Statistics for Behavioral Scientists
PSYC UN1610 (4 points)
Tentative syllabus for Fall 2019

Lecture Information

Tuesdays & Thursdays, 11:40-12:55pm
Location: 200b Schermerhorn

Lab Information

You must register for **both** UN1610 and one of the two sections of UN1611.

Section 001: Thursdays 4:10-6pm
Location: 200c Schermerhorn

Section 002: Thursdays 6:10-8pm
Location: 200c Schermerhorn

Section 003: Thursdays 4:10-6pm *[note: will not open until Sections 1 & 2 are full]*
Location: 200b Schermerhorn

Instructor Information

Katherine Fox-Glassman
Office: 314 Schermerhorn
Fall Office Hours: TBA
email: kjt2111@columbia.edu

TA Information

For most people, **learning statistics is not something that is most successfully approached alone**! You are welcome to attend any office hours (either of the TAs', and/or the instructor's), regardless of your section assignment. Please check our Canvas homepage for the most updated list of TA office hours and their locations. You are encouraged to request appointments with any of us outside of office hours if you cannot make the scheduled times.

Grad TAs:

TBA

Description of the Fall 2019 Course

This course provides an introductory overview to the basic statistical concepts and procedures used in experimental research. The focus is on becoming familiar with how to interpret and perform statistical tests, in order to design experiments and interpret their results. It is not a course on mathematical theory; no mathematical skills beyond basic algebra are required. The course is instead intended to provide a basic degree of scientific literacy, with an emphasis on the psychological sciences.

In addition to the lectures, students will participate in a mandatory laboratory section that meets once a week. Lab activities will consist primarily of hands-on data analysis using Excel, applying the concepts introduced in lecture.

Role in the Psychology Curriculum
For the Psychology major, and for the Psychology Post-Bac certificate program, this course counts toward the statistics requirement. For the Neuroscience & Behavior major, this course counts toward the P3 (statistics/research methods) requirement. For the Psychology concentration, this course counts as an elective.

Course Requirements

Participation
Your presence at every lecture is expected. Because each lecture's concepts build on previous ones, active attendance is crucial to building an understanding of the material. You will earn your participation grade (5% of your overall grade) by actively attending class. Active attendance means not only showing up, but also remaining awake and paying attention. Each student will start out with the full 5% for participation, and will have two free absences to use for any reason. Beyond this, you may lose part of your participation grade for additional unexcused absences or for regularly being present only physically (e.g., sleeping through class, browsing Facebook instead of paying attention, etc.). If you anticipate needing to miss more than two classes due to illness or other unavoidable obligations (e.g., traveling for athletic competitions, grad-school interviews), please contact Prof. Fox-Glassman as soon as possible, but no later than a week before the lecture you will need to miss.

Lab Assignments
Active attendance to every lab meeting is essential for this course. During each lab meeting, students will complete an assignment with the help of the TA. If you anticipate needing to miss a lab meeting, you must contact Prof. Fox-Glassman and your TA at least 2 weeks in advance in order for that absence to be excused. If you need to miss lab unexpectedly due to illness or emergency, your absence may be excused with a doctor's or dean's note. For excused absences, you will be able to make up your lab assignment, for full credit, on a timeline as arranged with your TA and instructor. Any lab assignments missed due to an unexcused absence may be made up for partial credit within one week of the missed lab meeting.

Written assignments
Homework. Practicing new knowledge is important in any subject, all the more so for statistics. Your homework assignments provide you with a chance to test your knowledge, cement concepts before we build on them in further lectures, and make instructive mistakes.

- **Homework assignments must represent your own—and only your own—work.** You may not collaborate or share answers with other students. That said, the homework assignments for this course are designed to test and challenge your understanding of the material, so every student, no matter how strong your math or stats background, is likely to need some help at some point. When that happens, please make good use of our office hours, or email a TA or Prof. Fox-Glassman to set up another time to meet and talk through your questions.

- **Show your work!** You will receive more of your points for using a correct method, as opposed to coming to a correct answer. This means that making a silly math error early on—or basing your hypothesis test on a shaky assumption—needn't cause you to lose all points for a question, even if that error makes your final answer wrong. It also means that you will not receive full points for a correct answer if the TAs cannot see how you arrived at it. Similarly, TAs can only give you points for work that they can read, so write legibly.
- **Homework is due at the beginning of class.** Points will be deducted per day past the due date of the assignment, which will always be at 11:40pm (when our class starts). If you have not finished your homework before class, the late penalty will be the same if you hand it in during or directly after class as if you turn it in any time before 11:40pm the next day. That means that if you haven't been able to finish a homework assignment before class starts, there's no benefit to working on it during class rather than paying attention to the new material—we would rather you gain the full benefit of class, and then finish your homework later in the day.
- **Homework is due in hard copy, stapled, with your name on each page.** It's your responsibility to make sure your entire assignment is stapled and can be traced back to you. Electronic submissions will not be accepted unless pre-approved by your TA.

Projects. Instead of sitting for in-class exams, you will demonstrate your understanding of course concepts by completing a series of data-analysis projects. Think of these projects as take-home exams. Some important notes about projects:

- **Projects are due 48 hours after they are assigned.** This is a short window, and late projects will lose points, so plan ahead to make sure that you can devote enough time to complete the project before it is due. Extensions will **only** be considered if requested well in advance of the project being assigned, or in cases of unforeseen emergency, as documented by a doctor's or dean's note.
- **You are expected to work alone.** You may use any reference resources (lecture notes, your textbook, other readings), but you may not receive help from fellow students, TAs, friends, internet message boards, or any other outside source. Receiving help from anyone on your projects for this class is considered the same as cheating on an exam, and will result in a score of 0 for that project and will be reported to Columbia as academic misconduct.
- At the time the project assignment goes live, you will receive a unique dataset that will serve as the basis for your individual analysis. Each student will have a different dataset, which means that each project will have a different set of correct answers. If you do not receive your dataset, let your TA and instructor know immediately.
- Note that the first couple of projects are weighted less strongly toward your final grade than the latter two. If you don't do as well as you would have liked on the first project, make sure to meet with your TA or the instructor to go over what you did wrong (but also what you're doing right!), so that you can improve your grade as the projects increase in value.

Grading

I don't grade on a curve in this class, so your grade will be determined only by your own work, not by how well you do relative to the other students. There is no pre-determined proportion of students who will receive As, Bs, Cs, etc.—if every student does A-level work, then everyone will receive an A in the course. Your grade will depend on the following:

Participation:	5%
Lab Assignments:	10%
Homework:	20%
Project 1:	10%
Project 2:	15%
Project 3:	20%
Project 4:	20%

The cutoffs for each letter grade are as follows:

97 – 100 % = A+
93 – 98.9 % = 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-
60 – 69.9 % = D
0 – 59.9 % = F

Academic Integrity

Academic honesty includes presenting only your own work in your assignments. Taking credit for work that is not your own is a serious violation within the academic community, and anyone found to be cheating in this class will be reported to the university, and will receive a score of zero on the assignment(s) in question. In this course, academic dishonesty includes receiving unauthorized help on your projects or homework assignments, copying another student's work, copying answers from online sources, or helping other students with their work. Detailed definitions and examples of academic dishonesty (and a rundown of the consequences) are available in Columbia's Guide to Academic Integrity (http://www.college.columbia.edu/academics/integrity). Ignorance of the rules is not a valid defense, so make sure you've read them.

If you find yourself in a position where it feels like getting answers from another person is your only option, *please* reach out to your instructor and/or your TA before going elsewhere. It's always preferable to deal with any issues before they get so bad that they become overwhelming, so please do come to us if you're feeling stressed out about the class workload or if there's a concept you're just not understanding. Getting help before a homework assignment is due, and before a project is assigned, is always going to be the best option, but even if you're reaching out after that, we'd rather you come to us rather than resorting to cheating. If you have an issue that you'd rather not talk about with us, you may contact your academic advisor or dean; or a Psychology Program Advisor (DUS); or the counselors at Columbia's CPS (http://health.columbia.edu/services/cps).

Students with Disabilities

Students with special needs who may require classroom accommodations should make an appointment to see me as soon as possible. If you have not already done so, stop by the Office of Disability Services (ODS) on the 7th floor of Lerner Hall to register for support services. ODS often requires a few weeks to process an application, so please contact them as soon as you can. The procedures for registering with ODS can be found at http://health.columbia.edu/services/ods or by calling (212) 854-2388. Please note that students who ordinarily receive extra time to complete in-class exams are not generally eligible to receive more time to complete the projects in this course.

Readings

Required Readings

Required reading will consist mainly of chapters from our main text:

- Introductory Statistics for the Behavioral Sciences, 7th Edition, by Joan Welkowitz, Barry H. Cohen, and R. Brooke Lea (2012). ISBN: 978-0-470-90776-4.

You are encouraged to obtain your own copy that you can highlight and write notes in—it is available at Book Culture, at 536 W 112th St. However, **the CU library does also make the entire textbook available online for free**, though with limits on the number of pages that you can download and print. If you do opt to use the online version of the text, remember (especially during project windows) that your access to it will be dependent on an internet connection!

Note that chapters are sometimes listed as required reading more than once. This is not a mistake, but rather a cue to re-read those chapters prior to the class in question: either because they are particularly important, or because they are particularly challenging.

Recommended Readings

Each lecture will also have an accompanying recommended reading, all of which will be made available as PDF files on Canvas. These are strictly optional and (wherever possible) non-mathematical. These supplementary readings have been chosen to help make the problems of the course a bit less abstruse. There is no need for you to purchase any of these supplementary readings, but if you are interested in reading beyond the excerpts we use in this class, you will find the sources for most of our recommended readings in this list, sorted by the first author's last name (the same convention by which the readings are listed in the table below, and the files on Canvas are named).

- *The Tiger That Isn't: Seeing through a world of numbers*, by Michael Blastland & Andrew Dinot
- *Statistics Without Maths for Psychology*, by Christine Dancey & John Reidy
- *The Essential Guide to Effect Sizes*, by Paul Ellis
- *The Cartoon Guide to Statistics*, by Larry Gonick & Wollcott Smith
- *Doing Bayesian Data Analysis*, by J. K. Kruschke
- *Statistical Rethinking*, by Richard McElreath
- *The Lady Tasting Tea: How statistics revolutionized science in the 20th century,* by David Salsburg
- *Bayes' Rule: A Tutorial Introduction to Bayesian Analysis*, by James Stone
- *The Visual Display of Quantitative Information*, by Edward Tufte

List of Topics & Readings

Chapters listed below are all from Welkowitz, unless otherwise noted.
Recommended readings are listed in parentheses.

Date	#	Topic	Readings	Lab	Due
Tues. 9/3/19	1	"Why Am I Here?"	Course Syllabus		
Thurs. 9/5/19	2	Variables & Measurement	Chapter 1 (Blastland Ch. 1)	Lab 1	

Tues. 9/10/19	3	Data Visualization	Chapter 2 (Tufte Ch. 1)		HW 1
Thurs. 9/12/19	4	Central Tendency	Chapter 3 (Blastland Ch. 5)	Lab 2	
Tues. 9/17/19	5	Variability	Chapter 3 (Gonick Ch. 2)		HW 2
Thurs. 9/19/19	6	Distributions	Chapter 4 (Salsburg Ch. 2)	Lab 3	
Tues. 9/24/19	7	Discrete Probability	Chapter 16 (Blastland Ch. 3)		HW 3
Thurs. 9/27/19	8	Probability Density	Chapter 4 (Salsburg Ch. 9)	Lab 4	Project 1
Tues. 10/2/19	9	Statistical Inference	Chapter 5 (Salsburg Ch. 11)		HW 4
Thurs. 10/4/19	10	Confidence Intervals	Chapter 5 (Salsburg Ch. 12)	Lab 5	
Tues. 10/8/19	11	The Small Sample Problem	Chapter 6 (Salsburg Ch. 3)		HW 5
Thurs. 10/10/19	12	Testing for a Change	Chapter 6 (Gonick Ch. 8)	Lab 6	
Tues. 10/15/19	13	Testing for a Difference	Chapter 7 (Gonick Ch. 9)		HW 6
Thurs. 10/18/19	14	Correlation	Chapter 9 (Blastland Ch. 12)	Lab 7	Project 2
Tues. 10/22/19	15	Linear Regression	Chapter 10 (Gonick Ch. 11)		HW 7
Thurs. 10/24/19	16	Linear Models	Chapter 10 (Dancey Ch. 12)	Lab 8	
Tues. 10/29/19	17	Analysis of Variance	Chapter 12 (Salsburg Ch. 5)		HW 8
Thurs. 10/31/19	18	Multiple Comparisons	Chapter 13 (Dancey Ch. 10)	Lab 9	

Tues. 11/5/19	-	*University Holiday: Election Day*	-	-	-
Thurs. 11/7/19	19	Factorial ANOVA	Chapter 14 (Dancey Ch. 11)	Lab 10	HW 9*
Tues. 11/12/19	20	Nonparametric Tests	Chapter 8 (Salsburg Ch. 10)		HW 10
Thurs. 11/14/19	21	Nonparametric Tests, Part II	Chapter 17 (Salsburg Ch. 10)	Lab 11	Project 3
Tues. 11/19/19	22	Effect Size	Ellis Ch. 1 (Wainer Ch. 1)		HW 11
Thurs. 11/21/19	-	*University Holiday: Thanksgiving*	-	-	-
Tues. 11/26/19	23	Power Analysis	Chapter 11 (Ioannidis, 2005)		HW 12
Thurs. 11/28/19	24	Bayes' Rule	Stone Ch. 1 (Salsburg Ch. 13)	Lab 12	
Tues. 12/3/19	25	Bayes' Rule, Part II	Goodman, 1999 (Kruschke Ch. 2)		HW 13
Thurs. 12/5/19	26	Analytic Strategy	(McElreath Ch. 1) (O.S.C., 2015)	Lab 13	
Tues 12/10/19	X	*Future Directions (optional extra lecture)*	-		
Thurs. 12/12/19	-	-	-		Project 4