

# Psychology 205: Psychological Research

William Revelle

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## 1 Instructors

William Revelle

web: [William Revelle](#) & [Elizabeth M. Dworak](#)

mail: [revelle@northwestern.edu](mailto:revelle@northwestern.edu) & [elizabeth.knowlton@northwestern.edu](mailto:elizabeth.knowlton@northwestern.edu)

Class address for zoom: Tuesday, March 30 : 946 6837 4313 (the first day is different from the later days)  
subsequent days: 954 6632 1152

## 2 Class time and office hours

MW 3:30-5:30. (by zoom)

Office Hours:WR: 2-4 Tuesday or by appointment (Zoom address is 847-491-7700)

This class will be taught remotely, but synchronously. Attendance at live classes is expected.

We will be using Campus Wire so that all of us can participate in discussions on how to do the various assignments. URL: [URL: https://campuswire.com/p/GB9DB2DE4](https://campuswire.com/p/GB9DB2DE4) Passcode: 2236

## 3 Course Overview

This course provides an introduction to psychological research techniques and methodology. Topics to be covered include the logic of research, the issues that must be considered in deciding how to study various psychological phenomena, and ways to address the difficulties posed by the limitations of specific studies. Ways for assessing threats to the internal and external validity of studies will be examined. These issues will be illustrated through reference to the examples of research on various topics in psychology. In addition to lectures and readings, students will participate actively in the design and analysis of three research projects.

Students will learn how to formulate hypotheses, design studies and collect relevant data to evaluate these hypotheses, and to write three research papers. The first paper will be based upon data collected in class, the second will be based upon student designed tests of hypotheses from a computer simulation, the third paper will be based upon data collected to test hypotheses of each student.

Lectures, readings, and discussions will be supplemented with tutorials on the use of modern statistical procedures for analyzing data.

### 3.1 Goals

1. To introduce you to fundamental skills in psychological research.
2. To facilitate your understanding of substantive courses in psychology.
3. To make you a better consumer of scientific information

4. To improve your ability to write and read scientific papers.

### 3.2 Prerequisites

Psychology 201 (statistics) or equivalent.

## 4 Text

Two online (open source and free) text books will be used: [Research Methods Textbook](#): Research Methods in Psychology, 4th American Edition by [Jhangiani et al. \(2019\)](#) and Russel [Poldrack \(2019\)](#) [on line statistics text](#). Both of these may be downloaded for free as pdfs or e-books.

Although the official Publication Manual of the American Psychological Association, Seventh Edition, is frequently suggested for this course I do not believe it is necessary. The APA style guide is not meant for student papers. It is probably more useful to follow the rules discussed in ‘[Doc Scribe’s APA Lite](#)’ or even some of the APA’s own website for what you really need to write papers for this class. See also the [APA style blog](#) . See also the APA style crib sheet available from the [Psych Web](#) project of Russ Dewey.

## 5 Teaching Method

Lectures, discussions, and research-related activities

## 6 Comment

This course is the second in the methodology sequence for the psychology major. It uses the statistical concepts learned in 201 and introduces concepts of experimental design, causal inference, and broad research methods to the study of psychological phenomena. It prepares students for advanced courses in research design applied to particular areas of psychology. Substantive examples will be drawn from all fields of psychology as well as other sciences. The readings will sometimes include reprints of articles in psychological research. These will be used as examples of experimental design and the types of inferences that can be drawn from data. In addition, ethical issues raised in some of the studies will be considered.

The text is used to supplement the examples of research given in class. Although the class lectures are not based upon the text, the readings will form an important part of class discussion and should be completed before class.

Thought problems from the current research and popular literature will be introduced at the beginning of most classes to focus discussion on particular problems of research design and interpretation.

## 7 Statistical software

Unlike most of the other sections of 205, we will use the powerful statistical system R ([R Core Team, 2021](#)) for our data analysis. We will not use SPSS. My students and I use R (as do active researchers at many other universities) because it provides access to new development in statistical analysis. We will take advantage of the power of R and the *psych* package ([Revelle, 2021](#)) in R which was developed specifically for psychological research.

The use of computers in psychological research will be emphasized and students will be able to access supplementary materials available on departmental and off campus file servers. Although prior experience with computers is not necessary, the use of computers will be emphasized, particularly for data analysis.

## 8 Class notes and supplementary material

Supplementary material will be available from the detailed outline available on the web. This will include the lecture notes for each class. Note that the links on this outline will change to reflect the specific results for that class day. You should plan on consulting the detailed syllabus before each class.

Papers 1 will be based upon data collected and analyzed in class. Paper 2 will be based upon a [computer simulation](#) of an experiment based upon real data that will provide unique data for each student. Paper 3 will be based upon an experiment designed and conducted individually. Before conducting the study 3, you will need to have discussed your proposal with the instructor.

## 9 Requirements and methods of evaluation

Three research papers. The first reports on the data collected in class. The second on data collected individually using a simulated experiment, the third based upon an individual project. A final research project that will include a review of the relevant literature, an experimental test of an hypothesis, and a discussion of the experimental results. The data collection and some analysis will be performed out of class. I will be available to help you analyze your data. All papers are to be written in APA style .

Two midterm exams that will cover the various methods and specific examples of classic studies discussed in class and in the readings. . Sample questions will be distributed before the exams.

A final exam that will cover the basic concepts of the course. (This final is optional and will be weighted equally with the other exams and projects.

Class and discussion group participation. This is a class on research methods and theories. It is necessary for all members of the class to participate in proposing alternative models and evaluating the theories presented. This may be done in class discussion, as well as extraclass interaction. Computerized conferencing will be used as well. Email discussion with the instructor and teaching assistant is strongly encouraged. Discussion groups, and review groups with your classmates are encouraged.

## 10 The following is taken from the Northwestern Registrar

### 10.1 Academic Integrity

Students in this course are required to comply with the policies found in the booklet, "Academic Integrity at Northwestern University: A Basic Guide". All papers submitted for credit in this course must be submitted electronically unless otherwise instructed by the professor. Your written work may be tested for plagiarized content. For details regarding academic integrity at Northwestern or to download the guide, visit: <https://www.northwestern.edu/provost/policies/academic-integrity/index.html>

### 10.2 Accessibility Statement

Northwestern University is committed to providing the most accessible learning environment as possible for students with disabilities. Should you anticipate or experience disability-related barriers in the academic setting, please contact AccessibleNU to move forward with the university's established accommodation process (e: [accessiblenu@northwestern.edu](mailto:accessiblenu@northwestern.edu); p: 847-467-5530). If you already have established accommodations with AccessibleNU, please let me know as soon as possible, preferably within the first two weeks of the term, so we can work together to implement your disability accommodations. Disability information, including academic accommodations, is confidential under the Family Educational Rights and Privacy Act.

### 10.3 Covid-19 testing compliance statement

To ensure the health of our community, Northwestern University currently requires students who come to campus or interact with the campus community in person regularly to be tested for COVID-19 routinely. Students must keep the Community Interaction Survey in CAESAR up-to-date, which is the method by which

students communicate such plans to the University. Community Interaction Survey status, enrollment in classes with face to face meetings, and/or living in an on-campus residence dictate the frequency with which students must be tested.

Students who fail to comply with COVID-19 testing or misrepresent their status in the Community Interaction Survey may face summary disciplinary action, including being restricted from campus or suspended.

## **10.4 Guidance on Class Recording**

This class or portions of this class will be recorded by me for educational purpose and available to the class during the quarter. I will communicate how you can access the recordings. Portions of the course that contain images, questions or commentary/discussion by students will be edited out of any recordings that are saved beyond the current term.

## **10.5 Prohibition of recording of class sessions by students**

Unauthorized student recording of classroom or other academic activities (including advising sessions or office hours) is prohibited. Unauthorized recording is unethical and may also be a violation of University policy and state law. Students requesting the use of assistive technology as an accommodation should contact AccessibleNU. Unauthorized use of classroom recordings – including distributing or posting them – is also prohibited. Under the University’s Copyright Policy, faculty own the copyright to instructional materials – including those resources created specifically for the purposes of instruction, such as syllabi, lectures and lecture notes, and presentations. Students cannot copy, reproduce, display, or distribute these materials. Students who engage in unauthorized recording, unauthorized use of a recording, or unauthorized distribution of instructional materials will be referred to the appropriate University office for follow-up.

## **10.6 Support for Wellness and Mental Health**

Northwestern University is committed to supporting the wellness of our students. Student Affairs has multiple resources to support student wellness and mental health. If you are feeling distressed or overwhelmed, please reach out for help. Students can access confidential resources through the Counseling and Psychological Services (CAPS), Religious and Spiritual Life (RSL) and the Center for Awareness, Response and Education (CARE). Additional information on all of the resources mentioned above can be found here:

<https://www.northwestern.edu/counseling/>

<https://www.northwestern.edu/religious-life/>

<https://www.northwestern.edu/care/>

# **11 Outline (to be added to frequently – keep checking)**

This is the abbreviated form of the syllabus, The full syllabus is at  
<https://personality-project.org/courses/205/205.syllabus.21.table.pdf>

Current version of March 31, 2021

## **11.1 News of changes**

None yet — Better formatting coming soon

## 11.2 Assignments as a table

| Week | Topic   | Lecture Notes   | Readings   | Homework  | R and statistics   |
|------|---|---|--|---|--|
| 1 a  | <a href="#">Introduction and Overview</a>   | Statistical and Experimental Inference  | Our memory study is based on <a href="#">Roediger &amp; McDermott, 1995</a>  | data collection Turn in data sheets Wednesday   | <a href="#">Statistics quiz</a>  |
| 1b   | <a href="#">Reasoning in Research</a>   | Review of statistical concepts<br><a href="#">the basic t.test</a>  | A classic example of experimental reasoning <a href="#">Madsen and McGaugh (1961)</a>  | review statistics from 201 (perhaps look at <a href="#">Poldrack's on line statistics text</a><br>Basic stats on our data   | <a href="#">t-test in R</a>  |
| 2a   | Examples of experimental reasoning  | <a href="#">Research design</a> as solving a puzzle   | Embracing the power of randomness<br>Descriptive statistics using R  | Solving the homework by using R for statistics  | <a href="#">A short introduction to R</a>  |
| 2 b  | Review of statistics and of the homework  | <a href="#">simulating distributions</a>  | Optional readings for your enjoyment<br><a href="#">Why you should not use Excel for statistics</a> (Simonof) or <a href="#">how to fight spreadsheet addiction</a> (Burns)  | stats home work solutions<br>Another approach.  |  |
| 3a   | Variables in Experimentation  | <a href="#">Overview of designs</a><br><br>Within Subject designs<br><br>Between subject designs                  | <a href="#">Are subjects WEIRD</a> (optional)<br><br>Modality effects on false memory results and the most recent results  |   | Estimating the central tendency/dispersion   |
| 3b   | Analysis of Variance  | Writing a research paper<br><br><br><br>Artifacts in Experimentation Theory Testing                               | APA Manual of Style see also the APA style FAQ as well as the APA tutorial of the basics of APA style ' <a href="#">Doc Scribe's APA Lite</a> '<br><br><br><a href="#">Bem (2003), Writing the empirical journal article</a> | Paper 1 Remember the instructions for writing a research paper<br><br><br><br>materials used in R & M study (For your paper) R & M results and analysis Possible figures to include in your paper may be taken from the results handout | ANOVA in R Using Endnote or BibTex for references using LaTeX to format an APA style paper |
| 4a   | <b>Mid Term 1</b>   | Sample tests and another sample test with key from  |  | Midterm 1 questions and answers   |  |
| 4b   | The use of ANOVA and Linear Regression in interaction designs   | More on Design in Experimentation   | Measurement Issues Correlational designs (reliability) Correlation and Regression Problems with inference  |   | <b>Paper 1 is DUE! Appointments for paper grading</b>                                      |
| 5a   | Correlational designs (continued)<br><br>Interaction designs and analysis   | Correlational designs (reliability) Correlation and Regression overview Problems with inference subject variables |  |   |  |
| 5b   | Experiment 2: simulation experiment   | Design in Experimentation   | Issues in Measurement Background on arousal theories   | A simulation experiment handout describing the experiment for Paper 2. The slides for Experiment 2. Experiment-2  | Block randomization using R  |
| 6a   | Observational versus randomized trials in field studies the example of health<br><br>Exploratory and Confirmatory data analysis | Random assignment in field trials (Born et al., 2002)<br><br>Pitfalls in scientific research                      | Searching the literature using Google Scholar or Psych Lit   |   | Shorter guide to R An even simpler guide to R Help on data analysis                        |
| 6b   | Ethics in Research  | On Being a Scientist (NAS)  | Ethical Standards of APA (2010)  |   |  |
| 7a   | Methods in Differential Psychology  | Methods in differential psychology  |  | Paper 2 is DUE! Schedule appointments for grading   |  |
| 7b   |   |   |  |   |  |
| 8a   | Alternatives to Experimentation<br><br>Other topics   | Quasi-experimental designs and other kinds of designs   |  | Research Proposals for final project due  | Advanced statistical procedures  |
| 8b   | Course Review   | Using Qualtrics to collect data   |  |   | scoring scales using qualtrics   |
|      | Reading Week begins   |   | appointments for analysis help Analyze study 3   | How to use R to score scales  | Score scales (more detail)   |

### 11.3 Daily detail— Still in progress

1. Bem (2003), Writing the empirical journal article
2. using LaTeX to format an APA style paper Three output styles: journal, document, manuscript But one tex file (with an accompanying boxplot and another graphic file as pdfs and an example bib file embedded in the text document.) Remember the instructions for writing a research paper
3. Using Endnote for references or using BibTex for references
4. Background on arousal theories Observational versus randomized trials in field studies experiments versus field studies: the example of health Random assignment in field trials (Born et al., 2002) Using statistics in psychological research A short guide to R for 205 students Long guide to R Detailed handout on data analysis for experiment 2 An even simpler guide to R written by a 205 student
5. Week 8 searching the literature
6. References for paper 2: Revelle, Humphreys, Simon and Gilliland, 1980 (this gives some of the EPI items to measure impulsivity and Revelle, Anderson, and Humphreys, 1987 (very large file) and Anderson and Revelle, 1994 see also Revelle, (1993) which reviews Thayer's results and discusses performance arousal theories
7. Methods in Differential Psychology Methods in differential psychology Paper 2 is DUE! Schedule appointments for grading
8. Midterm # 2 Study guide for Midterm 2 Example and answers for Midterm 2 (from 2010)
9. Ethics in Research On Being a Scientist (NAS) Ethical Standards of APA (2010)
10. Week 10 Alternatives to Experimentation Advanced statistical procedures Course Review Quasi-experimental designs and other kinds of designs Research Proposals for final project due
11. Oral reports on research proposals (Optional) Other topics Using Qualtrics to collect data scoring scales using qualtrics
12. Reading Week begins appointments for analysis help Analyze study 3 How to use R to score scales Score scales (more detail)
13. Finals Week

## References

- Jhangiani, R. S., Chiang, I.-C. A., Cuttler, C., and Leighton, D. C. (2019). *Research Methods in Psychology*. KPU Press, 4th edition.
- Poldrack, R. A. (2019). *Statistical Thinking for the 21st Century*. github.
- R Core Team (2021). *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria.
- Revelle, W. (2021). [psych](https://CRAN.r-project.org/package=psych): Procedures for personality and psychological research. Technical report, <https://CRAN.r-project.org/package=psych>. R package version 2.1.3.