Sampling, 7th Edition. Belmont CA: Thomson Brooks/Cole, 2012. (or the 6th Edition—the books are nearly identical)
    o Supplemental "Reader" (includes copies of my slides used in lecture, lab instructions, and other handouts). This is available in the ASUCLA Student Store. You can also download it from the course web site as a pdf file.
    Very optional: Small Stata and Getting Started manual (one-year license), available directly from Stata Corporation--http://www.stata.com/order/new/edu/gradplans/gp-direct.html.

Section: In the discussion section, the TA will review the homework problem sets with you as well as give you practice with other concepts covered in the course. This is also an opportunity to review material presented in class. Students who attend discussion sections regularly usually obtain better grades in this course than those who do not.

The web: Many course materials and all lecture outlines are on the UCLA CCLE website: https://www.ccle.ucla.edu. Please do download my lecture outlines to make your notetaking easier, but with the caveat that the notes reflect only what I intend to say, and as has been said before, "the best laid plans often go astray."

Computer: Some assignments are easier to do if you use Excel or another spreadsheet program of your choice. Other work will involve use of Stata in the computer lab. Stata is also available in several student computer labs or you can purchase your own 1 year license. You must do the Stata-based work you turn in in Stata; although the department emphasizes the use of R, this course is aimed at introducing you to the use of a commercial package you are more likely to be expected to use in many employment situations—hence the use of R is not allowed.

Exams: There will be a midterm (**Friday, February 5**) and a final (**Friday, March 18, 2016, 3:00pm-6:00pm**). Mark your calendars now; there will be no early or late exams given for any reason. Bring a simple hand calculator (that cannot store more than equations) and pens or pencils. One half of the final exam will cover the material presented after the midterm and is essentially a 2nd "midterm"; 1/2 of the final will be cumulative covering the whole course. For the midterm exam, you are allowed 1 page (double sided) of your own personal crib notes—in addition, exams will include the formula sheets shown in the Supplemental Reader. The personal crib notes must be made by you—copying someone else's notes or my handouts or lecture notes without rewriting in your own words is not allowed. For the final, you can use your crib notes from the Midterm which I will return to you, as well as 1 page of additional crib notes. You must turn these notes in with your exams. Exams will be based on lectures, labs, and the textbook. In the interests of fairness, all phones, smart watches, and wearable smarts must be placed in your closed backpack or bag during the exams.

Grading for Stat C155:

Homework: There are 10 problem sets assigned--but #5 and #10 are **not** turned in for credit so that I can post the answers to aid your studying for exams. Assignments and the date the 8 other assignments are due are listed below. You need to complete fully at least 6 of the 8 assignments to obtain full credit for homework. Some problems are located on the web and are numbered Web #question. Others are in your text at the end of the chapter. Homework assignments are turned in at the end of class lecture on the day due. Each homework assignment is graded as follows:

Points	Criteria
0	Not done
2	Less than 1/2 done
4	1/2 or more done but not completely done
6	All problems done

The homework is meant to give you practice at mastering concepts--for this reason you will not be penalized for occasionally getting the wrong answer. Because homework is being graded for how much of it you attempted and completed, the decision as to how "done" is done will be left to the reader. Answers that suggest you did not thoroughly attempt the homework, such as answering simply "yes" or "no" to complicated questions, will not be considered "done." You are free to work with friends, but homework that is copied from a friend or some other source will be considered cheating. You do **not** need to type your homework; handwritten is just fine.

Sampling Project: You are also going to conduct a quarter long sampling project. Further instructions are given in Appendix B in the Supplemental Reader. The project is turned in in 4 stages. You are free to work with other students in developing your project, but the project you turn in must be your own. Identical or closely identical work does not meet this criterion—if in doubt, please ask the instructor.

Your final grade will be determined as follows:

Work Product	What is used	Maximum points
Homework	Your scores from the 8 assignments up to 36 pts	36
Sampling project	Each of your 4 components	60
Midterm	Each of these are 100 pts maximum. I will drop ½ of your worst midterm exam for a maximum of 150 total points.*	150
Final--"Midterm 2" portion only		
Final—Cumulative portion	The cumulative portion of the final	100
Total points possible		346

*You must take all exams (see missed exams below).

There is no interim letter grade given for the midterm. Your course grade is determined by the total points you accumulate. Students enrolled in C155 will be evaluated separately from any students enrolled in CM248 or Epi M216.

Despite the teaching staff's best efforts to keep exam difficulty constant, there often are variations. In order to adjust for this, I may do the following:

- To adjust for differences in exam difficulty in deciding which exam to weight lower: I may standardize the midterm points to maintain equivalence in the value of points you obtain. For fairness, your final will be adjusted as well. I will do this if the means for the midterm and midterm-portion of the final exam are very different.
- To adjust for the general level of exam difficulty for this class: I will set the maximum points possible for C155 (the value defined as 100% in order to assign grades) equal to the second highest total score accumulated by a student in C155. Final grades will then be: 92-100% of maximum points, A; 89-91%, A-; 87-88%, B+; 81-86%, B; 79-80%, B-; 75-78%, C+; 55-74%, C; 45-54%, C-; 35-44%, D; 34% and below, F. If this is too harsh (as it often is), I may revert to curve grading. But you will get the best grade that derives from either method.

Grading for Stat CM248/Epi M216:

Homework: There are 10 problem sets assigned; at least 6 must be turned in for full credit. Please see instructions for C155.

Project:` You are going to conduct a quarter long sampling project. Further instructions are given in Appendix I in the Supplemental Reader. The project is turned in in 4 stages. Your choice of sampling designs is somewhat restricted compared to C155. With consent from the instructor, students can also substitute an individually tailored sampling project for the Project. If you wish to do so, please talk with me by the time that Task 1 is due.

Your final grade will be determined as follows:

There are no interim letter grades given for the midterm. Your course grade is determined by the total points you accumulate. Students CM248/Epi M216 will be evaluated separately from those in C155.

Work Product	What is used	Maximum points
Homework	Your highest scores of 8 assignments up to 36 pts	36
Sampling project	Each of your 4 components	60
Midterm Final--"Midterm 2" portion	Each of these are 100 pts maximum. I will drop ½ of your worst midterm exam for a maximum of 150 total points.*	150
Final—Cumulative portion	The cumulative portion of the final	100
Total points possible		346

*You must take all exams (see missed exams below).

Housekeeping:

Homework: Because answers to homework questions are posted on the web right after they are due, no late homework will be accepted.   If you are going to miss class when it is due, you can always turn it in early to my mail box in the Statistics Department office, 8th floor, MS 8125. FAXing or E-mailing the homework is **not** allowed. Please remember the reader grades homework assignments each week as quickly as possible so that we can return it to you without delay. To make this task go smoothly:
1.   Put your full name and your student ID number on the first page of the homework—staple or clip the pages (if loose, put your name on every page)
2.   On the first page in the upper left corner, put the number of the homework assignment
3.   Clearly number homework problems using Chapter/Problem numbers in the book or the web page problem numbers.
4.   Do the homework problems in the order assigned.
5.   Remember, the reader is only trying to be sure that you did the homework. If the reader cannot make sense of your homework then it might not be considered done.

Sampling project: No late assignments will be accepted. If you are going to miss class when due, you can always turn the assignment in early to my mail box in the Statistics Department office, 8th floor, MS 8125. Texting, FAXing or E-mailing a sampling project assignment is not allowed. Your final project(s) assignments must be turned in at the class Final to meet university deadlines.

Missed exams: By definition, emergencies beyond a student's control are rare events. There will be no make-up midterm exam given. However, if for unavoidable and truly exceptional reasons you are unable to take the midterm, we will make arrangements in the weighting of the final. But you must 1) seek my permission to miss the exam before the exam--please do this as early as possible and 2) I agree that the reason is beyond your control and makes you unable to take the exam when it is scheduled.   If you do not have my permission not to take the exam, you will receive a 0 for the missed exam. A make-up final examination is given only when circumstances beyond a student's control make it impossible to take the final. Make-up final exams are written individually for the student and have a different format than the regular exam. Final determination of whether or not to drop a missed midterm or to give a make-up final exam rests solely with the instructor.

Grade appeals: If you believe that a mistake has been made in grading your midterm, please write a note describing the error, attach it to your answer sheet, and give it to me or the TA. You have 5 working days to do this starting from the day that the midterm is returned in discussion section or class. To ensure fairnesss, please be advised that I copy graded answer sheets before returning them and will compare the two when considering your appeal. If you have a concern about the homework grading, you must bring this to the TA's or my attention the day your homework is returned. If you have a concern about the sampling project grading, please discuss your concerns with me promptly.

Incompletes: In the event you miss the final exam, you must meet the following criteria before I can give you an Incomplete: 1) your work must be of passing quality throughout the course, 2) missing the exam was due to

an emergency beyond your control that you have documented to my satisfaction, and 3) you contacted me on or before the day of the final to arrange a conference.

Accomodation for exams: If you wish to request an accommodation due to a disability, please contact the Office for Students with Disabilities as soon as possible at A255 Murphy Hall, (310) 825-1501, (310) 206-6083 (telephone device for the deaf). Website: www.osd.ucla.edu.

Academic Integrity: All students are expected to comport their behavior to be consistent with the University of California Standards of Student Conduct as administered by the Office of the Dean of Students. For more information about academic integrity expectations, please go to www.deanofstudents.ucla.edu.

Course Schedule

#	DATE	TOPIC COVERED	READING	HOMEWORK ASSIGNMENT[1]	SAMPLING PROJECT
1	1/4/16	Elements of surveys	Ch 1	#1: Web 3,4,6,8, Session 3 worksheet	#1—Topic
2	1/6/16	Basic sampling concepts	Ch 2.1-2.3; Ch 3.1-3.2		
3	1/8/16	**Lab:** Using Stata to graph & describe data	Appendix C‡		
4	1/11/16	Nonsampling error	Ch 2.4	**#1 due;** #2: Web: 15; Ch 2: 2.28; Ch 3: 3.13	
5	1/13/16	A basic framework for sampling	Ch 3.3-3.7		
6	1/15/16	**Lab:** Developing a sampling frame			
	1/18/16	**Holiday**			
7	1/20/16	Simple random sampling continuedsg	Ch 4.1-4.3	**#2 due;** #3: Web:17; 22; Ch 4: 4.20, Session 8 worksheet	
8	1/22/16	**Lab:** Creating good measurements	Ch 2.5-2.7		
9	1/25/16	Estimating needed sample sizes	Ch 4.4-4.5	**#3 due;** #4: Web 21; Ch 4: 4.22, 4.48 Session 11 worksheet	**#1 due;** #2—Instrument and pilot
10	1/27/16	Stratified sampling	Ch 4.6-4.7 Ch. 5.1-5.3		
11	1/29/16	**Lab:** Drawing SRS samples	Appendix D‡		
12	2/1/16	Optimizing stratified sampling	Ch 5.4-5.9	**#4 due;** #5 (Study Problems): Ch 5: 5.2, 5.5, 5.14,5.22, 5.40	
13	2/3/16	Stratifying with auxiliary knowledge	Ch 5.10-5.12		
	2/5/16	**MIDTERM**		**Homework #5 not turned in; Bring calculator, your crib notes**	
14	2/8/16	Ratio estimation	Ch. 6.1-6.5	#6 : Ch 6: 6.1, 6.2, 6.18; Session 16 worksheet	**#2 due;** #3—Sampling design and pilot
15	2/10/16	Regression & difference estimation	Ch 6.6-6.7		
16	2/12/16	**Lab:** Drawing stratified SRS samples	Appendix E‡		
	2/15/16	**Holiday**			
17	2/17/16	Efficiency of estimators	Ch 6.8-6.9	**#6 due;** #7: Ch 6: 6.23[2]; Session 18 worksheet	
18	2/19/16	**Lab:** Ratio & regression estimators	Appendix F‡		
19	2/22/16	Systematic sampling	Ch. 7.1-7.8	**#7 due;** #8: Ch 7: 746, 7.10; Ch 8: 8.23; Session 21 worksheet	
20	2/24/16	Cluster sampling	Ch. 8.1-8.7		
21	2/26/16	**Lab:** Drawing systematic and cluster samples	Appendix E‡		
22	2/29/16	Sampling proportional to size	Ch 8.8-8.9	**#8 due;** #9:; Ch 9: 9.2, 9.3, 9.18; Session 24 worksheet	**#3 due;** #4—Data collection and analysis
23	3/2/16	Two stage cluster sampling	Ch 9.1-9.5		
24	3/4/16	**Lab:** Drawing two stage samples, PPS samples	Appendix G‡		
25	3/7/16	Comparison of sampling designs	Ch. 12.1-12.2	**#9 due;** #10 (Study Problems): Ch 12: 12.4, 12.8; Web: 18, 19, 20	
26	3/9/16	Using inclusion probabilities	Ch. 11.5		
27	3/11/16	Wrap up			
	3/18/16	**FINAL**		**Homework #10 not turned in; Bring calculator, your crib notes**	**#4 due**

‡Appendices are in the Supplemental Reader.

[1]Chapter numbers refer to Exercises as the end of chapters in the textbook; Web numbers refer to questions on the class web site. Worksheets are completed during or after the computer labs and then turned in with your homework.
[2]Please look in the web homework questions on the class web site (at the end of the document) for some help with this problem—editions of the book are different; you are given details that will make it easier to solve the problem.