

PSY 204L QUANTITATIVE RESEARCH METHODS & STATISTICS FOR PSYCHOLOGICAL SCIENCE 1

Summary In this two-semester course series (204L/205L) we will learn how to turn curiosity into knowledge. We will focus on the design of research studies and the use of statistical methods to become better consumers, creators, and communicators of psychology and human neuroscience research. By the end of this semester, students will have the initial foundational methodological and statistical knowledge and skills to conduct their own research in PSY205L.

After taking this class, you will...

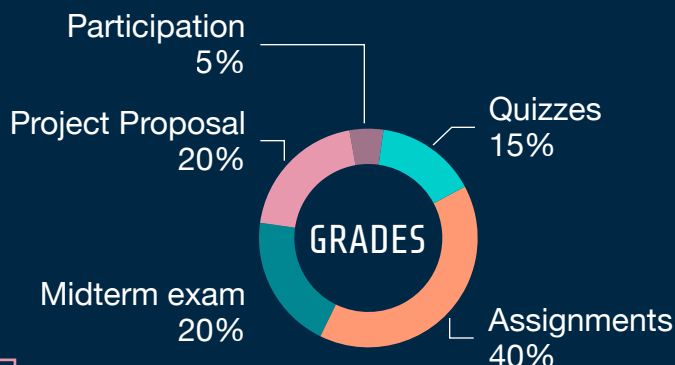
Know current best practices for research study design and statistical analysis

Have learned how to do basic statistical analysis of quantitative data

Be able to communicate scientific research results effectively and accurately

Be skilled in critically evaluating scientific research results & claims

Understand ethics in research and how to conduct ethical science



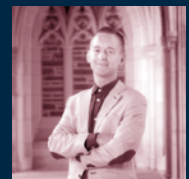
LECTURE MW 10:15-11:30am
SECTION M12-1:15pm, M1:45-3pm,
T8:30-9:45am, T10:15-11:30am
NO BOOK: all materials free on Sakai
PROJECT: choose your own team
LATE MIDTERM: 10/27 in class
OPTIONAL FINAL: 12/8 9am-12pm
WEEKLY ASSIGNMENT: Sunday 10pm
FREE SOFTWARE: <https://jasp-stats.org/>

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Office hours: TH1-2pm

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Teaching team

This semester (**PSY204L**) is focused on basic research design and measurement, ethical issues, statistical tests for observational studies (e.g., regression, correlation), and how to use statistical software.

Overview of Course Components and Grading

This is a hybrid course that combines **mini-lectures** with credit/no-credit **quizzes** (15% of grade), **interactive activities** (in-person and virtual) during normal class periods, **sections/labs** with a teaching assistant, weekly **assignments** (40% of grade) often with both group-based and individual components, an in-class **midterm exam** (20% of grade), an **optional cumulative final exam** (will replace midterm if higher grade), and a group-based **research study proposal** (20%). **Participation credit** (5% of grade) will be given for attending sections/labs and providing responses to in-class surveys. Details below on each course component.

TEXTBOOK & SOFTWARE

TEXTBOOK: There is no required textbook for this course. You paid for this class to learn from local Duke experts so all materials will be provided either via Sakai or via lectures and sections/labs. Some students learn better from reading a text and we completely understand that. If you feel like it would be helpful to have additional reading material, we will provide suggested materials (chapters from relevant textbooks) for each week on Sakai under Resources. Reading these materials is optional.

SOFTWARE: There are many different software options for basic data analysis. We will use the free and open source software, JASP, for demonstrations and activities during lecture and lab sections. This is not a programming course and we assume no prior background in programming or statistics. JASP does not require any programming. We will teach you the basics in JASP in a non-scary and supportive way. Our focus will be on teaching critical statistical thinking more than developing a foundation for programming.



LECTURES AND QUIZZES

There are two lecture periods each week where live lectures may be given that blend the presentation of information with student-instructor and student-student interaction. Each lecture will have a credit/no-credit quiz (15% of course grade) of multiple choice questions. The lecture quizzes are due every Sunday.

LABS/SECTIONS

In addition to the lecture components, students will attend a weekly section. During section, students will review lecture material with a PhD student Teaching Assistant (TA) and have more TA-supported hands-on practice with that week's material in preparation for the weekly assignment. Section will begin the first week of class.



PARTICIPATION

Participation credit is given for attending sections/labs as well as contributing to data collection throughout the semester. Many weeks there will be short Qualtrics surveys to collect data from students. These data will be collected, anonymized, and compiled by the teaching team and analyzed by you for assignments, lab activities, and/or exams.

WEEKLY ASSIGNMENTS

There will be weekly assignments posted in Gradescope (please follow the Gradescope link in Sakai to access these assignments). Assignments are mini-projects aimed at reinforcing concepts discussed in class and developing your independent methodological and statistical thinking and skills. Some components of the assignments are done in small groups (mostly to help build your research project proposal described below) and other parts should be done on your own. For the parts to be completed on your own, you may feel free to discuss those sections with other students **before you start doing the actual work of the assignment**, but the work that you turn in must be your own.

Assignments are due by Sunday at 10pm. Late assignments will lose 20% for every day late. The maximum grade for turning in the late assignment before 10pm on Monday is 80%, before 10pm on Tuesday is 60%, before 10pm on Wednesday is



40%, and before 10pm on Thursday is 20%. No assignments will be accepted after Thursday. All assignments count (we don't drop the lowest).

RESEARCH STUDY PROPOSAL

You will complete a research study proposal in small groups of 4 (semi-self-selected from classmates in your assigned sections/labs) over the course of the semester. This proposal will be in the form of a Registered Report which is a document providing a brief background and rationale for a proposed study with hypotheses (similar to a brief Introduction of a research paper) and the detailed methods of the proposed study (similar to a Method section of a research paper).

You will not have the opportunity to procrastinate on this proposal. Many of your weekly assignments will involve drafting sections of this document. You will be rewarded throughout the semester for making consistent progress on this project. At the end, you'll compile everything and feel great! **Our goal is to build to a very satisfying and non-stressful end-of-semester where you get to just bask in the glory of your new knowledge and skill.**

MIDTERM EXAM

There will be a relatively late midterm examination (multiple choice & short answer) based on about two-thirds of the course material. The exam will cover the topics discussed in lecture and sections/labs up until that date. The completed exam is submitted on Gradescope at the end of class. Make-up exams will be given only under exceptional circumstances. You must contact the instructors before the exam if an emergency arises. If you are entitled to exam accommodations via the Student Disability Access Office (SDAO), please let us know as soon as possible after the end of Drop/Add if you will be getting accommodations so we can be sure you are fully supported.

OPTIONAL FINAL EXAM

There will be an optional cumulative final examination during the final exam period that involves evaluating research methods and analyzing and reporting data. The exam will cover the topics from the entire semester. This is a non-traditional exam

where you will get the full exam (but not the data) on Sakai 24 hours in advance to allow time to jot down ideas, think, and plan without time pressure. The data are released via a Box folder at the beginning of the exam. Data analysis and write-up must be completed during the exam period, and the completed exam is submitted on Gradescope. Make-up exams will not be given since this exam will be optional. In this spirit, there are **no risks to taking the optional final** - only potential benefits. If you don't take it, your grade will not be affected. If you take it and the grade is higher than your midterm exam grade, your midterm exam grade will be replaced by your final exam grade. You do not need to request this; it will happen automatically. If your grade on the final exam is lower than your midterm, your midterm exam grade will not be replaced by your final exam grade. If the final exam grade is lower, we will not include that score anywhere in your final course grade.

Our course policy is as follows: We don't care when you learn it; all that matters is that you learn it!

GRADE SCALE


The letter-grade scale for this course is:

A+ = 99-100%	A = 95-98%	A- = 90-94%
B+ = 87-89%	B = 83-86%	B- = 80-82%
C+ = 77-79%	C = 73-76%	C- = 70-72%
D+ = 67-69%	D = 63-66%	D- = 60-62%
F = <60%		

Grades will be rounded up, for example, from 94.50% to 95%.

PSYCH MAJOR, PRE-MED REQUIREMENTS, QS

Completion of both semesters of the course are required to meet the statistics and methods requirements for Psychology. Both semesters are also required to meet the



pre-med statistics requirement. If you or a friend are not a Psychology major and just looking for a QS, you can take 204L and be done!

BEHAVIOR AND COMMUNITY STANDARDS

The Duke Compact

The Duke Compact recognizes our shared responsibility for our collective health and well-being. Please be reminded that by signing your name to this pledge, you have acknowledged that you understand the conditions for being on campus. These include complying with university, state, and local requirements and acting to protect yourself and those around you. For complete language and updated policies, please visit <https://returnto.duke.edu/compact/>

Duke Community Standard

All students, whether residing on campus or learning remotely, must adhere to the Duke Community Standard (DCS): Duke University is a community dedicated to scholarship, leadership, and service and to the principles of honesty, fairness, and accountability. Citizens of this community commit to reflect upon these principles in all academic and non-academic endeavors, and to protect and promote a culture of integrity.

To uphold the Duke Community Standard:

Students affirm their commitment to uphold the values of the Duke University community by signing a pledge that states:

- I will not lie, cheat, or steal in my academic endeavors;
- I will conduct myself honorably in all my endeavors;
- I will act if the Standard is compromised

Regardless of course delivery format, it is the responsibility of all students to understand and follow Duke policies regarding academic integrity, including doing one's own work, following proper citation of sources, and adhering to guidance

around group work projects. Ignoring these requirements is a violation of the Duke Community Standard. If you have any questions about how to follow these requirements, please contact Jeanna McCullers, Director of the Office of Student Conduct.




MENTAL HEALTH, WELLNESS, AND ACADEMIC SUPPORT

Student mental health and wellness is of primary importance at Duke, and the university offers resources to support students in managing daily stress and self-care. Duke offers several resources for students to seek assistance on coursework and to nurture daily habits that support overall well-being, some of which are listed below:

- **The Academic Resource Center:** (919) 684-5917, theARC@duke.edu, or arc.duke.edu
- **DuWell:** (919) 681-8421, duwell@studentaffairs.duke.edu, or <https://studentaffairs.duke.edu/duwell>

If your mental health concerns and/or stressful events negatively affect your daily emotional state, academic performance, or ability to participate in your daily activities, many resources are available to help you through difficult times. Duke encourages all students to access these resources.

- **DukeReach.** Provides comprehensive outreach services to identify and support students in managing all aspects of well-being. If you have concerns about a student's behavior or health visit the website for resources and assistance. <http://studentaffairs.duke.edu/dukereach>
- **Counseling and Psychological Services (CAPS).** CAPS services include individual, group, and couples counseling services, health coaching, psychiatric services, and workshops and discussions. (919) 660-1000. <https://studentaffairs.duke.edu/caps>
- **Blue Devils Care.** A convenient and cost-effective way for Duke students to receive 24/7 mental health support through TalkNow and scheduled counseling. bluedevilscore.duke.edu

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- **Two-Click Support.** Duke Student Government and DukeReach partnership that connects students to help in just two clicks. <https://bit.ly/TwoClickSupport>

Academic Support Resources. The Academic Resource Center (the ARC) offers services to support students academically during their undergraduate careers at Duke. The ARC can provide support with time management, academic skills and strategies, unique learning styles, peer tutoring, learning consultations, learning communities, and more. ARC services are available free to any Duke undergraduate student, in any year, studying in any discipline. (919) 684-5917, theARC@duke.edu, or arc.duke.edu.

Technology Accommodations. Students with demonstrated high financial need who have limited access to computers may request assistance in the form of loaner laptops. For new Fall 2021 technology assistance requests, please go [here](#). Please note that supplies are limited.

Course Materials Costs. This course shouldn't cost you one penny. We don't use a textbook in this class. If you are having difficulty with textbook and supply costs in any other course, here are some resources for you:

- Contact the financial aid office (whether or not you are on aid). They have loans and resources for connecting students with programs on campus that might be able to help alleviate these costs.
- DukeLIFE has resources available for students with demonstrated high financial need. To apply for a long-term loan of required course materials, please go [here](#). Please note that program resources are limited.
- Duke Libraries offers textbook rentals through the [Top Textbook Program](#), where you can rent out a textbook for 3 hours at a time.
- For course-specific technology needs such as Digital Voice Recorder, HD Video Camera, TI-84 Plus CE, DSLR camera kit, Tripod, Shotgun Mic, iPad Mini 4, a

Handheld Projector, or a GoPro, [you can reserve rental equipment](#) from the Link.

ACCESSIBILITY

[The Student Disability Access Office \(SDAO\)](#) is available to ensure that students are able to engage with their courses and related assignments. Students should be in touch with the Student Disability Access Office to [request or update accommodations](#) under these circumstances.

OTHER USEFUL RESOURCES

Duke University Libraries: Due to the research focus of this class, students will be asked to find and explore scholarly literature on topics relevant to psychology and neuroscience. Although some lab time will be devoted to ways to conduct effective literature searches, students also should examine the resources available via the Duke University Libraries website. Through this website, students are able to access various research databases; make library purchase requests; chat with librarians about general questions; and schedule consultation appointments with Ciara Healy, the subject specialist for both Psychology and Neuroscience. Please click <https://library.duke.edu/services/undergraduate> to read about these and additional services.

COURSE POLICIES/EXPECTATIONS

Inclement Weather Policy. In the event of inclement weather or other related events that prohibit class attendance, I will notify you how we will make up missed course content and work. Asynchronous virtual catch-up methods may apply.

Flexible Attendance & Due Date Policies. Responsibility for class attendance rests with individual students. Since regular and punctual class attendance is expected, students must accept the consequences of failure to attend. If you miss a lecture or section, you will likely need to get notes from someone else (or watch the recording since we will be offering recorded lectures to students who cannot attend synchronously). There will also be many interactive activities during lecture and




especially during section periods. If you miss a lecture, there is nothing specific you need to do to make up these activities. Try them out on your own. They are purely for your own benefit to support your learning. If you need to miss a section, you will need to notify the TA in advance and ask for details on how to make up that section which will likely involve some coordination with your group members.

Assignment due dates are fixed. No assignments get dropped. However, in recognition of possible extra personal and academic stress and health concerns this semester, **we will grant a one-time no-questions-asked assignment extension of 24 hours**. More details on Trinity attendance policies are available [here](#). More details on Pratt attendance policies are available [here](#).

Attendance Policy Related to COVID Symptoms, Exposure, or Infection. Student health, safety, and well-being are the university's top priorities. To help ensure your well-being and the well-being of those around you, please do not come to class if you have symptoms related to COVID-19, have had a known exposure to COVID-19, or have tested positive for COVID-19. If any of these situations apply to you, you must follow university guidance related to the ongoing COVID-19 pandemic and current health and safety protocols. If you are experiencing any COVID-19 symptoms, [contact student health](#). 919-681-9355.

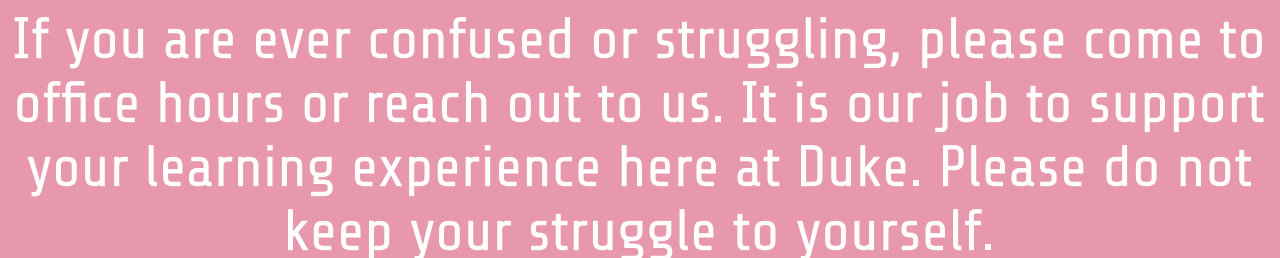

To keep the university community as safe and healthy as possible, you will be expected to follow these guidelines. Please reach out to us and your academic dean as soon as possible if you need to quarantine or isolate so that we can discuss arrangements for your continued participation in class.

Assignment/exam/report regrades: The assignments and exams are written by the professors who also write grading guides but the actual grading is primarily done by the TAs. If you have questions about a grade, please first contact your TA to discuss the assignment. If there is a grading error they can fix it. If it was grading correctly but you are contesting the grading, you will need to request a regrade by the professors. One of us will re-grade the entire assignment. Your grade may go up,



down, or not change. This is not meant to be threatening. If you ask for our extra time through a re-grade, we will do the best job we can re-grading it to be as fair as possible. We reserve the right to deny regrade requests if they become too frequent. We are committed to providing you the best learning experience possible and that takes time. We understand how critical your grades are. Know that everything we do leading up to that grade is intended to prepare you for success.

This is a collaboration: We all have the same goal. We are deeply invested in this course and your success in it. Every member of this teaching team loves teaching this content. We will do our best to get to know each and every one of you. Please bring your whole self to this class. Creating a welcoming and inclusive classroom experience together as instructors and students is an important priority for all of us. We are not therapists but we can direct you to one if you need it (see above). **We are here to help you not only learn the content of this course but become confident!** There is no shame in having a hard time. All of us on the teaching team have struggled with different parts of the content of this course at various career stages. We've been there; we're here now to help you have a better experience. We do not want anyone to feel like they are bad at research methods and statistics because they are confused or have difficulty with the software or because it isn't coming easily.



If you are ever confused or struggling, please come to office hours or reach out to us. It is our job to support your learning experience here at Duke. Please do not keep your struggle to yourself.

We are here to empower every single one of you!

DETAILED SCHEDULE

The course schedule is subject to change; topic dates are approximate.

Section 1: The Scientific Method and Ethics

Week 1	Aug 23 Aug 25	What is science? The scientific method	Lab W1	Assignment W1 (8/29)
Week 2	Aug 30 Sep 1	The scientific method continued Study design and validity	Lab W2	Assignment W2 (9/5)
Week 3	Sep 6 Sep 8	Ethics Ethics continued	Lab W3	Assignment W3 (9/12)

Section 2: Designing Research Studies

Week 4	Sep 13 Sep 15	Reliability Validity	Lab W4	Assignment W4 (9/19)
Week 5	Sep 20 Sep 22	Threats to validity Sampling and scales of measurement	Lab W5	Assignment W5 (9/26)
Week 6	Sep 27	Group project meetings w Prof SL		

Section 3: Analyzing Data

Week 6	Sep 29	Intro to data modeling	No labs	
Week 7	Oct 4 Oct 6	No class - Fall break Distributions and variance	Lab W7	Assignment W7 (10/10)
Week 8	Oct 11 Oct 13	Quantifying uncertainty Qualifying estimates	Lab W8	Assignment W8 (10/17)
Week 9	Oct 18 Oct 20	Explaining variance Visualizing data	Lab W9	Assignment W9 (10/24)

Week 10	Oct 25 Oct 27	Midterm prep Midterm	No labs	No assignment
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Week 11	Nov 1 Nov 3	Midterm exam review Transition to GLM	No labs	Assignment W11 (11/7)
Week 12	Nov 8 Nov 10	Correlation and Regression Group comparisons	Lab W12	Assignment W12 (11/14)

Section 4: Course Wrap-Up and Transition to 205L

Week 13	Nov 15 Nov 17	What's wrong with science How to make science better	Lab W13	Assignment W13 (11/21)
Week 14	Nov 22 Nov 24	Group project meetings with Prof SL No class - Thanksgiving break	No labs	No assignment
Week 15	Nov 29 Dec 1	Course review and closing thoughts Final exam prep	No labs	Assignment W15 & Project report (12/3)

Dec 8 **FINAL EXAM (9am-12pm)**