Research Methods I: Statistics & Design

Professor Carolyn Cates

Mondays & Thursdays 9:00am -12:00 noon in Library 1004D

General Course Introduction

Welcome to Research Methods I! In this course, we will learn how to ask questions and how to evaluate answers. During this class you will develop the practical skills needed to scientifically investigate human behavior and the world around you, and the skills needed to think critically about scientific research findings presented by scientists, journalists, politicians, and policymakers.

This course will cover the nature of scientific knowledge, how to design and run a psychology experiment, research ethics, and basic statistics. You will gain hands-on experience with data management and statistics software, learn how to design experiments, and also learn how data and probability are relevant to all areas of your life.

Pre-Requisites: To ensure you can be successful in this course, the Psychology Department requires that all students be psychology majors who have completed nearly 60 credits, received a grade of C or better in Introductory Psychology, and a B- in at least one other Psychology course.

Course Objectives

- Students will show competence in the following quantitative reasoning* skills:
  - Interpret and draw inferences from mathematical models such as formulas, graphs, tables, and schematics;
  - Represent mathematical information symbolically, visually, numerically, and verbally;
  - Employ quantitative methods such as arithmetic and statistics to solve problems;
  - Estimate and check mathematical results for reasonableness
  - Recognize the limits of mathematical and statistical methods
- Learn how to design, run, and analyze observational and experimental psychology studies
- Develop the ability to critically evaluate the science depicted in popular and academic media
- Learn how to use Excel to organize and manage data, and JASP to conduct statistical analyses
- Acquire a conceptually rich understanding of basic statistical concepts and procedures
- Cultivate a rigorous and ethical scientific mindset

***** This course satisfies the SUNY mathematics general education requirement.*

About the Instructor and Learning Assistants

Professor: Dr. Carolyn Cates (she/her)
What to Call Me: Dr. Cates or Professor Cates
Student Drop-In Hours: Monday 1:00-2:15pm; Thursday 1:00-2:15pm @ my office (NS1026) or by appointment in my Zoom office waiting room (if appointment is during office hours, please be patient as I may be helping an in-person student)
How to Contact Me: I welcome you to email me at Carolyn.Cates@purchase.edu, post on the FAQ forum, or visit my office (NS 1026).
Email: I try to respond to email questions within 24 business hours though I cannot reply as regularly in the evenings. So, if I ever don't get back to you with an answer, please, **please** just reach out again because it likely means the email has gotten lost.

Learning Assistant:

(1) Oliver Culliton
Email: darcy.culliton@purchase.edu
Student Drop-in Hours: Fridays, 12:00- 1:00PM; DMZ group area of Library

Course Requirements

Readings:

To keep the cost of this class accessible, all readings and course materials will be available online through the course Brightspace page. This course has been redesigned to align with the SUNY Open Educational Resources (OER) Initiative, which eliminates the need for students to purchase textbooks by utilizing open source/public domain materials to deliver course content.

Printing for Assignments/Exams/Lab Reports:

While assignments are submitted electronically, you may want to print out some materials in order to submit them for grading or to keep in your binder. Black-and-white printers are available in many of the computer labs on campus and charge from 5-7 points per page from your annual printing quota. If you are having difficulty funding the printing costs, please come talk to me so I can refer you to resources on campus that may help.

Computer and Software:

Since this is a research-intensive methods course with a weekly lab, you will probably not be surprised to hear that you will be getting a lot of hands-on experience with a variety of computer programs. Labs on Purchase Campus have all the programs we will be using. You can,

and should, also download these programs onto your personal laptop, Chromebook, or home computer. If you do not have a computer, you can contact CTS to obtain a loaner laptop.

Microsoft Excel: One of our principal tools will be Microsoft Excel (Google Sheets may be able to accomplish some of what we will be doing, but will require extra effort on your part to figure out how to do things). Purchase students can obtain a free copy of Microsoft 365, which includes Excel, from Campus Technology Services. Please visit their web page for information on how to download your copy. This is the most popular spreadsheet software and is used by almost every company and researcher in the world. In other words, even if you do not plan on a research-based career, you will greatly benefit from beefing up your Excel skills.

JASP statistical software: The other important program that we will be using is the free, open-source JASP statistics software, which will be available on all of the computers in the campus computer labs, and which you should download for yourself if you own a laptop or desktop by going to https://jasp-stats.org. In the past, this course has used IBM's SPSS software (and many researchers, including some of our faculty, use it as well), but SPSS can be complicated and is very expensive, while JASP is free and was created by psychologists specifically for use in psychological research. Plus, once you learn JASP, figuring out how to use SPSS is not as difficult (in case you need to use it for your senior project).

- If you cannot run JASP successfully on your laptop or tablet for some reason, you can also launch JASP directly through your Internet browser (you can see this option by scrolling down the download webpage a little). This can save you in a pinch so keep it in mind (https://jasp-stats.org/download/)

Course Format

This is an advanced psychology course that will include lectures, readings, assignments, exams, and hands-on research activities. This variety will give students with different strengths their own chance to demonstrate their growing understanding and skills in conducting research. Coursework will center on the following elements:

1. Exams (30%)

We will have 4 exams in this course as opportunities for you to demonstrate your growth. Exams will consist of multiple choice, short answer, and analysis questions. Exams will also include a statistical analysis component in which you will demonstrate your ability to use Excel and/or JASP. Exams 1-3 will focus primarily on material covered since the previous exam, but because of the nature of this course the information on the exams will really be somewhat cumulative. Exam 4 will cover content from the entire semester. I strongly advise against cramming for these tests and I recommend you come seek help if you find yourself struggling.

We will complete the exams in class together on the scheduled exam days, and I will be available to answer technical questions and help you with any computer issues that may arise. We have the entire class period available to us for the exam, but most students do not need the entire time to complete the exam, so you may take your time and do your best. If you require

accommodations for the exam to have less distractions, frequent breaks, or extended time, you can register for these through the Office of Disability Resources and take the exam in a special location during our exam time. *You have one "free pass" for an exam if you miss it or cannot complete it in its entirety.*

2. Lab Reports (35%)

Psychological research is reported according to the rules set by the American Psychological Association (APA). So that you can practice understanding the research of others and to prepare you for presenting your own research as part of our major, you will complete a written lab report for several of our lab-based experiment activities. Each lab report will consist of a methods section and a statistical results section, written and formatted in APA style, as they would appear in a scientific journal article. Details will be provided as we move throughout the semester and we will practice scientific writing in lab to prepare you.

3. Homework (15%)

The homework assignments serve multiple purposes. First, they will give you a chance to practice or learn essential skills before you need to use them. Second, the graded assignments will allow you to test your own understanding of the material between exams an allow me to see what content I may need to review for the class. When possible, you can begin the homework in lab after completing the required lab work.

All homework assignments should be completed individually but come visit me or the LA with specific questions or for guidance if you don't understand the instructions. If you're having trouble with the homework, come visit me!

4. Participation and Engagement (20%)

I hope you actively participate in this course! Attending class and speaking up are the best ways to engage with the material and work toward a deeper understanding of it. Asking questions in class is a wonderful way to contribute to our class discussions and I look forward to your questions just as much as your answers!

Attendance and Participation: Psychology research is a collaborative and interactive endeavor. In other words, your classmates and I need you to be here with us! But showing up isn't enough if you're not truly paying attention and absorbing the material. As you listen to lectures, think about how what you're learning fits in with other things you know and feel free to share. Or think about how it doesn't make sense or fit with other things you know, and then ask questions. Anything you're confused about is something other students are likely wondering so you're doing everyone a favor when you speak up! You should also take notes of your thoughts on the slides or in a notebook because a lot of important information is not written directly on the slides.

You should attend every class, arriving on time, and staying for the entirety, but I know that circumstances can make that difficult. You do not need to justify or explain your absences or lateness to me until it becomes an impediment to your ability to succeed in the course (four absences or more), though you should alert me of religious observances because we will need to plan accordingly for them.

I also understand that some students feel more comfortable speaking up in class than others, and that you cannot verbally participate on days for which you're absent. So there are other ways to show your engagement:

Discussion Forums: Post questions or comments related to course material that was reviewed in lectures or readings on the online Brightspace discussion forum. These will serve as an opportunity for you to work through some of the concepts and assess your own understanding of the material. You can also respond to other students' posts for credit. You can also submit your lecture notes on a day in which you were absent to show your virtual "attendance."

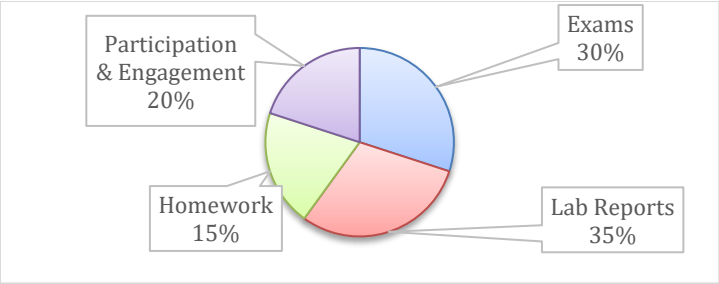
Tutoring and student drop-in hours: An important part of the scientific process is recognizing when you don't know something and finding a source for answers. If you're ever feeling you don't understand something, come see me or the Learning Assistant! We truly want to help you feel confident in what we're doing in class. You can also see the RMI tutor through Einstein's Corner or the general tutors at the tutoring center for more general math or writing question. You can check out the Academic Resources at the end of the syllabus for more information.

Research Methods Resource "Binder"

In this course, we typically request that you purchase a 3-ring, 1" binder for storing and organizing course materials. However, as some of you may not have regular access to a printer, an electronic binder using a program such as Google Drive (with multiple subfolders) is also allowable. Throughout the course, you are required to keep all handouts, lab activities, class notes, assignments, and work in your class binder or digital folder. This binder will serve as your own personal how-to statistical and research manual that you will reference for Research Methods 2 and your senior project. You should bring this binder (or have access to the digital folder) every lab meeting, and you are expected to manage this binder on a weekly basis to ensure that it is organized, labeled logically and well, and will actually be useful to you in the future. At the end of the semester, your binder should: (a) Include all the relevant course material, (b) be properly organized, labeled, and annotated to serve as a manual for you in the future, and (c) have completed How-To Sheets providing quick, easy guides summarizing major topic areas. A complete binder, for example, would have the course syllabus, ethics certificates, all assignment and lab, handouts, and notes from class and lab about research methods and how to conduct the statistical analysis we will be using. Trust us, you will thank yourself later for having a well-organized binder that can later serve as a "how-to" in future projects/ coursework!

How-To Sheets: As part of creating your RMI binder, we encourage you to create "How-to Sheets" that summarize the main concepts from class and include step-by-step explanations of how to do them through Excel or JASP. You should be creating these for yourself as a resource for your exams in this class, as well as an invaluable resource for RMII and Senior Project when everything is long-forgotten. However, to reward you for the work you're doing on this, you can submit your completed sheets to show your engagement.

- More on How-To Sheets: These sheets encourage you to define important concepts in your own words and to explain when you do certain analyses and how to do them. We encourage you to use screenshots and visuals as much as possible to help with this (in Windows computers, you have a "Snipping" app that will help you get screen images to then annotate. Making these sheets yourself will help you a) solidify your understanding of the ideas and, (b) ensure you understand things for future exams and courses because it was made for your brain and the way you tend to think.


Participation & Engagement 20%
Exams 30%
Homework 15%
Lab Reports 35%

Course Policies

LATE AND MISSING WORK: Because the course material builds on itself and students need to receive feedback to learn, we have to set deadlines for submissions. This ensures that you are learning the content prior to its assessment on exams, and also ensures that work is being turned in before the answers have been released to the class.

- *Late Work:* Because we're building on what we learn every class, we need deadlines for your homework so that both you and I can assess where you're at *before* you are assessed on that content. Homework assignments and lab reports are due by midnight on the due date listed in the syllabus. However, you have a grace period of 24 hours to upload them without penalty. After the grace period, the assignment will count as *missed*. Your wonderful Learning Assistant needs to grade the assignments in a single batch in order to ensure the grading is consistent, efficient, and respects the bounds of their learning assistant contract.

  *For lab reports, if you know that you will be unable to submit a lab report on time or within the 24 hours grace period, please get in touch with me *BEFORE* the deadline and we can set a reasonable extension. After the lab reports are graded and returned, I will post an "answer key" for you to reference, and I cannot accept reports after the key is posted.

- *Missed Homework or Exams, also known as "Free Passes":* As much as possible, I have created flexibility to accommodate issues that may arise in your lives that prohibit you from turning in work by giving you "free passes" for missed work.
  - For assignments, you have **two** "free passes" for assignments that could not be turned in before the grace period for submission ended. These two missed assignments will not count against your grade. **Note:* The free pass cannot be used toward the CITI ethics certification homework which must be completed before the end of the semester.
  - For exams, you have **one** "free pass" for a missed, incomplete, or suboptimal exam. This exam will not count against your grade. *Note:* If you ever cannot complete one part of an exam, but can complete the other, I recommend you complete what you can so that you can practice what you have learned, and so I can better assess your learning.
  - For lab reports, each report will allow me to assess your learning related to different methodologies and statistical analyses, so we cannot have any missed reports. As I mentioned above, you should let me know before the deadline if you will be unable to turn in a report. We will set an alternative deadline together that you will commit to meeting. I will be unable to assess your learning after the key is posted so it is crucial that you meet the extension deadline.

ABSENCES: You should attend every class, but I understand that extenuating circumstances may make that difficult. If circumstances make you miss more than 4 classes during the semester, you may be overextended and need to withdraw from the course, as it will be difficult to catch up. If you expect an absence due to a religious observance, please let me know in advance so we can discuss any assignments or work that will be completed or due on that day.

If you need to stay home from class, you can use the provided slides to follow along from home. I also recommend you come see me or the Learning Assistant to make sure you understand the material after any absence. The labs cannot be easily recorded, unfortunately, but the labs do provide pretty thorough step-by-

step guides and again, I recommend you come see us during Student Hours to get help and ensure you understand the material.

Academic Accommodations: It is my goal that this class be an accessible and welcoming experience for all students, including those with disabilities. You are welcome to talk to me at any point in the semester about course design concerns, but it is always best if we can talk as soon as possible about the need for any modifications. The Office of Disability Resources collaborates directly with students who identify documented disabilities to create accommodation plans, including testing accommodations, in order for students to access course content and validly demonstrate learning. For those students who may require accommodations, please call or email the Office of Disability Resources, (914) 251-6035, **odr@purchase.edu**.

Mental Health and Wellness: Help is available in Counseling & Behavioral Health Services on campus for difficulties with emotional wellbeing and psychological functioning. If distress is interfering in relationships, academics, work, or daily life, confidential support can be had right away. Contact the Counseling Center at (914-251-6390 or COU.counseling.center@purchase.edu on M – F, 9 am – 5 pm. The Counseling Center's website lists after hours emergency resources for mental health crises, sexual assault or interpersonal violence emergencies (Campus Advocacy Services), self-help and additional coping resources. To ensure that each of us has a healthy and safe learning experience, all students are required to remain informed and follow Purchase College Policy and/or any departmental, local, state, or federal laws, rules or regulations for attending classes on campus and in a remote learning environment.

Community Health During Covid-19: College Policy: To ensure that each of us has a healthy and safe learning experience, all students are required to remain informed and follow Purchase College Policy and/or any departmental, local, state, or federal laws, rules, or regulations for attending classes on campus and in a remote learning environment.

Within courses that involve in-person contact, all students, faculty members, staff, and visitors are required to adhere to the expectations outlined on the **College's COVID-19 website.** Failure to comply with requirements (e.g. wearing masks, maintaining social distancing where applicable) will result in the request to leave the classroom for that in-person class session. Students may also be referred to the **Office of Community Standards**.

Do not enter campus buildings if you test positive for or are experiencing any symptoms of COVID-19. Contact your faculty and **Health Services** if you need to miss class because of COVID-19 symptoms or a positive COVID-19 test result. The conservatory/school will address on a case-by-case basis student absences due to COVID-19, while awaiting test results, or during quarantine.

Additional Class Information: If you become worried about the risk of infection at any point throughout the semester, you can contact me or, if applicable, the Office of Disability Resources, to see if we can come up with a reasonable solution. It is also possible that course material will be delivered remotely for one or more class sessions depending on state/college guidelines or at my discretion as the instructor. However, it is my intention to safely complete the entire semester entirely in person.

If you must miss more than one class due to any illness, please let me know so we can try to work out a plan to keep you on track. Because the course builds on itself, it can be easy to fall behind and difficult to catch up. Communication and planning will be essential to helping you make it through the course successfully.

Plagiarism and Academic Integrity: The work assigned in this course has been selected because of its importance in your continued success through the Psychology major; it is essential that all work represent your independent thinking so that we can help you reach the level of understanding you will need in the future. In addition, adherence to ethical standards is essential in careers relating to Psychology. As a result, grading in this course will adhere to the Purchase policy on cheating and plagiarism (linked here). Plagiarism is the use or imitation of the language, ideas, and/or thoughts of another person and the representation of them as one's own original work. You can familiarize yourself with the definition of plagiarism and acceptable methods of attribution by clicking here for a library tutorial.

Plagiarism or speaking with others during the exam will earn you a failing grade on the assignment/exam. In sum, all work must demonstrate your independent thinking and writing and discussion is not allowed during exams.

Diversity and Inclusion: In an ideal world, science would be objective. However, much of science is subjective and is historically built on a small subset of privileged voices. In this class, we will make an effort to examine how research design can marginalize and privilege distinct groups of individuals at all levels and different stages of the research process. I acknowledge that it is possible that there may be both overt and covert biases in the material due to the lens with which it was written, even though the material is primarily of a scientific nature. Integrating a diverse set of experiences is important for a more comprehensive understanding of science. As a participant in course discussions, you should also strive to honor the diversity of your classmates.

Please contact me (in person or electronically) or submit anonymous feedback if you have any suggestions to improve the quality of the course materials. Furthermore, I would like to create a learning environment for my students that supports a diversity of thoughts, perspectives and experiences, and honors your identities (including race, gender, class, sexuality, religion, ability, etc.)

To help accomplish this: If you have a name and/or set of pronouns that differ from those that appear in your official Purchase College records, please let me know! You can also edit your name on the course Brightspace page, as well as edit your purchase.edu email address.

If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with me. I want to be a resource for you. Remember that you can also submit anonymous feedback (which will lead to me making a general announcement to the class, if necessary to address your concerns). If you prefer to speak with someone outside of the course, you can also speak with the Chief Diversity and Affirmative Action Officer.

I (like many people) am still in the process of learning about diverse perspectives and identities. If something was said in class (by anyone) that made you feel uncomfortable, please talk to me about it. (Again, anonymous feedback is always an option.)

Course Schedule

All reading assignments, lectures, and quizzes will be posted on the course Brightspace site; check the Brightspace page regularly to access the readings/lecture responses that are due each day. Any changes to the course schedule will be posted to Brightspace (and via announcement).

Date	Topic	ASSIGNMENTS
Mon, Aug 26	Intro to the course + scientific thinking	
Thu, Aug 29	Lab 1: Measurement and graphs	
Mon, Sept 2	Labor Day: NO CLASS	
Thu, Sept 5	Distributions and Descriptive Statistics	
Mon, Sept 9	Lab 2: Data Management & Descriptives	HW1 Due (Graphs)
Thu, Sept 12	Probability and Z-scores	
Mon, Sept 16	Lab 3: Descriptives and Z-Scores	
Thu, Sept 19	Ethics and Open Science	HW2 Due
Mon, Sept 23	Exam 1	
Thu, Sept 26	Hypothesis Testing: Single Sample Tests	
Mon, Sept 30	Lab 4: Probability, Z-tests & One sample	
Thu, Oct 3	Paired & Independent t-test	
Mon, Oct 7	Lab 5: T-tests	
Thu, Oct 10	Experimental Design: Independent sample t-test	HW3 DUE
Mon, Oct 14	Operationalization & Design	
Thu, Oct 17	Exam 2	
Mon, Oct 21	Lab 6: T-Test Review & Design	
Thu, Oct 24	Multi-level experiments and ANOVA	Lab Report 1 due
Mon, Oct 28	Lab 7: ANOVA	Last day to withdraw from classes
Thu, Oct 31	Lab 8: 2 X 2 ANOVA	
Mon, Nov 4	Observational Design & Survey design	

Thu, Nov 7	Lab 9: Observational study and Reliability analysis	Lab Report #2 DUE
Mon, Nov 11	Lab 10: Correlations & Regression	HW4 Due
Thu, Nov 14	Exam 3	
Mon, Nov 18	Choosing the Right Analysis/Reading Research articles	Required Reading Due
Thu, Nov 21	Lab 11: Original Study 1	HW5 Due
Mon, Nov 25	NO CLASS: CITI Training	HW6 Due
Thu, Nov 28	Thanksgiving Break: NO CLASS	
Mon, Dec 2	Additional Considerations and Review	HW7 Due
Thu, Dec 5	Lab 12: Original Study 2	
Mon, Dec 9	Exam 4	Lab Report #3 Due