

01:185:320:01 Research Methods in Cognitive Science

Dr. Jason Geller

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E-mail: jason.geller@ruccs.rutgers.edu

Office Hours: MW 1:00 P.M.-3:00 P.M.

Office: RuCCS A221

Web: www.drjasongeller.com

Class Hours: TTh 3:00 P.M. - 4:20 P.M.

Class Room: Busch SEC 209

Course Description

The aim for this course is to provide students with the necessary foundation to think critically about research in cognitive science. The course reviews the scientific method and considers the strengths and weaknesses of a range of approaches, such as laboratory experimentation, neuroscience methods, and online data collection. Students will be introduced to statistical reasoning in science, including a basic overview of common statistical techniques. We will also discuss principles for the ethical conduct of research both in the laboratory and online. This course will include traditional lectures, in-class activities, and special presentations by cognitive scientists at Rutgers and other universities in the field. Students will also get hands-on experience programming and collecting their own data, which will culminate in a paper and presentation. This course counts for 3 credits.

Learning Goals

1. Be able to evaluate a broad range of methods in cognitive science and consider how they suit various research questions
2. Understand basic principles of experimental design
3. Consider ethical questions and the role of the Institutional Review Board
4. Design and conduct your own experiment in Python/PsychoPy and take your research online
5. Practice writing and presenting scientific research

Required Texts

The following books are required (both are free). In addition, I will be posting supplemental articles on the course website.

- Jhangiani, R. S., Chiang, I.-C. A., Cuttler, C., & Leighton, D. C. (2019). *Research Methods in Psychology*.
- Peirce, J., & MacAskill, M. (2018). *Building Experiments in PsychoPy* (1st edition). SAGE Publications Ltd.

Technology Requirements

A computer and access to the internet.

Canvas Site

I have created a website for the course (<https://cogscimethods.netlify.app/>). Much of the material needed for the course will be available on the website via links. I will also post things to the Rutgers Canvas page (canvas.rutgers.edu) for ease of access.

Course Policies

Assessment Components

- **60%** (Research Project). One important element of advancing scientific knowledge is the ability to reproduce the materials, procedures, and analytic plan of published research in efforts to obtain similar results in other samples (i.e., replication). To the degree that research findings can be replicated by other labs using the same methods/materials, but of course with appropriate statistical power, more confidence can be placed on the hypothesized associations between abstract theoretical constructs. The primary assignment for this course is a group project that will involve the following:
 - a. Team Charter (5 points)
 - b. Team Project Proposal (5 points): Your group will need submit a short 1-page research proposal. This proposal should summarize the paper you are going to replicate. You will need to get article approval from me.
 - c. CITI Training and Institutional Review Board (IRB) Forms (5 points) - (Individual): Although student research projects are covered by the IRB, the ethical implications of your research project are important. To this end, you will become CITI certified and also submit IRB forms which involves creating your own consent form. You will complete and turn in the documents below:
 - CITI certificate
 - Research protocol form
 - Consent form
 - d. Preregistration (5 points) - (Team): After you have gotten you topic approved, you will preregister your experiment (we will discuss what this is in class). The preregistration should be two primary parts: (1) background and (2) an analysis plan. The background does not need to be lengthy, 2 pages or less, enough information for me to give you feedback on the big idea and feasibility before you get too far along. I will not grade the preregistration for being correct or accurate; I will only grade it for being complete (i.e., if you answer all the questions but some of your answers are wrong or don't make sense, you will still get full credit). The preregistration is meant to be an opportunity to get feedback from me early so that you can assess feasibility and develop the idea into a strong final presentation the whole class can benefit from.
 - e. Programmed Experiment (5 points) - (Team): Your program must be fully functional online.
 - f. Data Analysis Write Up (5 points) - (Team)
 - g. Group Presentation (15 points) - (Team): The last two classes will be devoted to presenting your final project to the class. Each groups will be give a 15-20 minute presentation followed by up to 5 minutes of questions from the audience. Presentations are a group effort, and it is expected that all members will either present or address questions. Do make an effort to be inclusive. I strongly recommend you rehearse this and make sure timing and flow is right, and that no one person is over-dominant or unheard. Each group will have no more than 20 minutes, strictly observed with a timer (I will stop you when time is up, regardless of whether you're done or not).
 - h. Project Write Up (15 points) - (Individual): You will be expected to write a short 6 – 10 page double spaced paper that details the replication project you conducted and how you would like to extend it in some way, either by hypothesizing a short follow up to address some issue that arose during it. You can use this paper to propose an extension using a method we talked about in class.

You must turn each assignment before proceeding onto the next one
- **25%** (Assignments/Lab Activities). These assignments are designed to engage you in the type of thinking that cognitive scientists do, and to introduce you to the tools and resources they use for setting up and carrying out experiments. Point totals will vary.

- **15% (Presentation Reflections).** We have a several guest lectures over the course of the semester. While attendance is not mandatory, you will get points for attending these talks and submitting a reflection for each talk/presentation (500-1000 words). Reflections will be due on the Friday by 4:00 P.M after the talk. These must be submitted via Canvas. The purpose of the response is to get you thinking about the readings, connecting the new material to other readings and discussion, and offering your own thoughts.

Schedule

Please see the course website (<https://cogscimethods.netlify.app/>) for most recent schedule

Masks

In order to protect the health and well-being of all members of the University community, masks must be worn by all persons on campus when in the presence of others (within six feet) and in buildings in non-private enclosed settings (e.g., common workplaces, workstations, meeting rooms, classrooms, etc.). Masks must be worn during class meetings; any student not wearing a mask will be asked to leave. Masks should conform to CDC guidelines and should completely cover the nose and mouth: <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/about-facecoverings.html> Each day before you arrive on campus or leave your residence hall, you must complete the brief survey on the My Campus Pass symptom checker self-screening app.

Laptops

While the research on laptops vs. handwritten notes in the classroom is fairly mixed (Mueller & Oppenheimer, 2014; Urry et al., 2021), I do not mind if your laptop is out during class. However, please try to keep it class related.

Late Assignments

You have a two day grace period for any individual assignment in this class (excluding team assignments), no questions asked. If there any extenuating circumstances, please reach out to me.

Attendance Policy

Given the current state of the world, attendance is not required in this course. If you are sick, please remain at home and not attend class.

Academic Integrity Policy

Rutgers University takes academic dishonesty very seriously. By enrolling in this course, you assume responsibility for familiarizing yourself with the Academic Integrity Policy and the possible penalties (including suspension and expulsion) for violating the policy. As per the policy, all suspected violations will be reported to the Office of Student Conduct. Academic dishonesty includes (but is not limited to):

- Cheating
- Plagiarism
- Aiding others in committing a violation or allowing others to use your work
- Failure to cite sources correctly
- Fabrication
- Using another person's ideas or words without attribution—re-using a previous assignment
- Unauthorized collaboration
- Sabotaging another student's work

For additional information on the Rutgers University policies on academic integrity, go to <http://academicintegrity.rutgers.edu/>.

Diversity and Inclusion Statement

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, SES, etc.) To help accomplish this:

- If you have a name and/or set of pronouns that differ from those that appear in your official Rutgers records, please let me know!
- 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).
- 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).

Student-Wellness Services

Just In Case Web App <http://codu.co/cee05e> Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)

- (848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901
- <http://health.rutgers.edu/medical-counseling-services/counseling/>

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners. Violence Prevention & Victim Assistance (VPVA) (848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / <http://vpva.rutgers.edu/> Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848- 9321181.

Disability Services

Rutgers University is committed to the creation of an inclusive and safe learning environment for all students, and welcomes students with disabilities into all the University's educational programs. The Office of Disability Services (ODS) is responsible for the determination of appropriate accommodations for students who encounter barriers due to disability. Once a student has completed the ODS process (registration, initial appointment, and submitted documentation) and reasonable accommodations are determined to be necessary and appropriate, a Letter of Accommodation (LOA) will be provided. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at www.ods.rutgers.edu. You can contact ODS at (848)445-6800 or via email at dsoffice@echo.rutgers.edu.