Department of Psychology

Psych 1900: Introduction to Statistics for the Behavioral Sciences (Fall 2024)

Lecture Time: Tuesday and Thursday, 10:30 – 11:45am
Lecture Location: Science Center Hall D

Lab Sections: TBD

Section #	Day of the Week	Time Slot	Locations
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
Maybe more			

Instructional Team

Instructor	Grace C. Lin, PhD
Email	gcl741@mail.harvard.edu
Office	WJH 832
Zoom link	https://harvard.zoom.us/j/99680852188?pwd=UGg4YkRoRVJmS1FEREF6K0hESW0zZz09
Office Hours	Tuesday 9:15-10:15am (in person walk-in), or by appointment either via Zoom or in person

Teaching Fellows TBD – Confirmation of TFs/TAs is in May 2024

Name (Head TF/TA)
email@g.harvard.edu
Sections: ## ##
Office hours: TBD / by appointment
Zoom Link

Name
email@g.harvard.edu
Sections: ## ##
Office hours: TBD / by appointment
Zoom Link

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Office hours: TBD / by appointment
Zoom Link

Name
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https://harvard.zoom.us/my/megsalvia

Name
email@g.harvard.edu
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Zoom Link

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email@g.harvard.edu
Sections: ## ##
Office hours: TBD / by appointment
Zoom Link

Course Goal and Objectives

Data are everywhere around us. Statistics are used to make sense of all this data. Netflix and Amazon use statistics to recommend movies and merchandise. Sports franchises use statistics to draft players, make trades, and build championship teams. Universities use statistics in determining who to admit. Professors use statistics in determining student grades. Most relevant to researchers in behavioral science, we use statistics to evaluate the outcome of our research studies. This course will familiarize you with the basics of statistical thinking and how statistics are used in psychology and other behavioral sciences. This course aims to provide you with the **scientific and statistical literacy** to become a **critical consumer** of the statistics (and science) you encounter in daily life. This course will teach you about relationships between variables, how data is used to predict future outcomes, and how to use data to answer questions you have about the world.

Student Learning Outcomes

Specifically, students who have successfully completed this course should be able to:

- Understand the use of descriptive statistics, generate, and apply them
- Demonstrate how data can be presented to illustrate important relations
- Understand and perform statistical analyses and data visualization using R
- Assess whether an effect is statistically significant and explain why
- Understand and explain the distinction between independent and dependent variables
- Select and implement the appropriate statistical test for a given data scenario from start (i.e., formulating a research question and the associated hypothesis) to finish (i.e., interpret the test results)
- Construct and interpret confidence intervals and effect sizes
- Assess the association between variables using various statistical techniques such as correlation and regression

Course Prerequisites

There is no official course pre-requisite for PSY 1900.

Course Website

We will use the course Canvas website **extensively**.

You will be able to find all relevant course materials—from lecture slides and surveys to Final Project information and Quizzes/Exams on Canvas. We package the course content information as **Modules** so that they may be easier for you to find. Course **Assignments** that require submission (and make up your grade) can also be found in the Assignment Tab.

You will submit assignments on Canvas (e.g., timed quizzes, surveys, in-class participation responses, etc.). The due date for each assignment is specified on the Canvas assignment. We highly encourage you to turn on Canvas notifications.

Software/Platforms

We will be using **Posit Cloud** for lab sections and problem sets. Posit Cloud is the cloud version of **RStudio**, an integrated development environment (IDE) that is considered the industry standard for statistical analysis. The cloud version allows you to work collaboratively with project partners, and even the free version is powerful and adequate for the purposes of PSY 1900.

However, if you plan on conducting research in the future (and if you have the space on your computer), we highly recommend you to download and install **R** and **RStudio**. (RStudio is the desktop version of Posit Cloud.)

Textbook(s)

Naked Statistics: Stripping the Dread from the Data by Charles Wheelan

An affordable and accessible source for understanding statistical concepts.

Doubly recommended if you enjoy sports metaphors! (If sports isn't your thing and you find the metaphors confusing, feel free to join the club…)

Recommended (if you desire more technical explanations):

- Field, A. (2022). An Adventure in Statistics: The Reality Enigma. London, UK: Sage Publications
  - **Extremely recommended** in terms of conceptual understanding.
- Field, A., Miles, J., & Field, Z. (2012). *Discovering Statistics Using R*. London, UK: Sage Publications
  - This book is **very helpful in terms of R.** It includes codes and explanations
- Vickers, A. J. (2009). *What is a p-value anyway?* New York: Pearson.

How to Succeed in PSY 1900

Having a bit of control over what you do has a positive effect on your health. I've designed this course in a way that promotes your aim to master the content out of your own desire to learn and benefit. Therefore, you can complete any assignment before the deadline if you wish.

You will succeed in this course if you do a few simple things: (1) Read every week, (2) attend lectures and lab sections and participate in class activities, (3) check emails and Canvas for announcements, (4) complete the assignments. You may contact Grace (or if you feel uncomfortable calling me by my first name, "Dr. Lin" will also work) and/or your TF should you have any questions regarding the statistics, the course, and/or psychology research. I have been told—by my many RAs—that I am quite approachable.

Required Materials/Skills:

- *Laptops for lab lections. (You get to play with data!!)*
- *Access to Canvas during class time (either via laptop or a smartphone)*
- *Internet connectivity*
- *The ability to count to 100, basic arithmetic (+− ×÷), and some knowledge or familiarity with algebra*
- *Openmindedness and a healthy sense of curiosity*
- *Endurance and tolerance of dramatic flair and mentions of chocolate and/or Pokemon*

How to Properly Contact Me

As a student, I definitely spent way more time than necessary trying to figure out a way to properly compose an email to my professors or advisors. So here is a template for how you can draft your emails to your TF or me. Hopefully this saves all of us some trouble and headaches. (Plus, it'll ensure that your email doesn't get lost in my inbox!)

Subject Line: [PSY 1900] questions.

Dear Dr. Lin/Grace (or some other greeting),

[A line that recognizes our common humanity. For example, "I hope you are enjoying your weekend."]

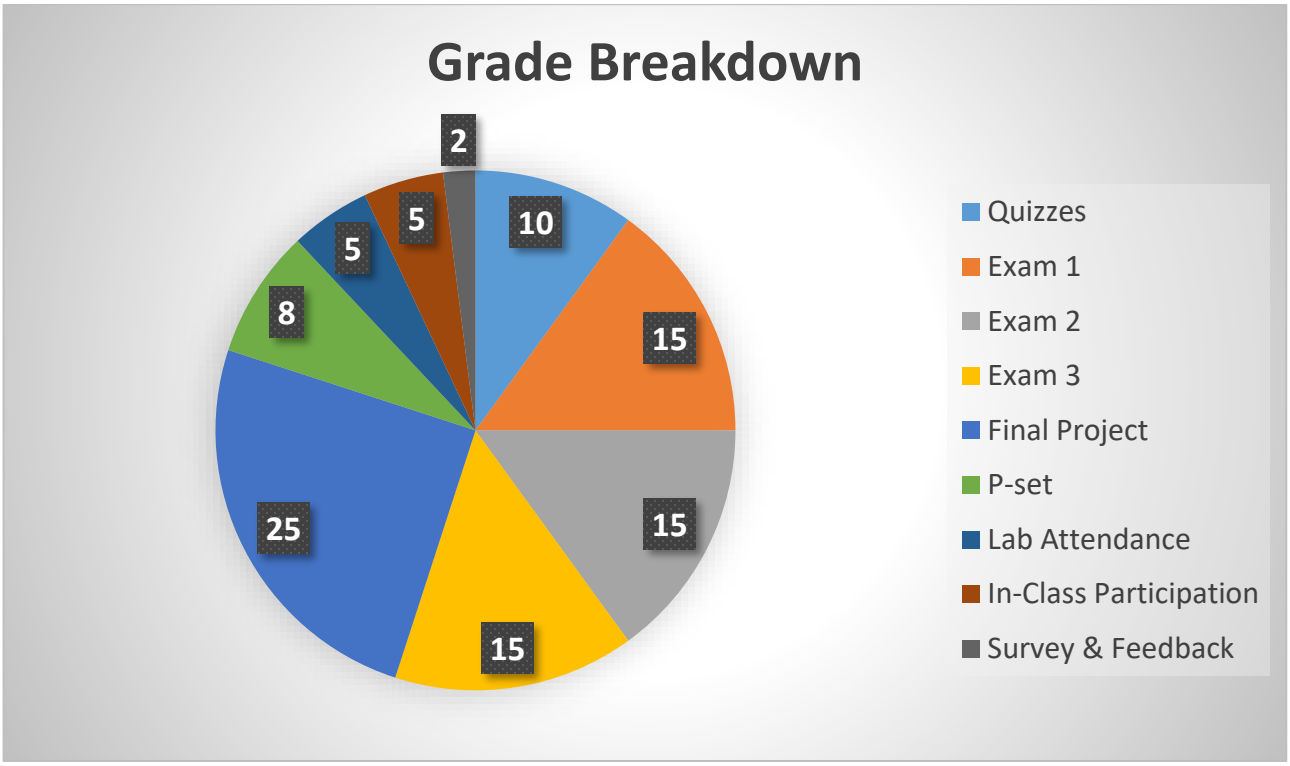
My name is _____ and I am in your PSY1900 course. I have a question regarding _____. [Ask question using proper grammar and spelling, making sure you consulted your notes, the syllabus, and your classmates]. Can you please clarify?

Thank you for your time,

[Your name]

For more information, please visit:
Resource: https://medium.com/@lportwoodstacer/how-to-email-your-professor-without-being-annoying-af-cf64ae0e4087#.1xcuo9rvg)

Email Policy and Additional Expectations
Emails relating to specific homework or lab assignment questions will not be answered. For statistical or questions specific to homework or lab assignments, ask in (or after) class or in the lab sections. If you have additional questions, email the instructional team. Because conceptual questions are often difficult to answer and explain via email, the instructional team may collect the questions and address them in class or individually via office hours.



Detailed Breakdown of Assignments

Lab Attendance (5%)	Attendance will be taken **at the start** of each lab section (for a total of 11 labs). Please arrive to lab sections on time. **You are allowed two unexcused absences**. That means, you should attend at least nine of the 11 lab sections for full attendance credit. This is to accommodate potential unavoidable situations (e.g., a flare up of a known condition, you fell ill/tested positive for COVID, or must attend a last-minute job interview). No documentation is required for these two unexcused absences. You will see 0 for any missed attendance, but two 0s will be dropped. **What if I end up missing more than 2?** (see FAQ section)
In-class Participation (5%)	Lecture attendance and participation in lecture activities will enhance your learning. Please arrive to class on time.

	You will submit assignments during class at least once a week to receive the participation points. Just like lab attendance, you are allowed to miss two in-class participation assignments with no penalty. **What if I end up missing more than 2?** (see FAQ section)
Surveys & Feedback (2%)	Because I value your opinions and believe in tailoring the materials to fit your needs (i.e., I care about pedagogy and your learning!) and because I'm an educational researcher, you will receive periodic surveys throughout the course to gauge your learning. The class surveys also serve to construct the class datasets to be used for the Final Project. It is essential that you complete them. We will make announcements during lectures and labs when a survey has been released. There are no right or wrong answers for the surveys, so completing them will guarantee you this 2%! Because surveys are time sensitive, **no make-up opportunity will be provided and no late submission will be accepted for surveys.**
Weekly Problem Set, aka "p-set" (8%)	The lab homework is due on Canvas the night before your next lab section at **11:59pm Eastern Time.** The psets (datasets, key questions, etc.) will be posed at the end of your weekly lab codes. However, you must go to Canvas to submit your responses. The p-set is ***partially*** based on **completion**. Shorter fill-in-the-blank or multiple choice questions will be based on accuracy. Open-ended questions that require longer codes will be based on your efforts. If you showed a good attempt, you may receive full credit on the longer coding questions even if the resulting code has bugs or does not generate the correct output. **Two lowest scores will be dropped.**
Quizzes (10%)	There will be a quiz most weeks (see course schedule) for a total of 10 quizzes. Quizzes are held remotely and administered via Canvas. They will open Thursday after class and close at the end of day on Friday. Unless otherwise stated, they are **open-book** and **open-note**. Even though they are open-book and open-note, you should treat the quizzes as if they are timed closed-book quizzes. The quizzes should take approximately 15 minutes to complete, but **you will get 30 minutes** (timed on Canvas) from when you first click into the quiz. This means if you are not ready to take the quiz or if you do not have 30 minutes to complete it, do not open it up. (DAO accommodations for extended time will be applied for those with DAO accommodations.) A missed quiz will result in a 0 score. The quizzes are meant to be **practice for your exams** and low stakes. Additionally, we understand that **technical mishaps** can happen. As such, **the lowest 3 quiz scores will be dropped.**
Exam 1 (15%)	Exam 1 covers up to materials in Week 5. It will be take-home, open book/open note. It is *not* open peers or open friends.

	The exam will contain both multiple-choice/short answers as well as open-ended responses. The style and format follow those of the quizzes and psets. This means you will be assessed on both conceptual understanding of the topics as well as practical skills when dealing with data (e.g., codes). The exam will open up during class time, but you will have until 11:59pm to complete the exam.
Exam 2 (15%)	Exam 2 covers up to materials up to Week 8. It is cumulative in the sense that you cannot understand the concepts from later weeks without knowing those from the earlier weeks. However, it will have a heavier emphasis on materials from Weeks 6-9. Just like Exam 1, Exam 2 will be take home, open book/open note. It is *not* open peers or open friends. The exam will contain both multiple-choice/short answers as well as open-ended responses. The style and format follow those of the quizzes and psets. This means you will be assessed on both conceptual understanding of the topics as well as practical skills when dealing with data (e.g., codes). The exam will open up during class time, but you will have until 11:59pm to complete the exam.
Exam 3 (15%)	Exam 3 covers all course content. It is cumulative but with heavier emphasis on materials after the second exam. Just like the other two exams, Exam 3 will be take home, open book/open note. It is *not* open peers or open friends. The exam will contain both multiple-choice/short answers as well as open-ended responses. The style and format follow those of the quizzes and psets. This means you will be assessed on both conceptual understanding of the topics as well as practical skills when dealing with data (e.g., codes). The exam will open up during class time, but you will have until 11:59pm to complete the exam.
Research Project (25%)	This is your chance to apply what you have learned to answer your questions! You will work in a group of two or three to complete this project. Your group will select one overarching research question (RQ) using the provided project datasets. You will use various statistical methods to explain your data and answer your RQ. You will also be expected to question the validity of your results and defend your analysis. You will present your findings during the scheduled presentation time in the form of a "poster" presentation. **How will I be graded on the Project? (See FAQ Section)**

Policies

- Arrive to classes and labs on time.
- **Collaboration:** Collaboration on quizzes and exams is not permitted in this class (quizzes and exams are already open-book, open-note, open-laptop; just not open-peers), but certain forms of collaboration are. Discussion and exchange of ideas are essential to academic work. For problem sets, you may consult and work with your classmates. However, you should ensure that the written work you submit for evaluation is the result of your own writing, and you should acknowledge the collaboration or assistance you received on a separate question of your problem set. For your research project, you will collaborate with a classmate and produce a joint submission.
- **Attendance:** Attendance is important and fundamental to learning. Lab sections and group work are an integral part of this course. Attendance is therefore mandatory for lab sections. However, we understand that life happens, so we will allow TWO *unexcused* absences (no questions asked and no documentation needed). Make-up for lab attendance and in-class participation may be granted for excused absences. Excused absences are those due to a health or emergency situation and you should submit a well-documented, verifiable, and unavoidable reason via email to the instructor and TF.
- **Religious Observances** Students will not be penalized for religious observances. Students will be allowed, whenever possible, to make up academic assignments that are missed due to such absences. It is the student's responsibility to contact the instructor and their TF by the third week of class or at least *one week* before the absence, whichever one is earlier, to allow for more advanced planning of arrangements for makeup work.
- **Late Work:** Unless otherwise stated, all late submissions will result in a **10% grade deduction per day** past the deadline. Extensions of the deadline/make-ups on all assignments (e.g., class participation, quizzes) will be granted only in cases with extenuating circumstances (e.g., concussions). This must be arranged with the instructional team, and we have sole discretion over whether or not to grant an extension or make-up.
    - Requests submitted within a week of the original due date have a higher chance of being granted. We assume a very serious circumstance must have occurred if you are unable to contact us within a week of the original due date. In such cases, please loop in your Resident Dean when contacting us.
    - If an extension has been granted, the late penalty will apply following the new deadline.
    - The **absolute last day** for any **make-up work** submission for serious extenuating circumstances is **Friday, May 10, 2024**. The request for such extension must be submitted to me via email by **Wednesday**, **May 1, 2024.** I will then review the request and inform you whether the request has been approved. For these last-minute requests, unless the extenuating circumstances were clearly conveyed to the instructional team (your TF *and* instructor) and your Resident Dean during and throughout the course of the semester, some form of late penalty will apply even if extension is granted. No make-up work request or extra credit opportunity will be granted after grades have been posted.
- **Exams make-up policy**: It is in your best interest to take the examinations at the scheduled time. At my discretion, some type of special arrangement may be made if you miss an examination for a well-documented, verifiable, and unavoidable reason based upon written documentation. If you miss an exam without a good reason, you will receive a zero for that exam. In order to schedule a make-up exam: 1a) you must contact me *and* your TF via email well ahead (minimum 1 week for anticipated absences) of the regularly scheduled exam time; 1b) you must contact me and your TF via email as soon as possible for an emergency/something that comes up unexpectedly (e.g., an illness); and 2) I have to agree that your reason for missing the regularly scheduled examination time is sufficient, valid, and verifiable. Unlike the regularly scheduled exams, in most cases make-up exams will be more difficult with additional readings, critical review, and/or stricter time limits and format (e.g., closed book).

- **COVID/Health- and Family-Related Contingency Planning:** We have made an effort to set the course up so that we can flexibly accommodate students who feel unwell (e.g., required to isolate due to COVID). If you are unable to attend class, please email me and your TF. Please also carefully review the contingency planning section at the bottom of this document, which carefully outlines how you can keep up with course work remotely if you are feeling well enough to do so.
- **Use of Electronic Equipment During Class:** Because the methodological concepts elaborated in the lecture units will be heavily supported by the use of R, you are ***encouraged*** to bring your laptop or tablet to class and lab sections. Feel free to use your electronic devices for note-taking and writing. However, please refrain from using class time for e-mails, instant messaging, social networking, or texting, as it is disruptive to those around you. If you are unable to bring your laptop to class or unable to submit your in-class participation assignment electronically, you *must* provide a written note version and hand it to the instructor or your TF by the end of the lecture period to earn your participation point.
- **Communication Policies**: Please refer to the email template. We will check our emails regularly but not immediately. Allow at least 24 hours for a response during the weekday. We will not respond to questions after 8:00 pm and questions during the weekend may take more time for a response.
- **Academic Integrity and Plagiarism:**
    - Out of fairness to the vast majority of students who take their education seriously, no form of academic dishonesty will be tolerated. It is expected that all of the assignments you turn in for this course will be your own, original work, and that you will be honest with me in matters concerning attendance and late assignments. You are free to work with other students when reviewing course material, and when preparing for quizzes, exams, and your final project. However, each student should submit only their own work on quizzes and exams. For the final lab project, students will work in groups of two or three.
    - To avoid committing plagiarism, you must follow two main rules:
        - Always cite the source of a finding, idea, or argument that isn't your own, no matter how much rewording you have done
        - Always put the findings, ideas, and arguments you cite into your own words. If a direct quote is absolutely necessary, put the text in quotation marks and include a page number in your citation.
    - Please refer to the Academic Integrity Policy in the Student Handbook for more details
    - Any suspicion of Honor Code violation will be referred to the Honor Council.
    - Additional Information:
        - Harvard Guide to Using Sources
        - The Honor Council | The Honor Code (harvard.edu)
- **Accommodations**: Students needing academic adjustments or accommodations because of a documented disability should present their Faculty Letter from the Disability Access Office (DAO) and speak with Dr. Lin by the end of the second week of class. Failure to do so may result in the Course Head's inability to respond in a timely manner. All discussions will remain confidential, although the DAO invites Faculty to discuss appropriate implementation with them.
- **Responsible use of Generative AI Tools:**
    - You are welcome to use generative AI models (e.g., ChatGPT, DALL-E, Stable Diffusion, Midjourney) in an unrestrictive fashion for your quizzes, exams, lab codes, presentation images, etc. However, you should recognize that large language models (LLMs) have a tendency to hallucinate, making up "facts" or citations that do not exist, ***code generation may produce inaccurate output***, and text-to-Image models can also produce offensive content.
    - You are responsible for any inaccurate, biased, or unethical content you submit regardless of whether it comes from you or a generative AI model.
    - If you decide to use a generative AI model, you need to
        - clearly acknowledge its use in your submission and
        - include the text of your query.

- In other words, in PSY 1900, the policy on **Academic Integrity and Plagiarism** (see above) applies to the use of AI generated contents (i.e., you should cite it properly).
- Having said all these disclaimers, I do encourage you to use Generative AI Tools, as they *may* help you submit assignments with higher quality in less time. (Another disclaimer: more research is needed for this claim, so take it with a grain of salt.)

Acknowledgment: In the spirit of citation and academic integrity, this policy borrows very heavily from Professor Ryan Baker's Core Methods in Educational Data Mining course at the University of Pennsylvania. Permission granted (R. Baker, personal communication, August 15, 2023).

Additional Resources regarding Your Wellbeing

Students often experience issues that may interfere with academic success and personal wellness, including stress, anxiety, hopelessness, life events, and other disruptions. If you or a friend is struggling, we strongly encourage you to seek support from course staff or on-campus resources.

- If you are struggling with this course, please visit during office hours or contact me by email at gcl741@mail.harvard.edu.
- Visit the Academic Resource Center (ARC) for specific information about mental health in the academic setting
- Meet with your academic advisor, proctor, or resident dean if you are struggling in multiple classes, unsure whether you are making the most of your time at Harvard, or unsure what academic resources are available at Harvard.
- Call CAMHS or the 24/7 CAMHS Cares Line at (617) 495-2042 or visit CAMHS (4th floor of Smith Campus Center at 1350 Massachusetts Ave, Cambridge, MA 02138) between 8:30am to 5:30pm to ask questions or make an appointment.
- Visit Find Help Now | Counseling and Mental Health Service for help with getting professional resources, Our Services | Counseling and Mental Health Service for information about other CAMHS resources, and Peer Counseling for help finding the best peer counseling resource for you.

Grading Scale

93-100 (A), 90-92 (A-), 86-89 (B+), 83-85 (B), 80-82 (B-), 76-79 (C+), 73-75 (C), 70-72 (C-), 66-69 (D+), 63-65 (D)
66-69 (D+), 63-65 (D), <59 (E)

This course may be taken Pass/Fail with permission of the instructor. However, to count towards the Psychology concentration or secondary field requirements, the course must be taken for a letter grade.

Class Schedule

WEEK	Date	Day of Week	Topic
WEEK 1	9/3/2024	Tuesday	Course Intro / Preview of Final Project
		Lab	R & Posit Intro
	9/5/2024	Thursday	Data & Basic Concepts; Overview of Stat Tests
WEEK 2	9/10/2024	Tuesday	Describing Data I
		Lab	R Basics & DataViz
	9/12/2024	Thursday	Describing Data II
WEEK 3	9/17/2024	Tuesday	Standard Normal Curve
		Lab	More DataViz + Descriptive Statistics
	9/19/2024	Thursday	Standard Scores
	9/20/2024	**Friday**	**Project Deliverable 1 due**
WEEK 4	9/24/2024	Tuesday	Central Limit Theorem

		Lab	Z-score and Sampling
	9/26/2024	Thursday	Standard Errors
WEEK 5	10/1/2024	Tuesday	NHST
		Lab	z-test, SE, barplot
	10/3/2024	**Thursday**	**Review. (Exam 1 Take-Home. Exam opens after class)**
	10/4/2024	**Friday**	**Exam 1 due**
WEEK 6	10/8/2024	Tuesday	t-test and friends
		Lab	t-test and friends
	10/10/2024	Thursday	Correlation
WEEK 7	10/15/2024	Tuesday	Regression I: Simple Regression
		Lab	Correlation & Simple Regression
	10/17/2024	Thursday	Regression II: Multiple Regression
	10/18/2024	**Friday**	**Project Deliverable 2 due**
WEEK 8	10/22/2024	Tuesday	Regression III: Residual Diagnostics
		Lab	Multiple Regression (with diagnostics)
	10/24/2024	Thursday	Regression IV: Regression with Categorical Predictors
		Friday	**Project Deliverable 2 REVISION due**
WEEK 9	10/29/2024	Tuesday	Chi-Sq
		Lab	Regression with Categorical Predictors
	10/31/2024	Thursday	**Review (Exam 2 Take-Home. Exam opens after class)**
Week 10	**11/4/2024**	**Monday**	**Exam 2 due**
	11/5/2024	Tuesday	One-way ANOVA
		Lab	Chi-Sq and One-way ANOVA
	11/7/2024	Thursday	Repeated Measures ANOVA
WEEK 11	11/12/2024	Tuesday	Factorial ANOVA
		Lab	Repeated Measures ANOVA
	11/14/2024	Thursday	Factorial Mixed ANOVA
WEEK 12	11/19/2024	Tuesday	Advanced Topics
		Lab	Factorial ANOVA
	11/21/2024	Thursday	**Review (Exam 3 Take-Home. Exam opens after class)**
WEEK 13	11/25/2024	Monday	**Exam 3 due**
	11/26/2024	Tuesday	Project Consultation Day
	11/27/2024	**Wednesday**	**Project Deliverable 3 due**
	11/28/2024	Thursday	THANKSGIVING BREAK
WEEK 14	**12/3/2024**	**Tuesday**	Advanced Topics II
	12/9/2024	**Monday**	**Final Project Presentation Day: poster files must be uploaded by 9am**

*Note. Two bonus videos for regression will be posted on Canvas. One is on regression with interaction terms and the other one is outside of the scope of this introductory class. You're not required to watch them, but they may be helpful for certain project ideas and if you'd like to challenge yourself.

Reading List

Week	Required	Recommended	Example Articles
1	Wheelan Intro & Ch1	Vickers1-4 Field – variables and scales select pages	Aguilar-Roca et al. 2012; Callahan 2005 Liu et al. 2021
2	Wheelan Ch2	Altman & Bland, 2005	Ramani et al., 2020
3	Wheelan Ch3		Barham, 2012; Mallan et al. 2017; Reynolds, 2006; Sullivan et al., 2014
4	Wheelan Ch7-8 Nagele, 2003 Sedgwick, 2015	Vickers5-9	Au et al., 2021; Callahan, 2005 Muñoz-Leyva et al., 2022; O'Brien & Roney, 2017; Parlett-Pelleriti et al. 2019; Ramani et al., 2017
5	Wheelan Ch5 Probability Wheelan Ch9 Inference		See Week 4
6	Vickers Ch16 Wheelan Ch4	Field Ch9;	Holmes et al., 2009; O'Brien & Roney, 2017; Ramani et al., 2017; Yoshimura et al., 2017; Dillion et al., 2023; Hasiloglu & Kunduraci, 2018
7	Wheelan Ch11	Field Ch6 p205-229 Gomila, 2021: logistic or linear?	Hilgard et al., 2019; Humphreys et al., 2022; Jenkins et al., 2016; Mallan et al., 2017; Okano et al., 2019; Preece et al., 2021; Thompson et al., 2022; Watts et al., 2018; Zuk et al., 2021
8	Field Ch7 (up to p. 263) Wheelan Ch12	Field Ch7	See Week 7, but in particular: Humphreys et a., 2022
9	Field Ch18 pp813-827	Schober & Vetter, 2019	Al-Hamdani et al., 2021; Xu et al., 2021; Yang et al., 2020
10	Field Ch10 Field Ch13 (up to p. 582)		Festinger & Carlsmith, 1959; Ramani et al., 2017; Xu et al., 2021; Van Rompay et al., 2018; Au et al., 2021; Gayet-Ageron et al., 2021; Kantono et al., 2016; Yoshimura et al., 2017 Elbin et al., 2018 Fortune et al., 2019 Monteleone et al., 2021
11	Field Ch12 Field Ch13 (remaining pages)		See Week 11 Hilgard et al., 2019; Van Rompay et al., 2018; Weisberg et al., 2008

Note. For empirical articles, read the tables and the results section where the authors report the statistics. More articles are posted on Canvas for each topic.

References	Week	Topic
Aguilar-Roca, N. M., Williams, A. E., & O'Dowd, D. K. (2012). The impact of laptop-free zones on student performance and attitudes in large lectures. *Computers & Education, 59*(4), 1300–1308. https://doi.org/10.1016/j.compedu.2012.05.002Links to an external site. Callahan, R. M. (2005). Tracking and High School English Learners: Limiting Opportunity to Learn. *American Educational Research Journal, 42*(2), 305–328. https://doi.org/10.3102/00028312042002305Links to an external site. Liu, T.-C., Lin, Y.-C., Wang, T.-N., Yeh, S.-C., & Kalyuga, S. (2021). Studying the effect of redundancy in a virtual reality classroom. *Educational Technology Research and Development, 69*(2), 1183–1200. https://doi.org/10.1007/s11423-021-09991-6Links to an external site.	1	Data, variables, scales
Altman, D. G., & Bland, J. M. (2005). Standard deviations and standard errors. *BMJ, 331*(7521), 903. https://doi.org/10.1136/bmj.331.7521.903 Ramani, G. B., Daubert, E. N., Lin, G. C., Kamarsu, S., Wodzinski, A., & Jaeggi, S. M. (2020). Racing dragons and remembering aliens: Benefits of playing number and working memory games on kindergartners' numerical knowledge. *Developmental Science, 23*(4). https://doi.org/10.1111/desc.12908	2	Standard deviation and standard error
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Hilgard, J., Engelhardt, C. R., Rouder, J. N., Segert, I. L., & Bartholow, B. D. (2019). Null Effects of Game Violence, Game Difficulty, and 2D:4D Digit Ratio on Aggressive Behavior. *Psychological Science, 30*(4), 606–616. https://doi.org/10.1177/0956797619829688Links to an external site. Van Rompay, T. J. L., Kramer, L.-M., & Saakes, D. (2018). The sweetest punch: Effects of 3D-printed surface textures and graphic design on ice-cream evaluation. *Food Quality and Preference, 68*, 198–204. https://doi.org/10.1016/j.foodqual.2018.02.015Links to an external site. Weisberg, D. S., Keil, F. C., Goodstein, J., Rawson, E., & Gray, J. R. (2008). The Seductive Allure of Neuroscience Explanations. *Journal of Cognitive Neuroscience, 20*(3), 470–477. https://doi.org/10.1162/jocn.2008.20040Links to an external site.	12	Factoria ANOVA and mixed ANOVA

Excused Absence contingency planning

Procedure in the event that you are unable to attend class due to reasons such as:

- Isolating due to positive test for COVID
- Participating in a school sanctioned event (e.g., away game, academic conference)

First off –
For medical reasons: oh dear! I'm sorry about this situation!
For school sanctioned event: good luck!
In any case: We are here to support you in whatever way you need!

Lecture Participation

- Pending our lecture hall, lectures will likely be recorded. You will have access to the recorded lecture to review the materials.
    - You may email a document to the Head TA and Grace with the answers to questions/responses to posed during class to receive participation point.
- If you carefully review the recordings and materials you will not miss any content!

Quizzes

- Reminder: You get to drop *three* quizzes and get to take them at home. This should serve as a cushion when you are unable to attend class. If you are feeling too unwell to take the quiz on the specified day, please notify **your TF, the head TA, and Grace** ahead of times if possible or afterwards with verifiable proof (e.g., from your Resident Dean). See policy section – Late Work for more details.

Lab Section: Content and Attendance

- At least one TF's section will be recorded and posted on Canvas each week. You will be able to view the video for any contents you missed.
- Remember, you are allowed to miss two lab sections with no penalty to your attendance grade.

P-Set

- If you are unable to complete the p-set on time please inform your TF BEFORE the deadline. If you circumstances prevent you from doing so (e.g., you are running a high fever or you are concussed), notify the instructional team ***after*** you get better and we can arrange for make-up work if needed.
- Reminder: you can miss up to 2 p-sets and still get full credit!

Student Hours

- Don't forget your awesome instructor and TFs offer student hours! (Can be arranged both in person or online!)

Exams

- If you are not well enough to complete the exams during the scheduled time, please inform Grace and the Head TA and we can open up the exams for you at another time.
- The Head TA will reach out to you to schedule a makeup time

Final Project Presentation

- If you are not well enough to present during the presentation week, please inform Grace and your TF and we can arrange a makeup presentation time.

FAQs

What if I end up missing more than 2 sections?
You should contact your TF by the third week of class or at least *one week* before the absence for any known absences (e.g., religious observation, away game, previously scheduled appointment that you cannot miss) so that we can arrange a make-up opportunity for you.

If you have more than two (2) unavoidable absences, *please contact your TF within a week of the absence* to arrange for make-up activities.

If your condition is so severe that you are out for more than a week or you cannot reach us within 1 week of the absence, please copy your Resident Dean in the email or have your Resident Dean contact us so they can verify your extenuating circumstances. Make-up activities can be arranged upon your return per the communication with your Resident Dean.

Note – this only applies if your condition and circumstances are severe. If you simply forgot to notify us within a week, you will be told, "Sorry that you weren't able to make it to lab. Make sure you watch the lab recordings and let us know if you have any questions about the content. As for the attendance score, the cutoff for contacting us is one week. It's been over a week, so the 0 will remain."

What if I joined the class late and missed assignments?

Please set up a meeting with the Head TF who will walk you through the necessary steps to make up the assignments. For example, if you missed a quiz because it occurred before you enrolled in the class, make sure you catch up on the contents, and Ben (the Head TA) to open up the past quiz(zes) for you so you can make it up.

How will I be graded on the Final Research Project?

You will also be graded on your collaborative team effort. Early in the semester, you will establish a contract with your teammates and submit your signed contract. Your final Research Project score will be adjusted based on your contribution to the team work.

We will set milestones throughout the semester to help you stay on top of your work. Grades on the interim milestones will be based on your effort and/or the accuracy of your statistical approach, analysis, and interpretation. You will base your later submissions on the feedback you receive on previous round(s).

Each team will have to schedule at least one office hour appointment with the TFs for the final project.

The in-person presentation will occur during the last full week of class (see class schedule above). To ensure that you are invested in not only your project work but also your peers', bonus questions on the final will pertain to select student project work.

To note, because you will have ample opportunities (see Exams 1, 2, and 3) to demonstrate your analytic skills and interpretation via writing individually, a heavier emphasis of the research project is on **your oral presentation skills**. Can you effectively communicate the RQ for your statistical test, the findings, and your interpretation?