

STAT 201: Elementary Statistical Inference

Fall 2017

Credits 3. 3 Lecture Hours.

Catalog description

(MATH 1342, 1442) Elementary Statistical Inference. Data collection, tabulation and presentation; elementary description of the tools of statistical inference; probability, sampling and hypothesis testing; applications of statistical techniques to practical problems. May not be taken for credit after or concurrently with any other course in statistics or SCMT 303. Prerequisites: None

Learning Outcomes

Students in this course learn how to think probabilistically and work with data in the natural and social sciences and everyday life. Upon successful completion of this course, students will be able to:

- Students will identify appropriate study designs, summary statistics, and graphic displays for real-life situations. They will understand the types of relationships that can be established from differing study designs (correlation vs. causation).
- Students will analyze real-life study designs for potential sources of error and bias.
- Students will understand the basics of data ethics in regards to designing studies and collecting data.
- Students will apply calculation of summary statistics, z-scores, and test statistics in order to facilitate statistical inference.
- Students will understand basic probability rules and use them to calculate probabilities.
- Students will understand probability and sampling concepts including independence, simulation, and sampling distributions.
- Students will calculate and interpret confidence intervals.
- Students will perform and interpret hypothesis tests.

Core Objectives

Critical Thinking

- Students will analyze study designs for potential sources of error and bias.
- Students will assess the ethical implications of a study design.
- Students will correctly interpret the results of a statistical study, recognizing in particular any limitations on the extent of inference that is possible, given the study's design.
- Students will apply the appropriate statistical techniques to a given data set.
- Students will assess the assumptions of any statistical models used and make appropriate modifications to the analysis to ensure that results are unbiased and reliable.

Communication Skills

- Students will symbolically relay probabilistic information and concepts by creating random variables and writing probability calculation statements.
- Students will synthesize the results of a data analysis into a written report that is accessible to a lay audience.
- Students will explain in writing probability and statistical inference solutions to problems.
- Students will justify statistical models used in the analysis of real data.
- Students will create and interpret insightful graphics for visualizing real data.

Empirical and Quantitative Skills

- Students will formulate and compute probabilities.

- Students will correctly compute and interpret p-values, confidence intervals, and other numerical summaries of data to enable statistical inference.
- Students will use statistical software to compute numerical and categorical summaries of real data.
- Students will critically assess published reports involving graphs and numerical summaries of real data.

STAT 201 - Elementary Statistical Inference - EXAMPLE SYLLABUS

Catalog Description:

Elementary topics in statistics; data collection; design of experiments; confidence intervals; hypothesis testing; ethics in statistics; the role of statistics in industry, the health profession and the sciences.

Learning Outcomes

Students in this course learn how to think probabilistically and work with data in the natural and social sciences and everyday life. Upon successful completion of this course, students will be able to:

- Identify appropriate study designs, summary statistics, and graphical displays for real-life situations.
- Understand the types of relationships that can be established from differing study designs.
- Recognize and appreciate the difference between correlation and causation.
- Critically investigate real-life study designs for potential sources of error and bias.
- Understand the basics of data ethics in regards to designing studies and collecting data.
- Calculate appropriate summary and test statistics as part of the process of statistical inference.
- Understand the basic probability rules and use them to compute probabilities in real-life situations.
- Understand probability and sampling concepts including independence, simulation, and sampling distributions.
- Calculate and interpret confidence intervals.
- Perform and interpret hypothesis tests.

Course Materials:

Moore and Notz, *Statistics: Concepts and Controversies*, (9th ed.). You need only purchase online access to the ebook. To do so, go to: <http://www.macmillanhighered.com/launchpad/scc9e/6101003> Please bookmark this webpage, as it gives you access to both the ebook, homework assignments, and supplemental activities. You have three options to enroll in the course: purchase direct access, buy an access code, or get free 21-day access while deciding.

Grading:

Your grade will be computed as follows:

- **Quizzes: 15%** - Quizzes will make up 15% of your overall grade. Quizzes will take place at the beginning of class on the days noted on the course schedule. All quizzes will be open note, so be sure to bring your notes to class on quiz days.
- **Homework: 25%** - Homework will be available under the Assignments section on LaunchPad. You are welcome to work with other students on the homework, but you must submit your own work. You will generally get 2 chances per question. These assignments will be automatically graded and the grades will automatically be added to your gradebook in LaunchPad. After the due date, I will add these grades to the official eCampus gradebook, so be sure to check for them in eCampus. Late homeworks will count as a zero.
- **Exams: 60%** - There will be two midterm exams as well as a comprehensive final exam. Each exam will count for 20% of your final grade. All exams will be multiple choice and you will be required to bring your own green Scantron form (882E) to each exam. Failure to bring the correct scantron will result in a point deduction on your exam. You will be allowed to use

any calculator you would like during the exam, as long as the calculator is not part of a communication device and is not capable of connecting to the internet. Unlike the quizzes, the exams will be closed note, so you are not allowed to use your notes/textbook on the exams. However, on the **final exam only**, you will be allowed to use one formula notecard. You will be allowed to write any notes you would like on the notecard, however it must be a 3 inch by 5 inch notecard, handwritten, with your name on the notecard. Failure to follow the guidelines for the formula notecard on the final exam will result in a point deduction.

Grading Scheme:

A: [90%, 100%]; B: [80%, 90%]; C: [70%, 80%]; D: [60%, 70%]; F: [0%, 60%]

Homework and Exam Grade Policy:

Once you have received a grade from me, you will have one week after the grade posts in eCampus to raise any concerns about that grade with me. After one week, no changes to your grade can be made.

Absences/Makeup Policy:

Please see the University rules and regulations concerning University excused absences (what qualifies, required documentation, notification times, etc.). Makeup exams are always different from the regularly scheduled exams.

Statement on Disabilities:

The Americans with Disabilities Act (ADA) is a federal antidiscrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Office of Disabilities Services in the Disability Services building at the Student Services at White Creek complex on west campus. Their phone number is 845-1637. For additional information, go to the website disability.tamu.edu.

Copyright Notice:

The handouts used in this course are copyrighted. By "handouts," I mean all materials generated for this class, which include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless I expressly grant permission.

Statement on Plagiarism:

As commonly defined, plagiarism consists of passing off as one's own ideas, words, writing, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, under the section "Scholastic Dishonesty."

Academic Integrity Statement:

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

The Aggie Honor Council Rules and Procedures are available at the website: aggiehonor.tamu.edu

Course Schedule

Week	Monday	Wednesday	Friday	Due (Friday at 11:59pm unless otherwise noted)
Week 1	Syllabus; Chapter 1	Chapter 2	Chapter 3	
Week 2	Chapter 4	Chapters 4 and 5	Chapter 5; Quiz 1	Homework 1 (Chapters 1-3)
Week 3	Chapter 6	Chapters 6 and 7	Chapter 7; Quiz 2	Homework 2 (Chapters 4-5)
Week 4	Chapter 8	Chapter 9	Exam 1 Review	Homework 3 (Chapters 6-7) Exam 1 Extra Credit
Week 5	Exam 1	Review Exam 1	Chapter 10	Homework 4 (Chapters 8-9)
Week 6	Chapter 11	Chapter 12	Chapter 13; Quiz 3	Homework 5 (Chapter 10)
Week 7	Chapter 13	Chapter 14	Chapters 14 and 15; Quiz 4	Homework 6 (Chapters 11-12)
Week 8	Chapter 15	Chapter 16	Chapters 16 and 17; Quiz 5	Homework 7 (Chapters 13-14)
Week 9	Chapter 17	Chapter 18	Chapters 18 and 19; Quiz 6	Homework 8 (Chapters 15-16)
Week 10	Chapter 19	Chapter 20	Exam 2 Review	Homework 9 (Chapters 17-18) Exam 2 Extra Credit
Week 11	Exam 2	Review Exam 2	Chapter 21;	Homework 10 (Chapters 19-20)
Week 12	Chapter 21	Chapter 22	Chapter 22; Quiz 7	Homework 11 (Chapter 21)
Week 13	Chapter 23	*No Class-Reading Day*	*No Class-Thanksgiving Break*	*No Class-Thanksgiving Break*
Week 14	Chapter 23	Chapter 24	Chapter 24; Quiz 8	Homework 12 (Chapters 21-22)
Week 15	Final Exam Review	Last Day of Class Final Exam Review	Final Exam: 10:00am-12:00pm	Homework 13 (Chapters 23-24) Final Exam EC