University of Pittsburgh

Outlier

Introduction to Statistics

STAT 0202

3 Credits

Instructors

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Course Description

This is an introductory course in statistics designed to teach foundational descriptive and inferential statistical procedures. Topics covered include descriptive statistics; probability; discrete and continuous random variables; the normal distribution; the central limit theorem; confidence intervals; hypothesis testing with one and two samples; categorical data analysis; the chi-square distribution; linear regression; correlation; f-distribution; and one-way ANOVA. Students will be introduced to statistical tools including Desmos and R.

Course Learning Outcomes

- Explain basic concepts of statistics and probability
- Solve basic statistical problems using R
- Understand, analyze, and criticize quantitative arguments using principles of statistics

Course Materials

This is an online course. All course materials (including lecture videos, interactive textbook, and practice exercises) are provided by Outlier.org through its course website, statistics.beta.outlier.org. Additional tools will be made available incorporated into or linked to from Outlier.org. For this course, RStudio.cloud will be used for statistical analysis. RStudio can be accessed by creating a free account on RStudio.cloud.

Class Policies

1. **Attendance & Attention to Course Materials** – As an online course, attendance is asynchronous and is tracked by students viewing the required lectures, engaging with interactive online materials, and completing problem sets. Each student will have the option to spend as much time as needed learning and practicing with additional materials and practice questions. The level of their understanding will be demonstrated by their performance on a set of mastery assessments in the form of quizzes, midterm exams, and a cumulative final exam.
2. **Access to Online Course Platform:** All course materials will be accessed through the course

website statistics.beta.outlier.org. Course progress, lectures, active learning, problem sets, and quizzes will be tracked and saved once you log in. Please reference your Course Homepage to view your grades and academic progress, and the Course Info page for details and instructions on the Outlier course features.

3. **Assessment Completion & Late Work** – Mastery assessments (quizzes, midterm exams, and the final exam) must be completed by their due dates (as indicated on Outlier.org). Failure to complete an assessment by the indicated due date will result in a grade of 0 for that assessment. Midterm and final exams are eligible to receive a 24-hour extension of the scheduled due date. Extensions can be requested by submitting a short request form within the site, available within 24 hours of the assessment deadline. For assessments offering multiple opportunities for completion (only quizzes in this course), only the highest grade of any completed instance of that assessment will count towards the student's final grade. Late work will not be accepted.
4. **Calculators** – Students are allowed to use calculators for all assignments. We suggest the Desmos smartphone or web app. RStudio will be used for statistical analysis.
5. **Exams** – In order to maintain high standards of academic integrity we use online technology to proctor exams. You will be asked to confirm your identity with a photo ID and you will be required to grant access to your computer, including its webcam, screen, and microphone, for the duration of the exam. Each exam can be taken anytime during the exam open period but must be completed in a single contiguous sitting. Times and dates below are all based on Pacific Standard Time. Exams will be available from the open date at 12:00pm ET through the closing date at 12:00pm ET.
6. **Exam Materials** – Students are allowed to use a graphing calculator, such the Desmos app, and the statistical analysis tool RStudio.cloud on exams. They may not use any other kind of notes, websites, books, or any other type of aid on course exams.
7. **Academic Integrity** – Students in this course will be expected to agree to and comply with the Outlier.org Academic Integrity Policy. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process as outlined in the Outlier.org Academic Integrity Policy.
8. **Student to Instructor Communications** – Most of your learning will happen within the Outlier course. Use the button in the bottom right corner to submit feedback or if you have a question(s) about any of the content in the lectures, active learning, or problem sets.. You can also reach a Success Advisor by sending an email to success@outlier.org or by engaging in the course Discussion Community.
9. **Course Participation** – Join Outlier's Discussion Community and participate in weekly conversations with the course facilitators and your peers to earn the discussion group portion of your grade. Course participation is counted as sharing an interesting article you read that pertains to the chapters you're working on, or asking a question of your fellow classmates to try to solve a difficult problem. You can also answer your peers' questions by starting a thread under their post. Derogatory and sarcastic comments and jokes that marginalize anyone are fundamentally unacceptable, especially in the classroom. Offensive language—or language that could be construed as offensive—should be avoided.
10. **Administrative Drops** – Students who do not meaningfully participate by the time 20% of the

term has passed will be administratively dropped from the course. For 15-week terms, the 20% mark is the third week of the course. Meaningful course participation includes regularly logging into the course, completing quizzes, engaging in the Discussion Community, and responding to Student Success outreach.

11. **Withdrawals** – If a student decides to exit from a course AFTER the drop deadline and BEFORE the withdrawal deadline, it is defined as a withdrawal. This is different from having dropped the course, as a grade of W will appear on your transcript. Withdrawals do not affect your GPA, but they do count towards the number of credits attempted. Students will still have access to review the lectures and active learning, but progress in the course will not be saved. Students who Withdraw are not eligible for a refund.
12. **Disability Accommodations** – If you have a request for reasonable disability accommodations, contact success@outlier.org. Please include specifics regarding the accommodation you are seeking. Additionally, if you have a disability accommodations letter from a school you are currently attending, please submit it as well. Outlier is committed to ensuring that learners with accessibility needs have equal opportunity to succeed in our courses.
13. **Religious observances** – Outlier will make a reasonable attempt to accommodate student needs in the case of serious incompatibility between a student's religious creed and a scheduled test or examination. Students should make such requests via success@outlier.org during the first two weeks of an academic term.
14. **Transfer Credit** – University of Pittsburgh grades and credits earned in this course appear on an official University of Pittsburgh transcript, and the course credits are likely to be eligible for transfer to other colleges and universities. Students are encouraged to contact potential colleges and universities in advance to ensure their credits would be accepted. If students decide to attend any University of Pittsburgh campus, the University of Pittsburgh grade earned in the course will count toward the student grade point average at the University, and the earned credits will count towards the overall credits required for graduation. At the University of Pittsburgh, the grade from this course supersedes any equivalent AP credit.

Grading Criteria

A student's grade in this course will be comprised of the following elements:

- 25% Final exam
- 20% Midterm exams (two midterm exams, 10% each)
- 50% Chapter quizzes (12 quizzes)
- 5% Course Participation in student group discussions

At the end of each chapter, each student is required to complete a quiz designed to assess their mastery of the material covered in that chapter. Each student will be able to attempt five (5) versions of each chapter's quiz:

- Three (3) of these will be made available to the student at the end of each chapter
- One (1) will become available to the student when the midterm covering the material of that

chapter is presented
- One (1) last version will become available to the student when the final is presented

For chapters with materials that are only covered on the final, the two (2) additional versions of those chapters' quizzes will become available to the student when the final is presented.

Each student is required to attempt and complete at least one version of each chapter's quiz. Failing to do so will result in a grade of 0% for that chapter. If a student completes more than one quiz for a chapter, only the highest grade achieved will be counted for that chapter. As such, the student is encouraged to use these multiple quiz attempts as opportunities to identify areas that are in need of further practice. This diligent effort will allow the student to improve their understanding, mastery of the material, and grade in the course.

Grades An official grade will appear on the University of Pittsburgh transcript for any student who continues their enrollment beyond the official drop date for the course. Outlier.org will publicize the official drop date for each semester.

Grading Scale
A: 92.5 -100%
A-: 89.5 – 92.49%
B+: 86.5-89.49%
B: 82.5 – 86.49%
B-: 79.5 – 82.49%
C+: 76.5 – 79.49%
C: 72.5 – 76.49%
C-: 69.5 – 72.49%
D: 59.5 – 69.49%
F: 0 – 59.49%

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Course Materials, Problem Sets, & Assessments

Chapter assignments and assessments are subject to change and will be announced through Outlier.org as applicable within a reasonable time frame.

Week	Day	Chapter	Topics	Activities and Assessments
Week 1	Day 1	1 - Introduction to Statistics and Statistical Thinking	• Introduction • The Statistical Process • Data and Sampling • Experimental Design and Ethics	Lectures Active Learning Practice Problems Chapter 1 Quiz
	Day 2	2 - Descriptive Statistics Pt. 1	• Graphs for Visualizing Data • Frequency Distributions and Histograms • Scatterplots	Lectures Active Learning Practice Problems Chapter 2 Part I Quiz
	Day 3	2 - Descriptive Statistics Pt. 2	• Measures of Center • Measures of Spread • Measures of Location and Box Plots	Lectures Active Learning Practice Problems Chapter 2 Part II Quiz
Week 2	Day 1	3 - Probability	• Basics of Probability • Rules of Probability • Contingency Tables	Lectures Active Learning
	Day 2			Practice Problems Chapter 3 Quiz
	Day 3	4 - Discrete Random Variables	• Introduction to Random Variables and Probability Distributions • Expectations of Discrete Random Variables • Binomial Distribution	Lectures Active Learning
	Day 4			Active Learning Practice Problems Chapter 4 Quiz
	Day 5	**1 - 4**	**Midterm Exam 1 opens at 12pm ET**	Practice Problems Chapter 4 Quiz

Week 3	Day 1	5 - Continuous Random Variables and The Normal Distribution	**Midterm Exam 1 closes at 12pm ET** • Continuous Random Variables and The Uniform Distribution • Expectations of Continuous Random Variables • The Normal Distribution	Lectures
	Day 2			Active Learning
	Day 3			Active Learning Practice Problems
	Day 4			Practice Problems
	Day 5			Chapter 5 Quiz
Week 4	Day 1	6 - The Central Limit Theorem	• Law of Large Numbers and Sampling Variability • Central Limit Theorem for Means and Sums	Lectures
	Day 2			Active Learning
	Day 3			Active Learning Practice Problems
	Day 4			Practice Problems
	Day 5			Chapter 6 Quiz
Week 5	Day 1	7 - Confidence Intervals	• What are Interval Estimates? • Interval Estimates Using the Normal Distribution • Interval Estimates Using the Student's t-Distribution	Lectures Active Learning

	Day 2	7 - Confidence Intervals	• Interval Estimates Using Population Proportions	Practice Problems Chapter 7 Quiz
	Day 3	8 - Hypothesis Testing With One Sample	• Hypothesis Testing, Type I and II Errors • Making Decisions About Hypotheses • Hypothesis Testing Examples	Lectures Active Learning
	Day 4	8 - Hypothesis Testing With One Sample,		Practice Problems Chapter 8 Quiz
	Day 5	8 - Hypothesis Testing With One Sample **5 - 7**	**Midterm Exam 2 opens at 12pm ET**	Midterm 2, Retake Chapters 5 - 7 Quizzes as needed
Week 6	Day 1	9 - Hypothesis Testing With Two Samples	**Midterm Exam 2 closes at 12pm ET** • Understanding Multiple Scores and Multiple Groups • Matched or Paired Samples • Independent Samples	Lectures Active Learning
	Day 2			Practice Problems Chapter 9 Quiz
	Day 3	10 - Categorical Data Analysis: The Chi-Square Distribution	• Facts about Chi Square • Test of Independence • Goodness of Fit Test • Homogeneity of Variance • Comparison of the Chi-Square Tests	Lectures Active Learning
	Day 4			Practice Problems
	Day 5			Chapter 10 Quiz
Week 7	Day 1	11 - Linear Regression, Correlation, F-Distribution and One-way ANOVA **1 - 11**	• Correlation Coefficients • Outliers and Other Factors Impacting Correlation • Computing Correlation and Finding Significance • Linear Equations • The Regression Equation • Prediction • One-Way ANOVA • The f-Distribution and the	Lectures
	Day 2			Active Learning
	Day 3			Active Learning Practice Problems

	Day 4		f-Ratio	Practice Problems
	Day 5		**Final Exam opens at 12pm ET**	Chapter 11 Quizzes Final Exam, Retake Chapters 1 - 11 Quizzes as needed
Week 8	Day 1		**Final Exam closes at 12pm ET**	

Exams are the only scheduled coursework. Quizzes can be completed at any time, once their corresponding chapter has been unlocked. All other active learning, exercises, and lectures are provided for your learning and practice and are not time-sensitive or graded.