

Experimental Psychology: Human Behavior  
PSYC S1420 – Summer 2020

**Instructor Information:**

Patricia Lindemann

Office hours: After class by appointment

E-mail (best): PGL2@columbia.edu

Teaching Assistant – Chris Medina-Kirchner – cmk2206@columbia.edu

**Course Description**

This is an introduction to research methods employed in the study of human behavior in psychology with a focus on studies in the areas of cognition and perception. You will gain experience in the design and conduct of research, including ethical issues, observation and measurement techniques, interpretation of data, and preparation of written and oral reports.

Prerequisites: Both an introductory psychology course and statistics course are **required**. Students are expected to be familiar with descriptive statistics, t-tests, correlation, regression and ANOVA. Without some background in statistics, it would be very difficult to get the most out of this course. The basic statistical methods necessary to understand/conduct the data analysis will be reviewed.

We will introduce and use R as a tool for statistical analysis. You are not expected to have any prior knowledge of R or any other statistical programming language. R is useful because it is widely used and freely available. It is only a tool, not a goal in itself. Note, this is not a full course in R, but rather a general/gentle introduction. You will not become an R programmer by taking this course.

You will get a great deal of practice writing lab reports to describe research projects in accordance with the publication manual of the American Psychological Association. You will also get practice with oral presentation of research.

Please be aware that the summer session version of this course is very intensive. It is a 4 point course compressed into 6 weeks. I equate this to 9 or 10 points during the regular academic year. You must plan accordingly.

This is a writing intensive course with a written assignment, exam and/or presentation every week. The first half of the course is especially intensive. Based on previous experience, if you are a full time student this summer, I recommend that you do not take no more than one other course in addition to this one. If you are enrolled as a part time student this summer, I recommend that you do not take any additional courses.

**Learning Objectives:**

Research is a process and in this course you will learn about that process in a variety of ways. The foundational skills that you will develop in this course will be useful to you whether you are a beginning researcher yourself or are assessing the research of others. The goals of the course align with the [psychology department's program goals](#) for our students which are available on the psychology department web site.

By actively engaging in this course, you will be able to:

- understand and apply basic research methods and experimental design principles
- design a research study motivated by theory

- plan, conduct and interpret appropriate statistical tests using R
- thoughtfully interpret basic visual representations of data
- report research in both oral and written form
- critically evaluate research conducted by others

## Course Structure

The course is organized around four projects. For each project, there are both lecture and lab activity components. Each project has a different set of learning goals. To help you better understand the logic of the course, let's go through the projects and consider the learning goals for each project.

### Project 1 – Understanding the Basics – Week 1

This project introduces you to the process of developing a study based on previous research. Our study is based on work by Iyengar et al. (2006), Schwartz et al. (2002) and Diab et al. (2008). Goals:

- Develop hypotheses based on previous research findings
- Operationalize psychological constructs
- Understand statistical concepts – correlation, regression, mediator variables, median split, t-test
- Conduct (and interpret) very basic statistical analyses using R
- Present findings in APA format (most elements)

### Project 2 – Nuts and Bolts of Project Development – Week 2

For this project, you will work together as a group to create your own version of an experiment based on an existing paradigm. Goals:

- Consider aspects of experimental design (Selecting conditions, between vs. within, order effects, etc)
- Representing results graphically
- Understand statistical concepts – factorial designs, main effects, interactions
- Conduct (and interpret) ANOVA using R
- Present findings in APA format (all elements)

### Project 3 – Research Proposal – Week 3

For this project, you will develop your own independent research proposal. Goals:

- Literature review
- Develop your own hypothesis and methodology related to existing research
- Plan appropriate statistical tests
- Present oral proposal
- Present written proposal in APA format

### Project 4 – Group Project – Weeks 4-6

We will select several of your proposals to develop into full projects. Goals:

- Develop methodology
- Pilot testing (giving, receiving and incorporating feedback)
- Planning appropriate statistical tests
- Analyzing data
- Interpret findings

- Present findings in oral presentation
- Present findings in written report in APA format

Most weeks about half of the time will be devoted to lecture and half will be devoted to independent or group project work. For the first half of the course, lecture topics will focus on developing the skills you will need to develop your own projects. In the second half of the course, you will apply these concepts in your own projects. Lectures will then focus on more specialized research designs and special topics.

## **Course Requirements:**

### Class Participation

Attend all zoom class periods and participate actively. Complete in class quizzes (ungraded). When we are using R, you will need to use your laptop or computer for class. Unexcused absences will subtract from your participation grade. Lectures will be recorded and available for your reference.

### Assignments

Graded assignments

- Four lab reports.
- Two oral presentations.

10 Ungraded homework assignments (Pass/Fail)

- Article worksheet 1 – Reading Iyengar et al. (2006)
- Completed R assignment 1 and 2 – Introduction to R
- Article worksheet 2 – Reading Schwartz et al. (2002) and Diab et al. (2008)
- Completed R assignment 3 – Data analysis
- Paper 1 checklist and questions – Prep for paper 1
- Collect data for project 2
- Practice talk – An opportunity to see what it’s like to do a quick zoom talk
- Lab Report 2 checklist and questions – Prep for paper 2
- Submit materials for group pilot study
- Submit final group project materials

Late assignments will be accepted, but you will lose 5 points off your total homework grade for each day late. Poor assignments must be resubmitted. You will lose 3 points for any assignment that must be redone.

### Exams

There will be one midterm and a final exam. On exams, you will apply your knowledge of research methods in the context of real and hypothetical experiments. This might include interpreting and evaluating results from studies, identifying research design flaws or explaining how methodological concepts apply in the context of a particular experimental example. The emphasis will be on using research concepts rather than merely memorizing them.

### Excused Absences/Extensions

Please contact me. Excused absences and extensions will be granted for documented serious extenuating circumstances only (emergencies, serious illness). Excused absences/extensions will not be granted for scheduling conflicts. Everyone can have ONE free extension of ONE day on any ONE lab report. Contact me if you would like to use your free extension. Otherwise, late lab reports lose 5 points per day late.

## Grading

<u>Exams</u> (40% of final grade)	
Midterm	20%
Final (cumulative)	20%
<u>Class Participation/Attendance</u> (7% of final grade)	7%
Homework (5% of final grade)	5%
<u>Projects</u> (50% of final grade)	
Project 1	5%
Project 2	10%
Project 3 – Your proposal (oral)	5%
Project 3 – Your proposal (written)	8%
Project 4 – Group project (oral)	5%
Project 4 – Group project (written)	15%

## **Textbook:**

Passer, M.W., (2014 or 2017). *Research Methods: Concepts and Connection*. New York: Worth.

Page numbers listed below are from the 2017 edition, but chapters and section headings should be directly translatable to the 2014 edition. Note that the current edition is available as a textbook rental, as a looseleaf edition or as an e-book.

Note: Additional weekly readings will be listed (and posted) on the Courseworks class website.

Notes on the reading/video segments:

- Readings are to be read prior to day where they are listed
- Book chapter readings are intended to provide familiarity with the concepts we will be using in class
- Videos are primarily intended to review statistical concepts that you will (hopefully) be familiar from intro to statistics

## **The reading list and weekly syllabus (subject to revision)**

**Before first day of class:**

- **Complete data collection survey**
- **Download R and R studio**

## **Week 1: Translating ideas into research - Project 1**

**May 26 – General Introduction**

### **Required Reading:**

- Chapter 1: Science and Psychology

### **Class Plan:**

1. Introductions
2. Lecture: Brief review of scientific method
3. Icebreaker exercise
4. Lecture: Background for Project 1 – Maximizing and Satisficing
5. R: Introduction to R basics – Part 1
6. Lecture: How to read a scientific paper

## May 27 – Translating ideas into research (Operationalizing and analysis Part 1)

Homework Due: Worksheet

### Required Reading:

- Iyengar, et al. (2006) + related worksheet
- Chapter 4: Defining and Measuring Variables (NOT Measurement Accuracy, Reliability and Validity)

### Class Plan:

1. Quiz: Variable types (discrete, continuous, nominal, ordinal, ratio, interval)
2. Lecture: Operationalizing
3. R: Introduction to R basics – Part 2
4. Lecture: Iyengar, et al. (2006) – operationalizing and analysis
5. Complete Class Survey 2 (Conceptual extension of Iyengar, et al. (2006))
6. Lecture: Planning our data analysis – What’s the right statistical test? (Pearson correlation)

## May 28 – Translating ideas into research (Operationalizing and Analysis Part 2)

Homework Due: Completed Introduction to R Part 1 and 2

### Required Reading:

- Chapter 5: Correlation and Correlational Research - (Basic Concepts, Correlation and Prediction)
- Statistics Modules 1-5 (these are at the back of the textbook)

### Recommended: Khan Academy Statistics Review

Important topics: measures of central tendency and spread (video link 1), correlation (video link 2)  
Optional topic: regression (video link 2) may help your understanding of the Iyengar, et al. (2006)

paper.

1. <https://www.khanacademy.org/math/statistics-probability/summarizing-quantitative-data>
2. <https://www.khanacademy.org/math/statistics-probability/describing-relationships-quantitative-data>

### Class Plan:

1. Quiz: Pearson correlation, mediators
2. Lecture: Pearson correlation review and statistical significance
3. Activity: Statistical significance
4. Lecture: Our study – extending Iyengar, et al. (2006), identifying boundary conditions
5. R: Correlational Data Analysis
6. Lecture: What is a median split? – example from Iyengar, et al (2006)
7. Activity: Identifying the right statistical test – t-test vs correlation
8. Preview: Operationalizing – Did Schwartz et al. (2002) get it right? (Complete Class Survey 3)

## May 29 – Translating ideas into research (Interpreting and Presenting Results)

Homework Due: Worksheet 2 and Completed R Correlational Analysis

### Required Reading:

- Schwartz et al., 2002 (limited sections)
- Diab et al., 2008 (limited sections)
- Statistics Module 12
- Appendix A: Communicating Research Results, pp. A1 - A14

### Recommended: Khan Academy Statistics Review

Important topics: the idea of significance tests (video link 1), comparing means (video link 2)

1. <https://www.khanacademy.org/math/statistics-probability/significance-tests-one-sample>
2. <https://www.khanacademy.org/math/statistics-probability/significance-tests-confidence-intervals-two-samples>

### Class Plan:

1. Quiz: statistical significance
2. Lecture: Operationalizing Maximizing Schwartz et al. (2002) vs Diab et al.(2008)
3. Activity: Which scale is better?
4. R: Final Analyses
5. Lecture: Interpreting and Presenting Results (How to write your lab report)

## **Week 2 – Experimental Design: Project 2**

### **June 1 – Introduction to developing an experiment**

Homework: Lab Project 1 – Checklist and questions

#### **Required Reading:**

- Statistics Modules 6-9
- Chapter 8: Single Factor Experimental Designs
- Chapter 10: Experimentation and Validity (Other issues concerning experimental control)

#### **Recommended:** Khan Academy Statistics Review

Important topics: comparing means (video link 1), z scores (link 2)

1. <https://www.khanacademy.org/math/statistics-probability/significance-tests-confidence-intervals-two-samples>
2. <https://www.khanacademy.org/math/statistics-probability/modeling-distributions-of-data>

#### **Class Plan:**

1. Quiz: t-test vs. correlation
2. Lecture: Experimental Control
3. Video: Dowsing Experiment
4. Lecture: Confirmation Bias
5. Activity: Designing an Experiment
6. Lecture: Between vs. Within Subjects Designs
7. Lecture: Type 1 and Type 2 Errors
8. Introduction to Project 2

### **June 2 – Validity of Experiments**

Homework: Lab Project 1 – Final Lab Report Due

#### **Required Reading:**

- Chapter 4: Defining and Measuring Variables (Review previous material and complete the chapter)
- Chapter 10: Experimentation and Validity (Types of Validity, Basic Threats)
- TBD

#### **Class Plan:**

1. Quiz: Between vs. Within; Type 1 and Type 2 Errors
2. Lecture: Measurement Accuracy, Reliability and Validity
3. Activity: Measurement Validity
4. Lecture: Internal vs. External Validity
5. Develop class study
6. \*(if time) Lecture: t-test vs One Way ANOVA
7. \*(if time) R: t-test vs One Way ANOVA

### **June 3 – Factorial Design**

Homework: Collect Data

#### **Required Reading:**

- Statistical Module 16
- Chapter 9: Factorial Designs

#### **Class Plan:**

1. Quiz: Means comparisons with more than 2 groups
2. Lecture: Factorial design
3. Activity: Main Effects and Interactions
4. Lecture: Factorial design and our study
5. Activity: Main Effects and Interactions – Predictions for our study

## June 4 – Analyzing and Interpreting our data

Homework: 1 minute practice talks

Required Reading: (TBD)

Class Plan:

- Quiz: Main Effects and Interactions
- R: Analyze and interpret data
- Review/catch up
- 1 minute practice talks (no real preparation required)

## Week 3 – Proposal Development

### June 8 – Visual Representations of Data

Homework: Lab Report 2 Checklist and Questions; R Analysis

Required Reading:

- Chapter 2: Conducting Psychological Research

Class Plan:

- Lecture – Good and Bad Data Representation
- Activity – Good and Bad Data Representation
- Lecture – Developing project ideas

### June 9 – Brainstorming

Homework: Lab Report 2 Final Version

Required Reading: REVIEW EVERYTHING

Class Plan:

- Brainstorming
- Literature Review
- Midterm Review
- Submit Papers

### June 10: Midterm

### June 11: Student Oral Proposals

## Week 4 – Group Project Development

### June 15: Begin Group Work

Homework: Written Proposal

Required Reading:

- Chapter 7: Survey Research

Class Plan:

1. Lecture: Survey research
2. Activity: Begin group project work

### June 16: Study Design Considerations

Required Reading:

- Chapter 5: Correlation and Correlational Research
- Chapter 8: Single-Factor Experimental Designs (review)
- Statistics Modules 13-15

Recommended: Khan Academy Statistics Review

Important topics: Error probabilities and power (video link 1)

1. <https://www.khanacademy.org/math/statistics-probability/significance-tests-one-sample>

Class Plan:

1. Quiz: Planning statistical tests (which test?)

2. Lecture: Experiments vs. Correlational studies, Correlation and Causality
3. Activity: Correlation and Causality
4. Lecture: Effect Size and Power
5. \*(if time) Group work

### **June 17 – Material Development (Group Work)**

#### **Class Plan:**

1. Quiz: Effect Size and Power
2. Group work

### **June 18 – Piloting Materials**

Homework: Bring Materials for Piloting

#### **Class Plan:**

1. Give feedback
2. Receive feedback
3. Incorporate feedback

### **Week 5 – Conducting your study**

#### **June 22 – Other Research Approaches**

Homework: Submit final version of study materials

#### **Required Reading:**

- Chapter 6: Case-Studies and Observational Research

#### **Class Plan:**

- Lecture: Other research approaches

#### **June 23 - Specialized Research Approaches**

#### **Required Reading:**

- Chapter 11: Quasi Experimental Design
- Chapter 12: Single-Case Experimental Design

#### **Class Plan:**

- Lecture: Specialized Research Approaches
- \*(if possible) Data Analysis

#### **June 23 – Data Analysis**

#### **June 25 – Ethics**

#### **Required Reading:**

- Chapter 3: Conducting Ethical Research
- Appendix B: APA Ethical Principles

#### **Class Plan:**

1. Lecture: Ethics
2. Data Analysis (if needed)

### **Week 6 – Wrapping up**

#### **June 29 – Replicability of Research**

#### **Required Reading:**

- Chapter 10: Experimentation and Validity (Strategies for Replicating Research)
- Open Source Collaboration (2015) <https://science.sciencemag.org/content/349/6251/aac4716>
- Faneli (2018) <https://www.pnas.org/content/115/11/2628>

#### **Class Plan:**

- Lecture: Replicability

## June 30 – Developing Group Presentation

### Class Plan:

- Developing Group Presentation

## July 1 – Final Presentations

## July 2 – Final Exam

## Final Lab Report Due Sunday, July 5

### Columbia Writing Center

It may be helpful to you to take advantage of the Columbia Writing Center in preparing your papers for this course. We encourage you to visit the Writing Center in 310 Philosophy Hall. The Center provides free individual consultations on your writing at any stage in the writing process. Writing consultants can help you find strategies not only for generating compelling ideas and conveying them effectively in a particular paper, but also for developing as a writer. Scientific writing is like other writing in that you are telling a specific story and backing it up with evidence. You want to be clear, interesting and compelling. We will provide substantial information about how to write lab reports for this course, but many students find the process daunting, especially at the start. You may make an appointment at the Writing Center and view drop-in hours at [www.college.columbia.edu/core/uwp/writing-center](http://www.college.columbia.edu/core/uwp/writing-center). They know that the summer session requires a compressed time frame and will attempt to work with students in a timely manner.

### Academic Integrity

"The intellectual venture in which we are all engaged requires of faculty and students alike the highest level of personal and academic integrity. As members of an academic community, each one of us bears the responsibility to participate in scholarly discourse and research in a manner characterized by intellectual honesty and scholarly integrity. . . . In practical terms, this means that, as students, you must be responsible for the full citations of others' ideas in all of your research papers and projects; you must be scrupulously honest when taking your examinations; you must always submit your own work and not that of another student, scholar, or internet agent."

From the Faculty Statement on Academic Integrity -

<https://www.college.columbia.edu/academics/integrity-statement>.

Cheating on assignments or exams and plagiarism are very serious violations within the academic community. Students are expected to do their own work on all tests and assignments for this class. Neglecting to cite sources in a paper is considered plagiarism. Copying text from another student is considered plagiarism. So is writing a paper together, but each of you putting it in your own words. This can be confusing when it comes to labs you work on with a partner or group projects, so please check with me or your TA if you have any questions about what is or is not OK. Here are some basics:

#### OK

- Discussing ideas with your lab partner(s) prior to writing the paper
- Discussing statistical analyses with lab partner(s) prior to writing the paper
- Discussing APA formatting rules with others
- Having someone who is not in the class proofread for grammar/spelling

IF YOUR PAPER IS VERY SIMILAR TO ANOTHER STUDENT'S, IT LOOKS LIKE PLAGIARISM, THE BEST WAY TO AVOID THIS IS TO AVOID PLANNING/WORKING ON PAPERS TOGETHER. If you don't plan the papers together, you won't use the same arguments or structure even if you are using the same data. Papers will be submitted online and we will be using Turn-It-In to check for plagiarism.

#### Not OK

- Don't work together as you write your paper. Your arguments may end up so similar that it will constitute plagiarism.
- Do not outline the paper together and work from the same/similar outlines
- Don't copy figures or tables from someone else. Make your own
- For group projects - Don't copy from the slides used for group presentations.
- For group projects - Don't copy text or specific arguments from the project proposal.

You are expected to always act in accordance with the Columbia honor code. Any student found cheating or plagiarizing in this class will be reported to Columbia's Office of Judicial Affairs and Community Standards for evaluation and academic discipline. If you have questions about any aspect of academic integrity at Columbia, please refer to the following link: <https://www.college.columbia.edu/academics/integrity> and if you have specific questions about sanctions or the judicial process: see <https://www.college.columbia.edu/academics/disciplinaryprocess>

### **Students with Disabilities:**

Students with disabilities taking this course who may need disability related classroom accommodations are encouraged to let me know as soon as possible. Also, stop by the Office of Disability Services (ODS) on the Wien Hall, Suite 108A to register for support services, if you have not done so already. ODS Phone (212) 854-2284. Students who are eligible for extra exam time should be certain to fill out the appropriate paperwork at the Office of Disability Services. Once I have received confirmation of your status, I will be able to make arrangements for additional exam time. Note that ODS often requires 2 weeks to process an application, so don't wait until midterm week to get in touch with them.