Introduction to Statistics for Psychologists: Psychology 109
Section 1: TR 2:45-04:00PM, Roberts North RM 103
Section 2: TR 1:15-02:30PM, Roberts North RM 103
Fall Semester 2016

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Required Materials:

- Andy Field (2012). *Discovering Statistics Using R (1st Ed.).* SAGE Publications Ltd. Amazon Link ISBN-13: 978-1446200469; DO NOT buy Kindle Version
- Other Chapters are listed next to the dates listed in the table below. Although most readings will not change over the course of the semester, there is a small chance I will exchange some readings out for others.
- A personal laptop or access to CMC network computer. If you are not a CMC student, you will need a CMC login in order to access the computers in the computer labs. This account should be created for you automatically. Please check your e-mails/spam for account information.
- RStudio (version 0.99.903); R (version 3.3.1) (Please DO NOT INSTALL without class installation instructions)
- A calculator for basic operations (e.g., addition, subtraction, multiplication, division, exponents, square roots) unless you are comfortable using R for these.

Supplemental Materials:

- Readings, handouts, and other files for this course are available online on Sakai. However, I recommend using WebDAV so that you do not have to download files from Sakai by logging into your account often. For instructions setting up WebDAV, go to http://goo.gl/ImHSmr
- Textbook Companion Site for Students: https://studysites.sagepub.com/dsur/study/default.htm (Contains: Podcasts, videos, flashcards, interactive multiple-choice questions, Smart Alex's Answers, data files, etc.)
- Author's Statistics Website: (videos) http://www.statisticshell.com/html/limbo.html ; (resources) http://www.statisticshell.com/html/cocytus.html

Overview: This course is an introduction to quantitative methods in Psychology for undergraduate students. Statistics is meant also as a precursor to understanding the principles of research design that you will learn about in a later semester. I intend to emphasize the *theoretical foundations* of statistics and some selected applications and deemphasize the mathematics involved in the statistical computations. Of course, however, we will work though several computations by hand.

You and I should have several goals for this course.

1. We should learn the foundations of both descriptive and inferential statistics because statistics provides a common language for all scientists to communicate and interpret research findings.
2. We should acquire some of the tools to think critically about the research in your area of interest (e.g., Which statistics are appropriate in different circumstances?). You will find that a skill set in statistics will take you some distance in dealing effectively with real-world issues and will assist you in becoming more critical consumers of information in general.
3. We should attempt to apply the concepts learned in this course to research ideas of your own as you experience the joy of research with a faculty supervisor.

4. We should embrace current market trends related to using data analytics for guiding organization and business decisions; familiarity with computer programming and R is very valuable to many employment prospects, even those not specifically for data analysis.

To these ends, you will participate in several modes of learning: participating in lectures, lab exercises and homework problems, examinations, and collaboration with peers. The lectures are intended to provide a slightly different organization of the course material (as much as is possible with an introductory statistics class). They also provide me with an opportunity to elaborate upon and illustrate major concepts. Lectures will provide you with an opportunity to ask questions and seek clarification; not all concepts covered in the readings will be covered during lecture. The homework exercises are useful in evaluating your own performance as the course progress. Exams afford you the opportunity to evaluate your mastery of the material. The examination should also be viewed as a learning process. Exams will not only measure your knowledge base about the material, but also your ability to: draw analogies, apply what you have learned to novel situations, and make inferences and conclusions about particular problem sets.

Course Specific and Departmental Learning Goals:

Course-specific learning goals: 1. Demonstrate conceptual understanding of major statistical concepts; 2. Think critically about data and analyses; 3. Understand similarities and differences of statistical tests; 4. Understand when to use different statistical tests; 5. Conduct and interpret statistical analyses using computer software.

The following **departmental learning goals** will also be met: 1. Knowledge of major concepts, theories, and empirical findings in psychology; 2. Understanding of research methods in psychology, including research design, data analysis and interpretation; 3. Development of critical-thinking skills and use of the scientific approach to solve problems related to behavior and mental processes

Formal Requirements and Grading:

***Exams*.** Your course grade will be determined by your performance in several different areas so there is ample opportunity to do well. There will be two closed-book closed-note interim examinations and a cumulative final examination. Each exam will have a similar format and will consist of multiple-choice questions, problem sets, interpretation of R output when appropriate, and take-home problems. Please note that good performance on exams will not be achieved by simple memorization of either formula or concepts; recognizing concepts without an understanding them will only take you so far. In order to prepare you for a professional career, for which erroneous information provided to your supervisor will not be treated as partially correct, no partial credit is awarded for incorrect answers.

There will be **no make-up exams** for this course. If there were extenuating circumstances surrounding your absence (e.g., medical reasons, sleeping in, etc.) and you are unable to take an exam, your performance on the **final exam** will replace the missed exam.

Learning involves identifying and studying that content one believes will appear on exams. Practice exams represent a subset of questions that might appear on an exam and they are used to help prepare for exams. Creating your own practice exams with peers is a good way to study. As such, practice exams will be made available to students who participate in creating questions (and answers) that they believe might appear on exams.

***Homework*.** There will be different types of assignments for this course. **Unless you have made special arrangements with me for submitting your homework before class, you must submit each assignment within the first 10 minutes of class on its due date.** Some homework assignments may be demanding and time consuming for you, so you should plan accordingly.

Some questions will focus on theoretical and conceptual understanding whereas other question will require using RStudio and the R programming language for data analysis. Both of these pieces of software are free for your personal computer and is used to accommodate students with off-campus obligations and address busy labs complaints. RStudio and R programming language assignments will serve to supplement your understanding of statistical principles and output; you may be asked to compute specified analyses from the R printout itself. A tentative outline for homework assignments is provided at the end of this syllabus. Because detecting errors and troubleshooting with code is improved with two sets of eyes, homework problems involving R will be completed with a partner. You should find a partner or as me to assign you to work with someone. I will often ask you to demonstrate your understanding in class or may call you into my office to ensure both of you are working together weekly rather than alternating. If you choose to work alone, you must let me know before completing the assignment. If I cannot understand what you did on a homework problem, I will assume that you do not understand what you did.

For obvious reasons, collaboration with fellow students when taking exams is not permissible. I do, however, very much encourage you to seek assistance from your classmates when working on the assigned homework. I offer the following caveat: If you cannot do the homework on your own, you will probably be unable to perform well on the exams. If you find yourself "dependent" on one or more of your classmates, I urge you strongly to practice additional exercises from the readings. This is good advice to all students because much of statistics is skill-based, and the only way to acquire skills is through a lot of practice.

Targeted Questions (TQ): Like homework assignments, targeted questions are always due at the beginning of class. TQs will target key concepts that are either conceptual or computational. I will assume that you have read and understood the basic concepts for answering the questions. If you have questions about the material, you should meet me during office hours or schedule a meeting prior to class time. Asking your peers for help is encouraged, but your work should be your own or your exam performance will likely suffer.

Quizzes. Quizzes can be taken early, but are **due by Fridays at 5:00pm at the latest**. My goal for this course is to improve your mastery and long-term, rather than short-term, learning of statistical concepts. As such, topic quizzes will be assigned for each topic and cover material from readings and lecture. These low-stakes quizzes are designed to help you answer questions in class, to help you raise questions of clarification in class, and to improve your performance on exams by strengthening your understanding of concepts. If interested, I can direct you to several research studies that demonstrate the effectiveness of quizzing on long-term retention of information. In order to incentivize keeping up with the materials, I will convert quiz scores of 80% or higher into 100%, otherwise your quiz grade will reflect your raw quiz grade.

Other Expectations (class participation, conduct, non-flakiness, etc.). As a serious student, I expect you to be punctual for class and appointments, to prepare for and participate in class, have respect for others, have personal responsibility and accountability, be courteous, collaborate responsibly with your peers on small-scale (e.g., problem sets, computer assignments, etc.), and pay attention to all speaking members of the classroom. Whether you decide to exercise these principles is up to you. In cases of rounding, exercising these principles might influence your grade favorably.

A few final notes about grading and assignments. As with any college course, you should expect a challenge. As do other faculty teaching statistics, I make a distinction between "*getting an A*" and "*earning and A*" in this course. You should expect to spend **about 7 hours of work a week** outside of class session if you want to earn an A. If reading a chapter and answering homework takes you 2 hours, you should spend the remaining time (e.g., 5 hours) reviewing the

material in your text and in your notes, completing practice assignments, and testing your knowledge either on your own or using online questionnaires. Kirk (in readings) offers the same advice. The exams will be challenging, but as expected for a course of this ilk. Consequently, performing well by cramming 6 hours the night (or two) before the exam is rare. By spending 7 hours per week on the materials, the concepts will build upon one another and your understanding of the material will be facilitated by previous learning.

I believe my expectations are reasonable and if you take my suggestions to heart, you will do just fine in the course. I do, however, understand that students' and professor's expectations are not always monotonic, especially for mastery of entry-level statistics course. If a couple students do not earn As in this course, I may adjust the grading distribution based on the grades obtained by you peers.

Grading:

Examination 1	25%
Examination 2	25%
Final Examination	30%
Homework	10%
Target Questions	5%
Quizzes	5%
Total	*100%*

Academic Integrity: Although you may find yourself working on assignments with a partner, all assignments should be your one original work. You are not to share materials with other students if that material has the potential of being copied, even if your intention is not to allow a classmate to copy your work. Any signs of academic dishonesty will be submitted to the Academic Standards Committee for review. Although I do not anticipate any events of academic dishonesty, any form of dishonestly of any form will *not* be tolerated. Many students are unclear of the definition of plagiarism and for that reason I have posted some CMC links to information that I believe will clarify the issue. In addition, any work completed for another course, past or present, may not be submitted for a grade for this course. http://registrar.academic.claremontmckenna.edu/acpolicy/default.asp

Accommodations: If you have a learning difference that requires special accommodations, please remember to contact the Dean of Students Office 909.621.8114. Please do so as soon as possible so that you can be appropriately accommodated. Students who need accommodations due to disabilities should contact the Dean of Students or Assistant Vice President for Diversity and Inclusion. It is the policy and practice of CMC to comply with the Americans with Disabilities Act and subsequent amendments, as well as state and local requirements regarding students with disabilities. CMC will make every effort to provide reasonable accommodations for students with medical, psychological, learning, or temporary disabilities. Accommodations are not provided to give a student an unfair advantage over other students, but simply to allow a student with disabilities to have an equal opportunity to be successful. A student has the responsibility to meet with Julia Easley x77377 as early as possible to discuss his or her request for accommodations.

Week	Date	Topics	Readings Due ‡ ¥
1 8/30	T	Statistics: An Introduction	Syllabus & Kirk (pp. 3-6) Field section: How to use this book
	R	(T1) Measurement and Variables	1.1 thru 1.6.3 Kirk (pp. 3-6; 6-21)
2 9/6	T	(T2) Descriptive Statistics and Distributions **TQ #1; Homework #1**	1.6.2 thru 1.7.5; Kirk (pp. 75-76)
	R	(T3) Properties & Assumptions of Inferential Statistics & Models **TQ #2; Homework #2**	Review 1.7.4
	F	**Quiz #1 (T1-T2)**	
3 9/13	T	(T4) Using R and RStudio	Datacamp 3.1 thru 3.5.5; 3.7.1 SKIP 3.4.6; 3.5.4 OPTIONAL 3.6 (using R commander); 3.7.2 thru 3.7.4 (dealing with files)
	R	Catch-up/Continue	
	F	**Quiz #2 (T3)**	
4 9/20	T	(T5) Linear Models, NHST, & Confidence Intervals **TQ #3**	2.2 thru 2.6.5
	R	(T6) Sampling, Sampling Distributions, & the Standard Error **TQ #4; Homework #3**	Review 2.5 thru 2.5.1
	F	**Quiz #3 (T5)**	
5 9/27	T	(T7) Linear Relationships between Variables: Correlation **TQ #5**	6.1 thru 6.9 SKIP 6.3.3 thru 6.3.4; 6.5.5 thru 6.8
	R	Continued/Review	
	F	**Quiz #4 (T6)**	
6 10/4	T	**EXAM 1** **Homework #4**	
	R	(T8) Prediction: Bivariate OLS Regression **TQ #6**	7.2 thru 7.5.3
	F	**Quiz #5 (T7)**	
7 10/11	T	Continued	
	R	(T9) Prediction: Multiple OLS Regression **TQ #7**	7.6 thru 7.11 SKIP 7.6.3; 7.6.4.2 thru 7.6.4.5; 7.7.2.3; 7.9.2; 7.10; 7.12
	F		
8 10/18	T	**FALL BREAK**	
	R	Continued	
	F	**Quiz #6 (T8-T9)**	

9 10/25	T	(T10) Comparing a Sample to a Population **TQ #8; Homework #5**	TBA
	R	(T11) Comparing Samples (Related and Independent) **TQ #9; Homework #6**	9.4 thru 9.7 SKIP 9.5.2.7; 9.6.3.7
	F	**Quiz #7 (T10)**	
10 11/1	T	Continued	
	R	(T12) Comparing More Than Two Samples + Multiple Comparisons among Means, & A Priori & Post-Hoc Tests **TQ #10; Homework #7**	10.1 thru 10.7 SKIP 10.2.3; 10.4 thru 10.4.5; 10.6.6.3 thru 10.6.7.2; 10.6.8.3
	F	**Quiz #8 (T11)**	
11 11/8	T	Continued	
	R	Catch-up/Review Day	
	F	**Quiz #9 (T12)**	
12 11/15	T	**EXAM 2** **Homework #8**	
	R	OPEN/Review	
	F		
13 11/22	T	(T13) Comparing Multiple Factors with Two or More Groups **TQ #11**	12.1 thru 12.9 SKIP 12.3; 12.5.6; 12.5.9 thru 12.5.10; 12.7; 12.8
	R	**THANKSGIVING BREAK (no classes in session)**	
	F		
14 11/29	T	Continued	
	R	(T14) Qualitative-Nominal-Categorical Data **TQ #12; Homework #9**	18.3 thru 18.6.8 SKIP 18.4.3 thru 18.4.4; 18.6.6 thru 18.6.7; 18.7
	F	**Quiz #10 (T13)**	
15 12/6	T	Continued	
	R	Last Day of Class/Catch-up/Review Day **Homework #10**	
	F		
Final Exam Week		**Time:_____ Location: _____** **Common Final period not yet assigned** **Link:** http://www.claremontmckenna.edu/registrar/finals.php	

No make-up exams will be granted unless you petition to receive an incomplete in the class and that petition is approved by the Academic Standards Committee by the time the final exam is administered.

¥ Bring your laptop and calculator to each class. Depending on the day, you will complete different exercises on your own computer during class, so having your computer with you at all times is best.

‡ Make sure to read before attending class as exercises and quizzes will often require reading.

Final Schedule: "Final examination schedules are published prior to registration. Students expect final examinations to occur as scheduled, and they cannot be changed by the instructor. Only the Dean of the Faculty may change final examination dates. No tests of any kind are to be scheduled during the last week of classes before final exams." (Faculty Handbook 5.5.1)

Disclaimer: I tried to make the schedule as accurate as possible. However, it may be necessary to make adjustments to it as the semester progresses, so do not consider these dates to be set in stone. I will advise you of changes to this schedule if such changes are necessary.