Applied Statistics
Syllabus

MTH-361 | Section A
Spring 2025 | University of Portland

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Department of Mathematics
University of Portland

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About the Class

Course Information

- Title: MTH 361: Applied Statistics I
- Sections: A

Instructor Information

- Instructor: Dr. Alex John Quijano
- Office: Buckley Center 279
- Email: quijano@up.edu

Lectures and Discussions

This course meets on Mondays, Wednesdays, and Fridays. Wednesdays and Fridays will focus on discussing topics. Homework and project phases will be scheduled for alternating Mondays. The typical class routine will include pre-reading assignments before each class, followed by a short lecture or demonstration, worksheet activities, group presentations, and discussions.

The course schedule and location is:

- **Section A:** MWF 11:25 AM - 12:20 PM, Franz Hall 125

Textbook

This course uses the following textbook - which is free to access - for reading and practice.

Click on the link to access the resources.

- Speegle D, lair, Bryan (2021). *Probability, Statistics, and Data: A, Fresh Approach Using R*. Chapman and Hall/CRC., https://probstatsdata.com/.

Communication Tools

Class Website

The syllabus, tentative topics schedule, and other information are posted on the course website.

> You can access the course website at mth-361a-sp25.

Note that this website can also be viewed in Teams.

Microsoft Teams

We will be using Teams as the main real-time communication tool for general announcements, question-answering discussions, and direct messages. I added you to the Teams page already, so you just need to log in using your UP credentials. If not, then send a request when you log in. Let me know if you need any assistance.

I recommend that you install the Teams software on your own machine for easy and stable access, instead of accessing Teams on the browser.

> The Teams for this course is MTH-361A-sp25.

Note that this course website and textbook can be accessed in Teams.

Email

My UP email is quijano@up.edu.

> If you prefer communicating through email, note that I have set up an email filter for this course, and you must put the "MTH 361" keyword in your subject line.

It is easy for me to get notice of your email if you put the keyword in the subject line. Concise and specific messages are helpful, so I know how I can best help you.

Assignment Tools

Moodle

We will be using the course Moodle page for submitting assignments and giving feedback.

> The Moodle for this course is MTH-361A - sp25 - Applied Statistics I. You are already listed in Moodle for this course using your UP account.

Posit Cloud

We will be using a computational tool (R) for some assignments. These tools are free and open-source. We will use the Posit Cloud service, an online computing environment.

> Create a free account at Posit Cloud Sign-Up using your UP email. Note that you must use your UP email for me to add you into the course's workspace in Posit Cloud. You will receive an email inviting you into the workspace at the first week of the semester.
>
> R instructions and materials will be provided ad hoc.

Note that the Posit Cloud computing service is free for you but it is metered by computation hours for the instructor. Please only use the service for course related computations.

If you are interested in using your own machine, you can install R environments yourself. First, you need to install R. Next, install R Studio.

Learning Goals

Description

This course offers an introduction to exploratory data analysis, probability theory, random variables, regression modeling, hypothesis testing, point and interval estimates, and sampling methods. Students will gain an understanding of foundational statistical concepts and probability models used across disciplines. Emphasis is placed on a data-driven approach and project-based learning, with the goal of developing the ability to provide clear and organized written and verbal explanations of statistical and probabilistic ideas to a diverse audience. To promote scientific transparency, replicability, and reproducibility, the course includes an introduction to the R programming language for data exploration, visualization, and statistical and probabilistic computing.

Learning Outcomes

Upon completion of the course, you will be able to:

- Understand data structures, collection methods, and limitations, and assess how these factors influence results, while representing data graphically and computing statistical properties.
- Apply linear regression models appropriately and interpret their outcomes in context.
- Understand the basic concepts of random variables, probability theory, and their applications in statistical analysis.
- Perform statistical inference, including hypothesis testing, confidence intervals, and estimation, to draw meaningful conclusions from data and critically assess claims and decisions based on the results.
- Develop and execute basic R code for data analysis, statistical modeling, and visualization.
- Produce a detailed written report demonstrating a thorough understanding of exploratory data analysis, statistical modeling, and inference.

Learning Objectives

The following learning objectives are designed to build on one another, with some overlap. The goal is to help you achieve proficiency in these areas.

Topic	Learning Objectives
Orientation	**O1:** Identify key components of the course syllabus, including grading policies, major assignments, and due dates. **O2:** Explain the expectations and learning outcomes of the course.
Statistical Thinking	**ST1:** Define the purpose and importance of statistical thinking in data analysis. **ST2:** Differentiate between descriptive and inferential statistics through real-world examples. **ST3:** Explain the role of variability and uncertainty in data.

Topic	Learning Objectives
R and R Studio	**RRS1:** Navigate the RStudio interface and explain its key components. **RRS2:** Run basic R commands and interpret their outputs **RRS3:** Install and load R packages relevant to data analysis.
R Markdown	**RM1:** Create and compile a basic R Markdown document. **RM2:** Use R Markdown to integrate narrative text, code, and visualizations. **RM3:** Format R Markdown documents for clear and professional presentation.
Data Principles	**DP1:** Identify and categorize different types of data (numerical vs. categorical). **DP2:** Compute measures of central tendency (mean, median, mode) and spread (range, variance, standard deviation). **DP3:** Interpret descriptive statistics to summarize data.
Data Processing and Visualizations	**DPV1:** Use R to create and manipulate basic data structures, including vectors, matrices, data frames, and lists. **DPV2:** Visualize data using basic plots (histograms, box plots) using R. **DPV3:** Choose appropriate visualizations for different data types and distributions.
Study Design	**SD1:** Distinguish between observational studies and experiments. **SD2:** Evaluate the validity of conclusions drawn from observational and experimental data. **SD3:** Identify key components of a well-designed experiment (randomization, control, replication).
Inference	**I1:** Differentiate between a population and a sample, identify examples of each, and explain how samples are used to make inferences about populations. **I2:** Explain the principles of statistical inference, including the concepts of sampling variability, estimation, and hypothesis testing. **I3:** Describe key sampling techniques (simple random, stratified, cluster) and evaluate their strengths and limitations.
Exploring Numerical Data	**END1:** Identify patterns, outliers, and trends in numerical data. **END2:** Compute and interpret key summary statistics for numerical datasets. **END3:** Use R to create visualizations such as scatter plots and line graphs.
Probability & Random Variables	**PRV1:** Define and calculate probabilities using basic rules and interpret them in context. **PRV2:** Compute conditional probabilities using contingency tables and Bayes' theorem and interpret them in context. **PRV3:** Understand the concept of random variables.
Probability Functions & Expected Value and Variance	**PFEVV1:** Define probability functions and their properties. **PFEVV2:** Compute the expected value of a random variable. **PFEVV3:** Compute the variance of a random variable.
Random Sampling	**RS1:** Simulate random sampling from data using R.
Discrete Random Variables & Probability Mass Functions	**DRPMF1:** Define discrete random variables and apply them in context. **DRPMF2:** Define probability mass functions and their properties.
Binomial and Geometric Distributions	**BGD1:** Explain the properties of a binomial random variable. **BGD2:** Explain the properties of a geometric random variable. **BGD3:** Use R to compute probabilities and cumulative probabilities for binomial and geometric distributions.
Simulating Discrete Random Variables	**SDRV1:** Simulate discrete random variables using R.

Topic	Learning Objectives
Continuous Random Variables & Probability Density Functions	**CRVPDF1:** Define continuous random variables and apply them in context. **CRVPDF2:** Define probability density functions and their properties.
Normal and Exponential Distributions	**NED1:** Explain the properties of the normal distribution. **NED2:** Explain the properties of the exponential distribution. **NED3:** Use R to calculate probabilities and percentiles for normal and exponential distributions.
Exploring Categorical Data	**ECD1:** Summarize categorical data using frequency tables and bar charts. **ECD2:** Compute and interpret proportions and relative frequencies. **ECD3:** Use R to analyze and visualize categorical data.
Law of Large Numbers	**LLN1:** Explain the Law of Large Numbers. **LLN2:** Apply it to show how sample averages converge to the population mean as sample size increases.
Central Limit Theorem	**CLT1:** Explain the Central Limit Theorem. **CLT2:** Apply it to approximate the sampling distribution of the sample mean for various population distributions.
Simulating Continuous Random Variables	**SCRV1:** Simulate continuous random variables.
Estimation and Variability	**EV1:** Explain the concepts of point estimates and variation. **EV2:** Explain and interpret the p-value. **EV3:** Explain and interpret confidence intervals.
Decision Errors	**DE1:** Define and explain the null and alternative hypothesis in context. **DE3:** Define Type I and Type II errors and their implications in hypothesis testing. **DE3:** Evaluate the impact of sample size and significance level on decision errors.
Estimating Sampling Distributions	**ESD1:** Use R to simulate data and estimate sampling distributions of sample statistics through repeated sampling. **ESD2:** Interpret how the sampling distribution reflects properties such as bias, variability, and the Central Limit Theorem.
Inference for Proportions	**IP1:** Conduct a hypothesis test for one proportion, evaluate assumptions, and interpret the p-value and confidence interval for one proportion. **IP2:** Perform hypothesis tests comparing two proportions, evaluate assumptions, and interpret the p-value and confidence interval for two proportions.
Inference for Means	**IM1:** Perform one-sample t-tests, evaluate assumptions, and interpret the p-value and confidence interval for one mean. **IM2:** Perform two-sample t-tests, evaluate assumptions, and interpret the p-value and confidence interval for comparing two means. **IM3:** Conduct paired t-tests to compare means, evaluate assumptions, and interpret confidence interval and p-value for paired data.
Choosing Tests for Parameter Estimations	**CTPE1:** Choose and justify appropriate tests for parameter estimation based on data type, assumptions, and context.
Rank-Based Tests	**RBT1:** Apply the one sample Wilcoxon signed rank text, evaluate assumptions, and interpret the results. **RBT2:** Apply the two sample Wilcoxon tests, evaluate assumptions, and interpret the results.

Topic	Learning Objectives
Chi-Squared Tests	**CST1:** Use chi-square tests to assess goodness of fit, evaluate assumptions, and interpret the chi-square statistic in the context. **CST2:** Conduct chi-square tests for independence, evaluate assumptions and interpret the p-value for two-way tables.
Hypothesis Testing for Proportions and Means	**HTPM1:** Perform a hypothesis test for proportions to a dataset using R. **HTPM2:** Perform a hypothesis test for means to a dataset using R.
Linear Regression and Least-Squares, & Residual Analysis	**LRLSRA1:** Calculate and interpret the slope and intercept of a regression line in context. **LRLSRA2:** Analyze the correlation coefficient, residuals, and regression errors to assess model fit and accuracy. **LRLSRA3:** Estimate regression coefficients, distinguish regression outliers, construct confidence intervals, and evaluate assumptions using the least squares method.
Multiple Linear Regression	**MLR1:** Explain the relationship between multiple predictors and a single response variable and interpret regression coefficients. **MLR2:** Assess model fit using metrics like R-squared and p-values, and identify potential issues.
Hypothesis Testing for Linear Regression	**HTLR1:** Perform hypothesis test for linear regression to a dataset using R. **HTLR2:** Fit a least-squares regression line to a dataset using R. **HTLR3:** Fit and interpret multiple linear regression models to a dataset using R.
Inference for Many Means	**IMM1:** Use ANalysis Of Variance (ANOVA) to compare more than two group means.
ANalysis Of VAriance (ANOVA)	**AV1:** Interpret F-statistics and p-values in the context of ANOVA.
Choosing Hypothesis Tests	**CHT1:** Identify the key characteristics of different hypothesis tests and understand the conditions under which each test is appropriate. **CHT2:** Apply the appropriate hypothesis test to a given research question, considering the data type, sample size, and underlying assumptions, to draw valid statistical inferences.
Logistic Regression	**LR1:** Explain the concept and application of logistic regression in binary classification problems.

Topics Schedule

Week	Day	Topic
1	M 1/13	Orientation
	W 1/15	Statistical Thinking
	F 1/17	R and R Studio
2	M 1/20	*MLK Day (no classes, offices closed)*
	W 1/22	R Markdown
	F 1/24	Data Principles
3	M 1/27	Data Processing and Visualizations & **Homework 1**
	W 1/29	Study Design
	F 1/31	Inference

Week	Day	Topic
4	M 2/3	Exploring Numerical Data & **Project Phase 1**
	W 2/5	Probability & Random Variables
	F 2/7	Probability Functions & Expected Value and Variance
5	M 2/10	Random Sampling & **Homework 2**
	W 2/12	Discrete Random Variables & Probability Mass Functions
	F 2/14	Binomial and Geometric Distributions
6	M 2/17	Simulating Discrete Random Variables & **Homework 3**
	W 2/19	Continuous Random Variables & Probability Density Functions
	F 2/21	Normal and Exponential Distributions
7	M 2/24	Exploring Categorical Data & **Project Phase 2**
	W 2/26	Law of Large Numbers
	F 2/28	Central Limit Theorem
8	M 3/3	*Spring Vacation*
	W 3/5	*Spring Vacation*
	F 3/7	*Spring Vacation*
9	M 3/10	Simulating Continuous Random Variables & **Homework 4**
	W 3/12	Estimation and Variability
	F 3/14	Decision Errors
10	M 3/17	Estimating Sampling Distributions & **Homework 5**
	W 3/19	Inference for Proportions
	F 3/21	Inference for Means
11	M 3/24	Choosing Tests for Parameter Estimations & **Project Phase 3**
	W 3/26	Rank-Based Tests
	F 3/28	Chi-Squared Tests
12	M 3/31	Hypothesis Testing for Proportions and Means & **Homework 6**
	W 4/2	Linear Regression and Least-Squares, & Residual Analysis
	F 4/4	Multiple Linear Regression
13	M 4/7	Hypothesis Testing for Linear Regression & **Homework 7**
	W 4/9	Inference for Many Means
	F 4/11	ANalysis Of VAriance (ANOVA)
14	M 4/14	Choosing Hypothesis Tests & **Project Phase 4**
	W 4/16	Logistic Regression
	F 4/18	*Easter vacation*
15	M 4/21	*Easter Vacation*
	W 4/23	Project Period
	F 4/25	Project Period
16	Tu 4/29	**Final Project Presentations (8:00 AM to 10:00 AM)**

Academic Support

Help Hours

Dr. Alex John Quijano

- Walk-in Monday to Friday at 4:00 PM - 5:00 PM, Buckley Center 279
- One-to-One, Buckley Center 279 or in Teams *Click on the link to sign-up for a 15-minute*

session.

My walk-in help hours start week 2. Note that you can bring a fellow student with you when you sign-up for a session. Just click the "Add Guests" link when you sign-up, and add in your fellow student's UP email. If you need more than 15 minutes, you can book at least two consecutive sessions.

The Learning Commons

You can get academic assistance through Learning Commons tutoring services and workshops. The Co-Pilot peer tutoring program provides you with opportunities to work with other students to get help in writing, math, group projects, and other courses. Schedule an appointment to meet with a Co-Pilot (tutor) by visiting the Learning Commons website. You can also meet with a Co-Pilot during drop-in hours. Check the Learning Commons website or drop by the Learning Commons in BC 163 to learn more about their services. Find a tutor at the Learning Commons to get support on your academic journey.

Math Resource Center

Appointment-based tutoring accepts appointments starting week 1 and sessions start week 2. Visit the Math Resource Center website to sign-up for an appointment. Drop-in tutoring is Monday to Thursday, 3:00 PM - 7:00 PM in BC 163 and starts week 2. Check the Math Resource Center website or drop by the center for more information.

Help Hours Guidelines

It is strongly recommended that you attend the walk-in help hours or set up a one-to-one meeting with the me if you feel like you are falling behind during our in-person class activities, or if you just need to clarify concepts discussed in class. In order to be more productive during a one-to-one meeting (or the walk-in help hours), these are three recommendations before you come in:

- List all gaps in knowledge you have (missed concepts) or list all concepts that were unclear to you during class. We will address them one by one.
- Prepare questions you want answered and be ready to show relevant materials.
- Regarding assignments, prepare to show (a) what are the steps you have tried and (b) what are the errors you encountered and the strategies you have tried.

Note that these are recommendations so that you can get the most out of the help hours allocated for you. If you just want to come in and chat about something else, feel free to do so. If the dedicated time for one-to-one meeting does not work for you, send me a message to set up an appointment.

Collaboration Policy

I expect you to participate in the class through lectures, class activities, discussions, homework, and other engagements. I also expect you to make use of opportunities to get help outside of class (help hours, Teams, email, tutoring) if you need help. Concise and specific messages are the most helpful so I know how I can best help you.

> You are encouraged to participate in discussions with your peers regarding assignments. However, each student must take responsibility and ownership of their work and submit their work individually, except for group projects.

Assessment

Assessment Disclosure Statement

Student work products for this course may be used by the University for educational quality assurance purposes. For reasons of confidentiality, such examples will not include student names.

Standards-Based Grading

Learning statistics demands focus, rigorous examination of the concepts you have encountered, and a process of ongoing refinement and improvement. You will be assessed on your proficiency in statistical thinking, scientific reasoning, and inference. You will have opportunities to demonstrate your proficiency, revise your work, and reflect on your growth in analyzing data, interpreting results, and making data-driven conclusions.

This course uses a standards-based grading system, which emphasizes mastery of specific learning objectives. This approach is more precise and motivating than traditional grading methods and fosters a more equitable learning environment. Key features of standards-based grading include:

- A clear focus on mastering defined learning objectives
- The use of diverse assessment methods to evaluate understanding
- Regular, detailed feedback to guide your progress
- Support in setting meaningful goals and tracking your growth

This system prioritizes learning and personal development, enabling you to excel and reach your highest potential.

General Marking Guide

Each assignment will be graded according to the general marking guide detailed below. You will be given feedback on your assignment and learning process to improve your performance. Note that each assignment has its own rubric guided by these general guidelines and the assignment's learning objectives.

Given the following marks, your work:

Mark	Rubric Description
Outstanding (O)	Demonstrates a full understanding of the material, clearly and concisely explains concepts, applies them correctly and efficiently to solve problems, and may extend the concepts to new situations.
Excellent (E)	Demonstrates an approximate understanding of the material, may have made minor errors but is able to correct them and explain the reasoning, solves problems correctly, and may need more time or practice to improve efficiency.
Acceptable (A)	Demonstrates some understanding of the material but makes errors, can solve some problems, may need help with more difficult ones, and may need to work on improving problem-solving skills and reasoning.
Needs Improvement (NI)	Shows potential but needs more work, may have made several errors, is unable to solve problems, and needs to focus on understanding the material and developing problem-solving skills.

Mark	Rubric Description
Needs Major Improvement (NMI)	Shows little understanding of the material, may have made many significant errors, is unable to solve problems, and needs to focus on building a foundational understanding of the material.
Missing (M)	Shows incomplete (either entirely or partially) or incomprehensible work.

Note that these are categorical marks (not numerical scores).

Final Course Grades

Assignment	Rank	Mark	A	B	C	D
Project Phases	1	O	90%	-	-	-
		E	-	80%	-	-
		A	-	-	70%	-
		NI	-	-	-	60%
Homeworks	2	O	100%	-	-	-
		E	-	90%	-	-
		A	-	-	80%	-
		NI	-	-	-	70%
Worksheets	3	Completed	90%	80%	70%	60%

The above table shows the percent of given assignments. These percentages are minimum requirements for each letter grade. The rank determines the importance of each assignment where 1 means the highest rank and 3 means lowest rank.

> If you need more assistance on understanding your overall standing in this course, I encourage you to communicate with me directly.

Assignments

Submission Guidelines

Your work must be labeled correctly and clearly written. Homework and worksheets can be electronically hand-written or typed but must be uploaded to Moodle as a single pdf or html file. If you choose to handwrite your answers on paper, scan your document using a scanner app to ensure the text is clear. I recommend using the 'Adobe Scan' app, which is available for both Android and iOS."

> You need to submit all assignments online through Moodle.

Worksheets

There will be worksheets every Wednesday and Friday. The purpose of the worksheets is for in-class group work and activities.

> You must submit your worksheet individually by end-of-class or end-of-day. Your name must exist in your worksheet and the names of your collaborators.

Worksheets are marked mostly on completion, and partially on correctness. It will be marked either pass or fail, there will no detailed feedback on worksheets, and no opportunities for revisions and make-up.

Homeworks

Homework is assigned every Monday. The purpose of the homework is to provide practice with problems, and it will include tasks that involve R.

> You must submit your homework individually by the end of the day on Friday of the week it is assigned.

Homeworks are marked using the general grading guide and will be returned with detailed feedback.

Homework Revisions

You can revise your homework for an up-grade, meaning - for example - a grade of "NI" can be up-graded to "A".

Here are the qualifications and requirements for homework revisions:

- A homework mark of "NMI", "NI", "A", or "E".
- The revised homework must be completed, meaning all parts should have your full written solutions.
- Homework marked with "M" is disqualified for revisions, but you can still use them as practice.

Here are the rules for homework revisions:

- Homework revisions are accepted within one week of the homework being returned to you, otherwise the grade is set.
- You can revised your homework multiple times as long as it is not marked as "M".

Project Phases

Writing a scientific report/paper is essential for any student who wants to pursue a STEM career or STEM-related careers. Your project is a way for you to get exposure to the rigors of writing a paper that involves data exploration and statistical analysis.

This course's main assessments is through a semester-long project and it will be divided into phases. The purpose of the project phases is to break the semester-long project into smaller tasks, allowing for incremental progress toward its completion.

- **Phase 1: Group formation and data selection.** Each group should consist of 2-4 people. For people who want to form their own groups, please send a list of names for your group by the due date. The rest will be randomly assigned. Each group must choose a data set to analyze. Each group should have a unique data set. Final group formations will be announced.
- **Phase 2: Study design, data exploration, and framing research questions.** Explore your chosen dataset. Your first project report document must include these three parts:
  - *Dataset:* Put together your first data frame. What is it? Where does it come from? What is the description of each variable? What are the types of variables? What kind of sampling strategy (or data collection) was used?

  - *Exploration:* Exploring the dataset involves creating plots such as scatterplots, bar plots, boxplots, histograms, etc. Once you see what you are interested in, pick plots relevant to your research questions.
  - *Research questions:* Formulate your research question and include relevant background research.

- **Phase 3: Hypothesis formulation, more data exploration, and testing out appropriate methods.** Focus on data exploration, test the methods discussed in class, and formulate a hypothesis with clear statements and appropriate mathematical symbols. Action items should address the feedback provided in the Phase 2 submission. Your second project report document must include these three parts:

  - *More Exploration:* To create a hypothesis, you must explore more and consider different ways to look at your data. What other variables can you include in your analysis? What are your observations of the data?
  - *Hypothesis Formulation:* Based on your research questions, formulate a hypothesis –or hypotheses. The hypothesis statements must be complete sentences with their corresponding mathematical notations.
  - *Trying Out Statistical Methods:* Depending on the hypothesis, what statistical method can you apply to answer your research question (randomization, bootstrapping, etc.)? Are you using proportions, means, difference in proportions, difference in means, etc? What are your point estimates? What are your initial results/findings/observations?

- **Phase 4: Methods fine-tuning, and writing the interpretation and discussion of the results in the context of the data.** Implement the method described in Phase 3 and address the feedback comments. Your third project report document must include these three parts:

  - *Performing the statistical analysis:* Rigorously perform the appropriate statistical method for your data.
  - *Interpret the results and discuss your conclusions:* Write at least two paragraphs detailing the results of your analysis. What insights and conclusions can you write based on your results? How do your results support your hypothesis? Are your research questions answered or supported?

- **Final Phase, Presentations, and Peer Review: Draft conclusions, compile the report into a cohesive scientific narrative, and participate in the peer review process.** Your final report and presentation must include the following:

  - *Put your report together as one scientific narrative:*Your final report should contain these three parts below. Note that you already wrote most of these from Phases 2-4. You need to organize them in a more scientific narrative fashion.
    * **Title.** Your final project report must have a descriptive title, and list all group members.
    * **Introduction.** This section should include your background research, research questions, hypothesis statements, and data description.
    * **Data Exploration.** This section should explore the data that leads to your question and hypotheses. Include details on how you wrangle your data or if you made additional computations.
    * **Methods.** This section should include the processes you used for your statistical method.
    * **Results and Discussions.** This section should include the results of your statistical analysis and discuss them in the context of your research question. You can still include figures and tables here.
    * **Conclusions.** This is a summary of your argument or experiment/research, and it should

be related to the introduction.
- *Create a 10-minute Presentation:* There will be a final presentation on the day of the "final exam". Your talk should highlight and be organized around the following points.
  * **Short Title.** Include a short title of your report and list all group members.
  * **Motivation.** What is the problem? Why should the audience tune in to this talk? Why is this an interesting problem?
  * **Key Ideas.** What is your dataset? What statistical methods did you use? What are the strengths and weaknesses of the method you used? What are the results? What are your key conclusions?
- *Peer Review:* Complete the peer-review questionnaire on the day of the presentations, where you answer specific questions to review another group's project presentation.

The final project presentations are on:

- **Section A:** April 29, Tu 8:00 AM - 10:00 AM, Franz Hall 125

Project Assessments

Project phase reports are marked using the general grading guide and will be returned with detailed feedback. Each phase will include the group's project report and an individual assessment worksheet.

There will be no revisions for project phases because each phase is designed to include drafting and revising as part of the process. This semester-long project is intentionally structured to be iterative.

Assessing Project Reports The project reports allows you demonstrate your understanding of the material in written form. This part will be evaluated on the details of your methodology and analysis.

Reports will be graded on 3 components:

Report	Description
Methodology	The method should be sound and well-founded. It should be based on a solid understanding of the underlying principles. The method should be applied correctly and consistently.
Reasoning	The solution method should be explained in a clear and logical way. The steps of the method should be justified and explained. The reasonableness of the solution should be justified.
Writing	The solution process should be written in a clear and concise way. The steps of the method should be easy to follow. The graphs/diagrams/equations should be clear and helpful. The mathematical notation should be used clearly and correctly.

Assessing Presentations The project presentations allows you to demonstrate your understanding of the materials as well as your ability to communicate your work.

Presentations will be graded on 3 components:

Presentation	Description
Knowledge	This includes the student's ability to recall and apply statistical concepts and procedures. The student should be able to answer questions about the material in a clear and concise way, and they should be able to solve problems using a variety of methods.
Communication	This includes the student's ability to explain their thinking clearly, concisely, and timely. The student should be able to use statistical language fluently, and they should be able to communicate their ideas in a way that is understandable.
Problem-solving	This includes the student's ability to identify and solve statistical problems. The student should be able to think critically about problems, and they should be able to develop and implement strategies for solving them.

Project Guidelines

> Each group must submit a report together by the next project phase. The report must be written in RMarkdown and saved as html file.

The final report must include all relevant R codes that generated all figures and statistical analysis. R codes can be also be included in the Appendix section of your report if you choose. The R Code must be properly documented or with comments.

For this project, you are encouraged to utilize all resources available to you, including course materials, online references, and collaborative discussions with your group members. However, you must adhere to the following guidelines:

- **Follow the Academic Integrity Policy:** Ensure all work is your own or properly credited where collaboration or external resources are involved.
- **Comply with the Course AI Policy:** Any use of AI tools must align with the course-specific AI guidelines provided. Misuse of AI will be considered a violation of academic integrity.
- **Adhere to Referencing and Citation Guidelines:** Properly cite all external sources used in your work to give appropriate credit and avoid plagiarism.
- **Uphold the Academic Honor Code:** I trust you to maintain the highest standards of honesty and integrity in your work.
- **Take Ownership of Your Work:** Each group member must contribute meaningfully and be prepared to explain and defend the project outcomes.

By following these principles, you will not only meet the project requirements but also demonstrate your commitment to ethical and responsible academic practices.

Here are some other rules regarding group formations:

- If a group must be disbanded for any reason, students need to discuss their disbandment to me - as soon as possible - for a detailed plan on how to move forward.
- If groups must be combined for any reason, the new group must inform me about the union as soon as possible, and their plans on moving forward.
- Group disbandment or union are allowed up to Phase 3 of the project. Special cases are considered.

Expectations

Deadline Extension Policy

If you need more time to submit a homework assignment, you may request an extension by following these steps:

- Communicate with me at least 12 hours before the deadline.
- Specify the exact day you plan to submit your work or the number of extra days you need.
- Please ensure that you adhere to the established timeline for submitting assignments, as it is important to maintain fairness and avoid over-reliance on extensions.

Submitting a few hours late is usually not a major issue, as long as I receive your work before I begin marking and providing feedback. An extension is not required in such cases. Extensions for worksheets will only be granted if I decide to extend the deadline for the entire class.

Withdrawal Procedures

It is the student's responsibility to drop the course if he or she is no longer planning on attending the course or filling the other course requirements. In order to drop, the student must use and Add/Drop form available at the Registration Office. If a student does not properly withdraw from a course, he or she may receive an **F** for the course. A properly withdrawn student will receive a **W**. The last day to withdraw is **Monday, April 14th**.

Appointment Cancelation Policies

You can cancel your appointments, but it is strongly recommended that you cancel 24 hours before your scheduled time so that other students can schedule when a spot opens. You can reschedule for a different day and time if you need to.

Please try to show-up to any of your appointments. If you have extenuating circumstances, please let me know as soon as possible to discuss next steps.

Attendance and Participation

Attendance is not tracked. However, participation is highly recommended. You are expected to actively participate in this class. Participation includes coming to class on time, being prepared, being willing to ask questions and share ideas, setting up study groups outside of class, attending tutoring sessions, posting helpful resources online, and contributing to the Teams discussion channels. Group and individual presentations of ideas is a suggested component of participation.

Absences

Generally, students are expected to attend all class sessions according to the instructor's direction. Students who feel unwell should NOT attend class in person. These students should inform their instructor as soon as possible.

Should the instructor need to miss class, the course may be temporarily conducted remotely. Should the instructor be unable to teach for an extended period of time, the respective department or unit will find a substitute to continue the course.

Late Assignments

You are expected to turn in all completed assignments on time. Circumstances that may disallow you to turn in your work on time - such as a medical reason - are understandable. Please let me know if you are unable to submit your work and have missed the deadline way beyond its original posted date. Because every assignment is an important aspect of your learning in this class, we will discuss when you will turn in the assignment as well as decide upon an acceptable consequence for your turning it in late. I am committed to successfully helping you learn from this course.

Incompletes

An incomplete "I" will only be considered when the quality of a student's work is satisfactory (C- or better), but for some essential reason the course has not been completed by the student. An "I" is reserved for emergency situations only. To request an incomplete, the student must submit a typed, signed and dated letter stating the reason(s) why an incomplete is appropriate. The letter should also contain the conditions for the completion of work. Acceptance of the request shall be at the discretion of the instructor, Department Chair, and/or Dean of the College of Arts & Sciences.

Accessibility Statement

The University of Portland strives to make its courses and services fully accessible to all students. Students are encouraged to discuss with their instructors what might be most helpful in enabling them to meet the learning goals of the course. Students who experience a disability are also encouraged to use the services of the Office for Accessible Education Services (AES), located in the Shepard Academic Resource Center (503-943-8985). **If you have an AES Accommodation Plan**, you should meet with your instructor to discuss how to implement your plan in this class. Requests for alternate location for exams and/or extended exam time should, where possible, be made two weeks in advance of an exam, and must be made at least one week in advance of an exam. Also, if applicable, you should meet with your instructor to discuss emergency medical information or how best to ensure your safe evacuation from the building in case of fire or other emergency. All information that students provide regarding disability or accommodation is confidential. All students are responsible for completing the required coursework and are held to the same evaluation standards specified in the course syllabus.

Code of Academic Integrity

The University of Portland is a diverse academic community of learners and scholars who are dedicated to freely sharing ideas and engaging in respectful discussion of those ideas to discover truth. Such pursuits require each person, whether student or faculty, to present truthfully our own ideas and give credit to others for the ideas that they generate. Thus, cheating on exams, copying another student's assignment, including homework, or using the work of others without proper citation are some examples of violating academic integrity.

Especially for written and oral assignments, students have an ethical responsibility to properly cite the authors of any books, articles, or other sources that they use. Students should expect to submit assignments to Turnitin, a database that ensures assignments are original work of the student submitting. Each discipline has guidelines for how to give appropriate credit, and instructors will communicate the specific guidelines for their discipline. The Clark Library also maintains a webpage that provides citation guidelines at https://libguides.up.edu/cite.

The misuse of AI to shortcut course learning outcomes will be treated as a violation of academic integrity comparable to plagiarism or cheating. Faculty are responsible for including a written "Course AI Policy" in their syllabi that clearly states what they consider appropriate and inappropriate uses of AI in the context of their courses. Students are responsible for using AI in ways that do not detract from the established learning outcomes of the course. All members of the scholarly community are responsible for demonstrating sound judgment in discerning when and how to utilize AI in their work, upholding standards of citation, originality, and integrity.

Please see the University Bulletin for further information: up.smartcatalogiq.com/en/2023-2024/bulletin/.

Course AI Policy

The use of generative AI — such as Copilot, Gemini, or ChatGPT — is encouraged and allowed in all of its capacity. However, students must use these tools ethically and responsibly. To use generative AI responsibly in this class, students should grasp underlying concepts, acknowledge AI's assistance, protect data privacy, verify information, and uphold academic honor code. AI should be seen as a learning aid, not a replacement for critical thinking.

Referencing and Citation Guidelines

In your written work for this course, you must cite all sources of information that you use, whether they are direct quotes, paraphrases, or summaries. The style of citation that you use should be consistent throughout your paper. The citation styles for this course are APA or CSE.

- APA style is used in the social sciences and psychology. It is characterized by parenthetical citations that include the author's last name and the year of publication. For example, "According to Smith (2023), the average height of a man in the United States is 5'10"."
- CSE style is used in the natural sciences and engineering. It is characterized by numbered citations that are listed at the end of the paper. For example, "[1] Smith, J. (2023). The average height of a man in the United States. Journal of Human Biology, 55(2), 123-132."

If you are unsure which citation style to use, please consult with me. You can also find more information about APA and CSE style in the Clark Library citation guidelines: libguides.up.edu/cite

Plagiarism is the act of using someone else's work without giving them credit. It is a serious academic offense that can result in a failing grade or even expulsion from school. By following these guidelines, you can help to avoid plagiarism and ensure that your work is properly cited.

Mental Health Statement

Anyone may sometimes experience problems with their mental health that interfere with academic experiences and negatively impact daily life. If you or someone you know experiences mental health challenges at UP, please contact the University of Portland Counseling Center in the upper level of Orrico Hall (down the hill from Franz Hall and near Mehling Hall) at 503-943-7134 or hcc@up.edu. Their services are free and confidential. In addition, confidential phone counseling is available at the Pilot Helpline by calling 503-943-7134 and pressing 3. The University of Portland Campus Safety Department (503-943-4444) also has personnel trained to respond sensitively to mental health emergencies at all hours. Remember that getting help is a smart and courageous thing to do – for yourself, for those you care about, and for those who care about you. For more information on health and wellness resources at UP go to https://linktr.ee/wellnessUP.

Non-Violence Statement

The University of Portland is committed to fostering a safe and respectful community free from all forms of violence. Violence of any kind, and in particular acts of power-based personal violence, are inconsistent with our mission. Together, all UP community members must take a stand against violence. Learn more about what interpersonal violence looks like, campus and community resources, UP's prevention strategy, and what we as individuals can do to assist on the Green Dot website, www.up.edu/greendot. Further information and reporting options may be found on the Title IX website, www.up.edu/titleix.

Ethics of Information

The University of Portland is a community dedicated to the investigation and discovery of processes for thinking ethically and encouraging the development of ethical reasoning in the formation of the whole person. Using information ethically, as an element in open and honest scholarly endeavors, involves moral reasoning to determine the right way to access, create, distribute, and employ information, including: considerations of intellectual property rights, fair use, information bias, censorship, and privacy. More information can be found in the Clark Library's guide to the Ethical Use of Information at Ethical Use of Information at libguides.up.edu/ethicaluse.

Diversity and Inclusion Statement

In the study of natural and mathematical sciences, often perceived as objective disciplines aimed at understanding the world, it is crucial to recognize the historical biases embedded within these fields, stemming from a limited set of privileged populations. Acknowledging the potential existence of overt and covert biases within the course, I emphasize that science is a human endeavor necessitating the incorporation of diverse experiences in the pursuit of knowledge and skill. Valuing every student irrespective of background, origin, race, religion, ethnicity, sexual orientation, disability status, etc., I am committed to fostering an inclusive climate throughout the course. Encouraging open communication about concerns or challenges, I assure confidentiality, except for instances of academic integrity violations or sexual harassment, which are legally mandated to be reported. Within our classroom, diversity and individual differences are celebrated as strengths, and the use of mathematics as an analytical tool to challenge power, privilege, and oppression is supported. It is our collective responsibility to create a welcoming space where ideas can be challenged while maintaining respect for individuals.