APSY-UE 25

RESEARCH METHODS IN APPLIED PSYCHOLOGY I

Steinhardt School of Culture, Education, and Human Development
New York University

Mondays and Wednesdays, 9:30-10:45am
Silver Center for Arts & Science, 100 Washington Sq. East, Room 405

Instructor:
Alejandro J. Ganimian
Assistant Professor of Applied Psychology and Economics
246 Greene St., Kimball Hall, Room 406W
+1 212 998-4029
alejandro.ganimian@nyu.edu
Personal website: http://alejandroganimian.com
Twitter: http://twitter.com/aganimian

Office hours:
https://calendly.com/alejandro-ganimian/office-hours

Course assistants:

Zezhen (Michael) Wu
246 Greene St., Kimball Hall, Room 412W
zw1429@nyu.edu
Office hours: Fridays 2.00-4.00pm
Recitations: Fridays
11.15am-12.05pm and 12.30-1.20pm
Bobst Library, 70 Washington Sq. South,
Room LL112

Verónica Mesalles
246 Greene St., Kimball Hall, Room 412W
vmm316@nyu.edu
Office hours: Wednesday 4.00-6.00pm
Recitations: Fridays
9-9.50am and 10.15-11.05am
246 Greene St., Kimball Hall,
Room B-02W

1. Objectives

This research-methods course sequence seeks to introduce students to quantitative research as an approach to understanding and transforming human development across the lifespan, as well as the socio-ecological factors that influence the contexts and systems in which people develop. This first course in the sequence focuses on providing students with the knowledge and skills they need to read, understand, and critically evaluate quantitative research in applied psychology. The second course will build on this foundation and support students to design their own studies.

This course is structured around four essential steps of quantitative research: (a) asking questions that advance knowledge and affect people's lives; (b) designing studies to explore plausible answers and rival explanations (e.g., selecting participants, assigning participants to conditions, weighing ethical considerations); (c) developing instruments to capture key outcomes and mechanisms (e.g., surveys, assessments, observations); and (d) analyzing data to test descriptive, correlational, and causal explanations.

The components of the course aim to achieve different, but complementary, objectives:

- The readings, to be completed *before each lecture*, will introduce students to a problem in quantitative research (e.g., how do we decide who should participate in a study?), why it matters (e.g., what will be the implications of our study if some groups are over-represented, while others are omitted or under-represented?), and the approaches that researchers typically employ to solve this problem (e.g., identifying the groups about whom we wish to make inferences from our study and draw a sample from within each of these groups).
- The lectures will briefly review the problem introduced in the readings, discuss its implications in greater detail, and compare and contrast different approaches to solve the problem, drawing extensively on examples from applied research.
- The recitations will allow students to ask clarifying questions about the material covered during lectures and to practice implementing the approaches reviewed in class, often with the help of a statistical package and the support from a course assistant.
- The problem sets, which can be completed in groups, but must be written-up individually, will provide students with opportunities to practice implementing the approaches discussed in lectures and recitations on their own using a statistical package.
- The exams, which must be completed individually during recitation, will assess students' ability to apply the material covered in the course independently.

The sequencing of the components (i.e., the fact that students will first complete the readings, then come to lectures, attend recitations, complete the problem sets in groups, and apply the material to real-world scenarios individually during exams) aims to provide students with scaffolding to become critical consumers of research. By the end of the semester, they will be expected to understand the concepts, methods, and analytical strategies covered on their own.

This syllabus draws on previous iterations of the course. The instructor thanks Erin Godfrey and Shabnam Javdani for sharing their materials. He also thanks Ali Bloomgarden, Travis Cramer, Tori Dahl, Ashley Greaves, Rashmi Marwaha, Andrew Ribner, Brian Spitzer, Emilie Tumale, and Rui Yang, all the previous course assistants, for their helpful feedback.

2. Pre-requisites

Students must complete APSY-UE 10 ("Developmental Psychology") before taking this course. Students may take PSYCH-UA 10 ("Statistics for Behavioral Sciences") or APSTA-UE 1085 ("Basic Statistics") either concurrently or after taking this course.

3. Auditing

This course may be taken for a letter-grade only, not on a satisfactory/no credit basis. Auditors are not allowed for two main reasons. First, students are unlikely to master the material in the course if they do not complete all requirements. If a student plans to complete these requirements, he/she/they should receive credit for doing so. Second, the teaching team works very hard to support a large number of registered students throughout the semester. Auditors place additional demands on the teaching team, which invariably limit the instructors' capacity to provide this intensive support. Therefore, there will be no exceptions.

4. Readings

There will be one required text for this course:

- Weinberg, S. L. & Abramowitz, S. K. (2016). *Statistics using Stata: An integrative approach (1st edition)*. New York, NY: Cambridge University Press.

The instructor specifically chose this book because it is one of the few that explains analytical strategies in sufficient detail and indicates how to carry them out using a statistical software. Students are expected to purchase or rent this textbook within the first two weeks of the semester. It will introduce students to the statistical concepts and methods to be covered during lecture and to the statistical programming to be covered during recitation. Students are not expected to understand the readings before attending lecture or recitation, but they must have completed them and made a good-faith effort to understand them.

All the reading assignments in the course calendar below are for the print edition, which students are encouraged to purchase. Students who purchase the electronic edition should ask a classmate for the corresponding page numbers for the assigned readings for each week.

All other materials will be posted to the course site on Brightspace: https://brightspace.nyu.edu/d2l/home/122229.

5. Grading

Each student's grade in the course will be determined as follows:

a) attendance and punctuality (5%);
b) class participation (15%);
c) problem sets (50%); and
d) exams (30%).

Attendance and punctuality: Students are expected to attend all lessons and recitations. If a student cannot attend a lecture or recitation, he/she/they should e-mail his/her/their course assistant at least 24 hours in advance of the lecture/recitation stating the reason for the absence. If a student missed a lecture/recitation but was unable to notify the course assistant in advance (e.g., in the case of a health condition or emergency), he/she/they should e-mail the course assistant afterwards. These communications help the teaching understand students' individual circumstances and provide additional support whenever necessary.

Both planned and unplanned absences will be considered in the 5% of the unadjusted course grade assigned to attendance and punctuality. There is only one exception. In accordance to NYU's calendar policy on religious holidays, students who let the course assistants know of their absences to lecture (recitation) due to religious holidays ahead of time will not incur any penalty on their attendance score. However, they are expected to review the slides and complete the assigned readings to catch up with any missed lectures (recitations). No extensions will be granted due to religious holidays (see section on "Late assignments" below) to ensure all students are treated equally. There will be no exceptions.

Students are expected to arrive before the start of each lecture (recitation) to allow the instructor (course assistants) to begin on time. Late arrivals will be considered in the 5% of the unadjusted course grade assigned to attendance and punctuality.

Each student's attendance and punctuality score will be calculated as follows. The student will receive a score of 1 for attending each lecture (recitation) before the official start time, a score of 0.75 for arriving after the official start time or leaving early, and a score of 0 for missing each lecture (recitation). The student's total attendance and punctuality score will be the sum of all the individual scores over the total number of lectures and recitations, multiplied by 100. For example, if a student attended 40 of 41 sessions (including lectures and recitations), his/her/their score will be (40/41)*100 or 98. The maximum attendance and punctuality score is 100.

<u>Class participation:</u> During each lecture, students may answer questions from the instructor about the readings, explain their rationale for selecting a specific answer in response to i<Clicker questions, and/or ask clarifying questions themselves. All three of these types of interventions will be considered in the 15% of the unadjusted course grade assigned to class participation.

Each student's class participation score will be calculated as follows. On each lecture, a student will receive a score of 1 for making a good-faith effort to participate (even if they do so incorrectly) or a score of 0 for attending class but refraining from participating. The student's total participation score will be the sum of the scores for all lectures over 10, multiplied by 100. Based on this scheme, to obtain a perfect class-participation score by the end of the semester, a student must have participated on 10 instances (out of a total of 28 lectures). For example, if a student participated in 9 of 28 lectures, his/her/their score will be (9/10)*100 or 90. The maximum participation score is 100.

For reference, the mean class-participation scores for the previous semesters have been: 74 (spring 2018), 82 (fall 2018), 74 (spring 2019), 74 (fall 2019), and 79 (spring 2020).

<u>Problem sets:</u> Students are expected to complete four problem sets throughout the semester. As stated in the course objectives, these problem sets are meant to provide students with opportunities to practice the material covered in lecture and recitations. Students can complete problem sets in groups, but they must write up their results individually. Instructions on how to format and submit problem sets will be included at the beginning of each problem set. The problem sets from previous iterations of the course are posted on the "Resources" tab of the course site. These are meant to provide students with general guidance on the expected level of detail of their answers and the instructor's approach to grading. Yet, the content and types of questions in problem sets vary from one semester to the next as the course continues to evolve.

Each student's problem-sets score will be calculated as follows. The student will receive a score of 0 to 100 on each problem set, based on the proportion of questions he/she/they answered correctly. Partial credit will be awarded for partially correct answers, so students are encouraged to show their work. The student's overall problem-sets score will be the average of the four highest problem set scores (i.e., the lowest score will not count). This provision is meant to account for the fact that some students may find some of the problem sets more difficult than others, and to prevent one low problem set score from playing a large role in determining students' overall grade. It is also meant to allow students to "drop" (i.e., choose not to complete) one problem set during the semester (e.g., if they cannot complete the problem set on time due to unforeseen circumstances). Students should use this opportunity judiciously and avoid dropping earlier problem sets for non-essential reasons only to encounter a situation that impedes them from performing well on a later problem set for which they have no remedy. For example, if a student obtained scores of 90, 80, 100, and 50, his/her/their score will be (90+80+100)/3 or 90. The maximum problem-sets score is 100.

For reference, the mean problem-sets scores for the previous semesters have been: 89 (spring 2018), 92 (fall 2018), 86 (spring 2019), 95 (fall 2019), and 93 (spring 2020).

Exams: Students are expected to complete mid-term and final exams. As stated in the course objectives, the exams aim to assess students' ability to apply the material from lecture and recitations independently. Students must complete the exams individually. Instructions on the materials allowed during the exams will be provided closer to the dates. The exams from the previous iteration of the course are posted on the "Resources" tab of the course site. These are meant to provide students with general guidance on the expected level of detail of their answers and the instructor's approach to grading. Yet, the content and types of questions in exams vary from one semester to the next as the course continues to evolve.

Each student's exams score will be calculated as follows. The student will receive a score of 0 to 100 on each exam, based on the proportion of questions he/she/they answered correctly. Partial credit will be awarded for partially correct answers, so students are encouraged to show their work. The student's overall exams score will be the average of the mid-term and final exam scores. For example, if a student obtained a 70 in the mid-term exam and a 90 in the final exam, his/her/their score will be (70+90)/2 or 80. The maximum exams score is 100.

For reference, the mean exams scores for the previous semesters have been: 92 (spring 2018), 84 (spring 2019), 87 (fall 2019), and 94 (spring 2020). There was no exam score in fall of 2018 because the teaching team identified evidence of plagiarism; course scores were recalculated for all students, using adjusted weights for all other course components.

Overall course grade: The overall numeric score for each student will be calculated as the weighted average of his/her/their attendance and punctuality, class participation, problem sets, and exams scores. The weights correspond to the percentages allotted to each score above. For example, if a student obtained a 75 for his/her/their warm-ups, a 92 for his/her/their problem sets, and an 80 for his/her/their exams, his/her/their overall numeric score will be (98*0.05)+(90*0.15)+(90*0.5)+(80*0.3) or 87.

The overall letter grades will be determined based on the distribution of numeric scores for all students in the course. This is meant to account for the fact that some student cohorts may find the material more or less difficult than others. Letter grades will be assigned as follows:

If a student has a numeric score that is…	…he/she/they will earn a/an…
…0.5 standard deviations (SDs) above the mean…	…A
…above the mean by less than 0.5 SDs…	…A-

…below the mean by less than 0.5 SDs…	…B+
…between 0.5 and 1 SD below the mean…	…B
…between 1 and 1.5 SD below the mean…	…B-
…between 1.5 and 2 SDs below the mean…	…C+ or lower

The mean and standard deviation for the cohort will be posted on the course site when mid-term grades are due (on November 3) and when final grades are due (on December 24 at the latest). Both grade releases will be accompanied by a letter to each student explaining how his/her/their grade was calculated. Mid-term letter grades are not final; they are meant to inform students of their relative standing and allow them to seek feedback from the teaching team on how to improve their grade. For example, if a student obtained a numeric score of 87, the cohort mean is 80, and the cohort standard deviation is 10, (87-80)/10 or about 0.7 SDs above the mean corresponds to an overall letter grade of A. (Please, note this cohort mean and standard deviation are only examples).

The cutoff scores have varied across semesters as follows:

Criterion	Letter grade	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020
0.5 standard deviations (SDs) above the mean	…A	92	94	90	95	95
above the mean by less than 0.5 SDs	…A-	88	89	87	92	93
below the mean by less than 0.5 SDs	…B+	83	83	83	89	91
between 0.5 and 1 SD below the mean	…B	79	78	80	86	89
between 1 and 1.5 SD below the mean	…B-	75	72	77	83	87
between 1.5 and 2 SDs below the mean	…C+ or lower	70	67	70	77	83

The instructor may (and often does) adjust a student's final letter grade on the course based on his/her/their improvement over time and exemplary performance on one or more dimensions, so the actual distribution of letter grades is never determined exclusively by the cutoff scores above. Students must obtain at least a grade of C- to continue on to "Research Methods II".

All grades posted at the end of the semester are final and the instructor will not discuss grades over e-mail. Students interested in better understanding their grades after they are posted are welcome to make an appointment with the instructor at the start of the following semester. There will be no exceptions to ensure no students are given an unfair advantage over others.

<u>Grading criteria for assignments:</u> The teaching team will follow multiple mechanisms to maximize consistency across graders. First, after each problem set and exam are due, the instructor will post an answer key and scoring criteria, which will determine how all members of the teaching team ought to grade each question. Second, the instructor and course assistants will take turns grading each student's assignments. This process aims to avoid penalizing students for discrepancies in grading stringency across the members of the teaching team within the aforementioned guidelines. Third, prior to the release of each set of scores, the course assistants will share with the instructor the top and bottom scores for each assignment. This instance allows the instructor to identify inconsistencies across graders and adjust the scoring criteria

accordingly. Finally, the course assistants will check the scores assigned to students who completed problem sets together to ensure they are consistent. Note, however, that the scores of problem-set teammates may differ due to their individual write-ups.

After each problem set and exam are graded, the instructor and course assistants will post the answer key, scoring criteria, and student exemplars (i.e., anonymized problem set and exams with top scores, with students' permission). Students are strongly encouraged to consult these documents to ask the teaching team any questions they might have on the material.

A student may ask for his/her/their problem sets and/or mid-term exam to be regraded if—after carefully reviewing the answer key, scoring criteria, and exemplars and meeting with his/her/their grader—he/she/they does not believe that his/her/they grade is correct. Students who wish to request a regrade should e-mail the instructor no later than one week after scores have been posted. The instructor will conduct all regrades. He will regrade the entire problem set or exam, not just the questions being disputed. Therefore, regrades may result in a lower, equal, or higher scores than originally awarded. The final-exam scores are final (i.e., not subject to regrades).

6. Classroom policies and expectations

Laptops and tablets: Evidence from multiple randomized experiments indicates that students who take notes on their laptops or tablets learn less and earn worse grades than those who take notes using pen/pencil and paper. They are also more likely to adversely affect their peers' learning and grades. (See Prof. Susan M. Dynarski's summary of the evidence at: http://brook.gs/2vS6I3e). Therefore, laptop and tablet use are prohibited during lectures and recitations that do not involve statistical programming.

Lecture slides are written up in considerable detail to allow students to pay full attention in class instead of taking down notes. For students who still prefer to take notes during class, the instructor will make available draft slides before each lecture. However, the instructor often edits these drafts (e.g., to correct typos or incorporate aspects that arose during class discussions) and posts final versions after each lecture. Students should use those final versions as reference for course assignments.

Cell phones: Cell phone use (for making or receiving calls and sending or receiving text messages) is prohibited during lectures and recitations. There will be no exceptions.

Eating and drinking: No eating is allowed during lecture or recitation for two main reasons. First, if many students eat during class, they are likely to disrupt the classroom dynamic. Second, eating in classrooms is likely to create additional work for maintenance workers who clean the university's spaces between lessons. Students may bring water bottles or coffees/teas in a covered container. There will be no exceptions.

Late assignments: Students should budget enough time to submit all course assignments well ahead of each deadline. Late assignments, regardless of how late they are (even a minute past the deadline), will not be accepted for four main reasons. First, the class already has a built-in system to account for unanticipated events: dropping the lowest problem-set score (see Grading section above). Second, the process of granting exceptions is inevitably inequitable: for every student who requests an extension, there are often many others who would have also benefited from such an extension but were too shy to request it. In the instructor's experience, it is often students from more advantaged backgrounds who fall into the first group and those from disadvantaged backgrounds who fall into the second group, perpetuating pre-existing trends in inequality in academic socialization. Third, the teaching team has no way to determine whether some circumstances are more meritorious of an extension than others. And finally, with 70+ students in the class and four problem sets, such a provision has the potential to result in a considerable disruption in the teaching team's time, for a class that already requires a much higher workload than most others. For all these reasons, there will be no exceptions.

Surveys: The instructor will invite students to complete two surveys during the semester: a "student survey" (at the beginning of the semester), which will allow the teaching team to get to know students better, and a "feedback survey" (midway through the semester), which will allow students to provide feedback on what is working well and what could be improved in the course. The teaching team takes feedback surveys very seriously and it will make a good-faith effort to address the concerns raised by students.

All surveys are optional and there will be no repercussions for students who choose not to answer them. The student survey will ask for identifying information (to avoid asking questions for which the instructor already has information), but the feedback survey will be anonymous. None of the surveys will be considered in students' course grades. All data survey responses will be deleted at the end of the course and it will not be used for other purposes.

7. Statistical programming

All students will need to get access to Stata, a statistical package, to complete the problem sets for this course. All the example code to be provided by the instructor will be written in Stata 15, so students should get access to Stata 15 or above.

Students may get access to Stata on campus, through the computers at Data Services (on the fifth floor of Bobst Library), the Student Technology Centers (LaGuardia Co-op, Kimmel Center Lab, and Third Avenue Lab; see http://bit.ly/2xgqvHg), or the High Performance Computing's Prince cluster (see https://bit.ly/31Rr4Wq).

Students may also get access to Stata off campus through the Virtual Computer Lab at: http://www.nyu.edu//it/vcl.

Finally, students may purchase Stata at a discounted rate through Stata Campus GradPlan at: http://bit.ly/2w1DrCc. An annual license for Stata/BE (the version for mid-sized datasets), which will be sufficient for this course, is $125.

Lectures will not be used to teach students how to code, but example code will be included in the assigned readings and lecture slides. Recitations will offer students opportunities to practice coding and ask questions. All the commands that students need to use in the problem sets and exams will be included in the recitation guides, which will be posted on the course site.

Additionally, students can seek help with coding from Data Services (on the fifth floor of Bobst Library) either by signing up for their Stata tutorials (see calendar at https://guides.nyu.edu/DS_class_calendar) or by making an appointment for a one-on-one meeting with a consultant (see https://library.nyu.edu/departments/data-services/.)

8. Writing

The problem sets and exams will involve a fair amount of writing (e.g., to define key concepts or explain results from statistical analyses). Students should not take this writing lightly; an important part of becoming a researcher is learning to convey arguments clearly.

Students are expected to review their assignments for typos and grammatical errors before submitting them. They should also take full advantage of the various on-campus resources to help them improve their writing, including the Writing Center (https://bit.ly/2PMe13x) and the University Learning Center (https://bit.ly/2hBrgX0).

9. Plagiarism

Students taking this course are expected to have read in full and agreed to NYU-Steinhardt's statement on academic integrity (http://bit.ly/2vSt2JR). As the statement specifies, "plagiarism is failure to properly assign authorship to a paper, a document, an oral presentation, a musical score and/or other materials, which are not your original work."

As the problem-set instructions will specify, students will be required to recognize any peers with whom they have collaborated (e.g., discussing questions, solved problems together, compared answers). This will help the instructor and the course assistants understand any similarities in assignments submitted by different students.

Students who have questions about what constitutes appropriate collaboration in a problem set should contact his/her/their course assistant 24 hours before they submit their problem sets.

If the instructor suspects that a student has committed plagiarism, disciplinary action may be taken following the department procedure or through referral to the Committee on Student Discipline, through the Office of the Associate Dean for Student Affairs. See the statement on academic integrity for details on the steps involved in each procedure.

10. Accommodations

Any student who needs an accommodation due to a chronic, psychological, visual, mobility and/or learning disability, or who is deaf or hard of hearing, should register with the Moses Center for Student Accessibility (www.nyu.edu/csd) at 212 998-4980, 726 Broadway, 2nd and 3rd Floors. Students should also notify the instructor within the first two weeks of the semester.

Students with health-related absences (due to them or their close relatives contracting a disease/illness or passing) will be treated as in need of accommodations (i.e., they will be entitled to alternative exam arrangements) for the mid-term and final exams. Students are not expected to provide any details on their situation or any certification to verify it.

11. Calendar

This course calendar is tentative. The instructor may adjust the topics to be covered in each class based on how students respond to the material during the semester. Students are expected to check the latest version of the calendar on the course site before every lecture and recitation.

Part I: Asking questions that advance knowledge and affect people's lives

Date	Topics	Readings	Assignments
Sep 6	*[Labor day – no class]*		
Sep 8	<u>Lecture #1: Introduction to the course</u> • What are the objectives of the course? • What are its main components? • Who is the teaching team?		Student survey posted
Sep 10	<u>Recitation #1: Introduction to Stata</u> • What is Stata? • What are the different windows in Stata? • How can we load, browse, describe, and save datasets in Stata? • What are string, numeric, and encoded variables in Stata?		
Sep 13	<u>Lecture #2: How can we ask questions in quantitative research?</u> • What is research? • What are hypotheses and theories? • What different types of variables exist (e.g., independent v. dependent, moderator v. mediator, variable v. constant, etc.)? • What are levels/scales of measurement (nominal, ordinal, interval, and ratio scales)?	Weinberg & Abramowitz (2016), pp. 1-13 (from "Introduction" to before exercises)	
Sep 15	<u>Lecture #3: How can we describe the distribution of a quantitative variable?</u> • How can we describe the distribution of a quantitative variable using tables and graphs? (frequency distribution tables, bar charts, histograms, and line graphs)	Weinberg & Abramowitz (2016), pp. 26-42, 72-92, 96-100 (from "Examining univariate distributions" to before "Accumulating data;" from "Measures of location, spread,	Student survey due

	• How can we characterize the shapes of these distributions? (symmetry and skewness) • How can we identify the typical value of a quantitative variable? (mean, median, and mode) • How can we describe the variation around the typical value of a quantitative variable? (range, inter-quartile range, variance, standard deviation)	and skewness" to before "Characterizing the skewness of a distribution;" and from "Selecting measures of location and spread" to before "Summary of Stata commands in chapter 3")	
Sep 17	<u>Recitation #2: Describing univariate distributions</u> • How can we display frequency distribution tables, bar graphs, histograms, and density plots in Stata? • How can we display the mean, median, and mode and the range, inter-quartile range, variance, and standard deviation in Stata?		
Sep 20	<u>Lecture #4: How can we describe the relative standing of an observation?</u> • How can we convey the relative standing of the value of a quantitative variable? (probability and cumulative distribution functions, percentile ranks, and percentiles) • How can we convey the relative standing of a value in a "bell-shaped" distribution? (standard scores, z-scores, the Normal distribution, and the 68-95-99.7 rule)	Weinberg & Abramowitz (2016), pp. 43-49, 121-129 (from "Accumulating data" to before "Five-number summaries and boxplots;" and from "Standard scores" to before "Nonlinear transformations")	
Sep 22	<u>Lecture #5: How can we describe the relationship between two quantitative variables?</u> • How can we describe the relationship between two quantitative variables using tables and graphs? (joint frequency distribution tables, scatterplots) How can we choose between these displays? • How can we characterize these relationships? (shape, direction, and strength) • How can we measure the relationship between two quantitative variables? (Pearson, Spearman, and Point Biserial correlation coefficients)	Weinberg & Abramowitz (2016), pp. 153-159 (from "Exploring relationships between two variables" to before "The Pearson product moment correlation coefficient")	Problem set 1 posted
Sep 24	<u>Recitation #3: Describing bivariate distributions</u> • How can we display joint frequency distribution tables, bar graphs, and scatterplots in Stata?		

	• How do we estimate and interpret the Pearson, Spearman, and Point Biserial correlation coefficients in Stata?		
Sep 27	Lecture #6: In-class discussion of journal article • How can we apply what we have learned to evaluate/critique quantitative research?	TBA	

Part II: Designing studies to explore plausible answers and rival explanations

Date	Topics	Readings	Assignments
Sep 29	Lecture #7: How can we select participants in a quantitative study? • What are populations, sampling frames, and samples? • What are probability and non-probability samples? • What are some examples of probability samples? (simple and stratified random samples, systematic and cluster samples) • What are some examples of non-probability samples? (convenience and quota samples)	Weinberg & Abramowitz (2016), pp. 259-265 (from "The role of sampling and inferential statistics" to before "Sampling distributions")	Problem set 1 due
Oct 1	Recitation #4: Drawing simple and stratified samples • How can we draw simple and stratified samples in Stata?		
Oct 4	Lecture #8: How can we draw inferences from samples about populations? • What are statistics and parameters? • What are empirical and theoretical sampling distributions? • How do theoretical sampling distributions help us make inferences about populations from samples? (central limit theorem)	Weinberg & Abramowitz (2016), pp. 265-276 (from "Sampling distributions" to before "Summary of chapter 9 Stata commands")	
Oct 6	Lecture #9: How can we use a sample mean to estimate a population mean? • What is interval estimation? • What is hypothesis testing? (z-test) • How are these two procedures equivalent?	Weinberg & Abramowitz (2016), pp. 281-296 (from "Inferences involving the mean of a single population when sigma is known" to before "Effect size")	
Oct 8	Recitation #5: Conducting z-tests in Stata • How can we perform one- and two-tailed z- in Stata?		

Oct 11	*[Fall break – no class]*		
Oct 12	Lecture #10: How can we calculate the desired sample size in a quantitative study? • What is Type I and Type II error? • What is a true zero and a true effect? • What is statistical power?	Weinberg & Abramowitz (2016), pp. 296-302 (from "Effect size" to before "Summary of chapter 10 Stata commands")	
Oct 13	Lecture #11: How can we design randomized experiments? • What does random assignment of an intervention allow us to estimate its causal effect? • What are one-way and factorial experimental designs? • What is between- and within-subjects randomization? • What are some examples of randomization strategies? (simple and stratified random assignment)	Weinberg & Abramowitz (2016), pp. 374-380 (from "Research design: Introduction and overview" to before "Including blocking in a research design")	Problem set 2 posted
Oct 15	Recitation #6: Conducting statistical power analyses in Stata • How can we estimate the minimum detectable effect size, given a sample? • How can we estimate the requisite sample, given an expected effect size?		
Oct 18	Lecture #12: In-class discussion of journal article • How can we apply what we have learned to evaluate/critique quantitative research?	TBA	

Part III: Collecting information on key outcomes and potential mechanisms

Date	Topics	Readings	Assignments
Oct 20	Lecture #13: How can we collect data in a quantitative study? • What are observational, physiological, and self-report methods of data collection? • How can we ensure that our data collection strategies protect study participants? (guidelines for ethical research and institutional review boards)	TBA	Problem set 2 due Student survey posted
Oct 22	Recitation #7: Mid-term exam		

Oct 25	Lecture #14: How can we describe relationships between variables with nominal scales? • How can we determine whether the distribution of two variables with nominal scales is the same? (chi-square goodness-of-fit test) • How can we determine whether two variables with nominal scales are related? (chi-square test of independence)	Weinberg & Abramowitz (2016), pp. 574-586 (from "The chi-square distribution" to before "Fisher's exact test")	
Oct 27	Lecture #15: How can we describe relationships between variables with ordinal, interval, or ratio scales? • How can we measure the predictive relationship between two variables with ordinal or higher scales? (simple linear regression, the standardized regression equation, and its relationship with the correlation coefficient) • How can we determine our success at identifying predictive relationships between two quantitative variables? (*R*, *R-squared*, and the use of *R* and *r* as measures of effect sizes)	Weinberg & Abramowitz (2016), pp. 196-213 (from "Simple linear regression" to before "Summary of Stata commands in chapter 6")	Student survey due
Oct 29	Recitation #8: Estimating relationships between variables • How do we carry out and interpret chi-square tests and simple linear regression in Stata?		
Nov 1	Lecture #16: How can we determine whether an instrument measures what we want to capture? • What are different types of validity evidence? (content, construct, and criterion-related validity) • How can we muster evidence of validity? (convergent and discriminant validity, concurrent and predictive validity)	TBA	
Nov 3	Lecture #17: How can we determine whether an instrument yields consistent responses? • What are different types of reliability? (reliability across items, raters, and occasions) • How can we measure reliability across items? (split-half reliability, the Spearman-Brown formula, and Cronbach's alpha) • How can we measure reliability across raters? (inter-rater agreement and Cohen's kappa)	TBA	Problem set 3 posted
Nov 5	Recitation #9: Estimating validity and reliability		

	• How do we establish validity evidence in Stata? • How do we establish inter-item and inter-rater reliability in Stata?		
Nov 8	Lecture #18: In-class discussion of journal article • How can we apply what we have learned to evaluate/critique quantitative research?	TBA	

Part IV: Analyzing data to marshal evidence for and against our preferred explanations

Date	Topics	Readings	Assignments
Nov 10	Lecture #19: How can we use two sample means to estimate differences between population means? • How can we determine whether the mean from a sample is comparable to the mean of its corresponding population? (one-sample t-test) • How can we determine whether the difference between the means of two samples are indicative of a difference in their corresponding populations? (independent- and dependent-samples t-test)	Weinberg & Abramowitz (2016), pp. 308-342 (from "Inferences involving the mean when sigma is not known: One- and two-sample designs" to "Paired samples t-test and confidence interval")	Problem set 3 due
Nov 12	Recitation #10: Running and interpreting two-samples t-tests • How do we run two-samples t-tests in Stata? • How do we adjust per-comparison error rates in Stata?		
Nov 15	Lecture #20: What are the problems with performing multiple comparisons across population means? • What are some challenges in making multiple (related) comparisons between samples? (per-comparison v. family-wise error rates and Type I error revisited) • What are some potential solutions to minimize the probability of drawing incorrect conclusions from samples? (the Bonferroni adjustment)	Weinberg & Abramowitz (2016), pp. 395-397, 426-429 (from "One-way analysis of variance" to before "The one-way analysis of variance;" and from "The Bonferroni adjustment" to before "Summary of Stata commands in chapter 13")	
Nov 17	Lecture #21: How can we address the problems stemming from multiple comparisons of population means?	Weinberg & Abramowitz (2016), pp. 397-413 (from "The one-way analysis of variance" to before	

	• How can we draw comparisons between the means of more than two samples? (one-way analysis of variance – ANOVA) • How can we determine which of the differences between more than two samples are indicative of differences in their corresponding populations? (one-way ANOVA post-hoc tests)	"Post-hoc multiple comparison tests")	
Nov 19	<u>Recitation #11: Running and interpreting one-way ANOVAs</u> • How do we run one-way ANOVAs in Stata? • How do we run post-hoc tests?		
Nov 22	<u>Lecture #22: How can we compare population means across multiple variables?</u> • How can we draw comparisons between the means of more than two grouping variables? (two-way analysis of variance – ANOVA) • How can we determine which of the differences between more than two grouping variables are indicative of differences in their corresponding populations? (two-way ANOVA post-hoc tests)	Weinberg & Abramowitz (2016), pp. 436-466 (from "Two-way analysis of variance" to before "Summary of Stata commands in Chapter 14")	
Nov 24	<u>Lecture #23: How can we perform comparisons and account for potential confounders?</u> • How can we estimate the relationship between one dependent variable and two or more independent variables? (multiple regression)	Weinberg & Abramowitz (2016), pp. 523-533 (from "An introduction to multiple regression" to before "Testing the b-weights for statistical significance")	
Nov 26	*[Thanksgiving recess – no class]*		
Nov 29	<u>Lecture #24: How can we choose between approaches to compare two or more population means?</u> • How do different approaches to comparing two or more population means compare? (independent-samples t-tests, one- and two-way ANOVAs, and simple and multiple regressions)	Weinberg & Abramowitz (2016), pp. 533-545 (from "Testing the b-weights for statistical significance" to before "The concept of interaction between two variables that are at least interval-leveled")	Problem set 4 posted
Dec 1	<u>Lecture #25: How can we determine whether the effect of one variable differs along the effect of another variable?</u>	Weinberg & Abramowitz (2016), pp. 545-559 (from The concept of interaction between two variables	

	• How can we determine whether there is an interaction effect between more than two grouping variables? (multiple regression and interaction effects)	that are at least interval-leveled" to before "Summary of Stata commands in chapter 16")	
Dec 3	Recitation #12: Running and interpreting two-way ANOVAs and multiple regressions • How do we run two-way ANOVAs in Stata? • How do we run and interpret multiple regressions in Stata?		
Dec 6	Lecture #26: In-class discussion of journal article • How can we apply what we have learned to evaluate/critique quantitative research?	TBA	Problem set 4 due
Dec 8	Lecture #27: Review for the final exam • What are the key concepts and analytical strategies that we have learned? • How can we make decisions about research drawing on these concepts and strategies?	None	
Dec 10	Recitation #14: Final exam		
Dec 13	Lecture #28: Final exam for students with accommodations	None	