STA 3032/16489

Spring 2024

Engineering Statistics

MWF 11:45 AM - 12:35 PM in LIT 0101

Course Overview

Instructor:
Hongqiang Sun, sunh1@ufl.edu
Office Hour: Thu 4:00-6:00PM or by appointment
Zoom link: https://ufl.zoom.us/j/5390445385

Teaching Assistant:
Zikun Qin, qinzikun@ufl.edu
Office Hour: Mon 1:00-3:00PM, Griffin-Floyd Hall 234
Grade: homework 2, 4, exam 3

Yuhua Zhang, yuhua.zhang@ufl.edu
Office Hour: Tue 9:30-11:30AM, Griffin-Floyd Hall 101D
Grade: homework 1, 3, exam 1

Wangxing Zhang, zhangwangxing@ufl.edu
Office Hour: Tue 10:00-11:00AM, Griffin-Floyd Hall 116D
Grade: homework 5, exam 2

Course Description
A survey of the basic concepts in probability and statistics with engineering applications. Topics include probability, discrete and continuous random variables, confidence interval estimation, hypothesis testing, correlation, and regression.

Course Goals

- Access, manipulate, and analyze data using statistical software.
- Produce appropriate graphs and descriptive statistics for one and two variables, for both categorical and continuous data.
- Interpret graphs and descriptive statistics for one and two variables.
- Know and apply the basic probability rules, the concepts of expected value and variance for discrete and continuous variables.
- Know and apply the central limit theorem, which is crucial for inference
- Understand confidence intervals and hypothesis tests.
- Carry out and interpret one-sample and two-sample analyses for means and proportions.

- Carry out and interpret statistical modeling using simple linear regression.

Student Learning Outcomes
At the end of this course, students will be expected to have achieved the following learning outcomes:

- Content
  - Identify, describe, and explain the basic concepts, theories, and terminology of natural science and the scientific method, and apply them to analyze various systems
  - Demonstrate proficiency in accessing, manipulating, and analyzing data using statistical software, and producing appropriate graphs and descriptive statistics for one and two variables, across both categorical and continuous data.– Interpret graphs and descriptive statistics for one and two variables, drawing meaningful insights from the data.
  - Understand and apply the basic probability rules, as well as concepts of expected value and variance for both discrete and continuous variables.
  - Apply the Central Limit Theorem effectively for inference, providing a foundation for statistical reasoning.
  - Formulate mathematical models and arguments, utilizing statistical models to address real-world situations and provide effective solutions.
  - Assessments will be made with textbook based assignments, coding assignments, quizzes, and exams.

- Critical Thinking

  - Formulate empirically-testable hypotheses derived from the study of physical processes or living things, demonstrating a capacity for scientific inquiry and logical reasoning.
  - Apply logical reasoning skills effectively through scientific criticism and argument, enabling rigorous evaluation of scientific ideas and theories.
  - Apply techniques of discovery and critical thinking effectively to solve scientific problems and evaluate outcomes, demonstrating analytical skills in problem-solving.
  - Assessments will be made with textbook based assignments, quizzes, and exams.

- Communication
  - Communicate scientific knowledge, thoughts, and reasoning clearly and effectively, both in written and verbal form.
  - Report on statistical analysis of people's attitudes towards choices based on the framing of the choices, presenting findings with clarity and precision.
  - Report on statistical analyses of global warming, employing numeric and graphical presentation to effectively convey information.
  - Assessments will be made with textbook based assignments.

Grades - This course has been designated a General Education course. Note that the minimum passing grade for General Education credits is a C.

Required Text:

Probability & Statistics for Engineers & Scientists, 9th Edition available via UF All Access. **Author(s):** Walpole, Myers, Myers, Ye; **ISBN-13:** 978-0134115856

Course Website: e-Learning

Course Communication:

- Use e-mail to contact the instructor regarding administrative matters. Please include **STA 3032** in the subject line.

- For questions regarding course content, please see the instructor or TAs during office hours.

Syllabus Changes: The instructor reserves the right to update any part of this syllabus as necessary. Students will be notified of any changes.

Course Policies

Assignments

Homework: Homework assignments will be given roughly every one or two weeks to be turned in on Canvas as one file. Students are expected to work independently on homework assignments unless otherwise specified in writing.

Exams: Exams will be held in-class during regular class times. See below for exam dates. You will need to bring a scientific calculator. Cell phone usage will not be permitted.

Exam Dates (tentative):

Exam #1 .... Feb 14
Exam #2 ....Mar 20
Exam #3 ....Apr 24

Grade Corrections: If you believe there was a mistake made in the grading of your homework assignment or exam, please contact the TA's within *one week* after the grade has been posted.

Grading

Grade distribution:

Homework	25%
Exams 1, 2, and 3	75% (25% each)

Letter grade assignment:

The following grade cutoffs are adopted grading scale

90+ -> A
87 - 89.99 -> A-
83 - 86.99 -> B+
80 - 82.99 -> B
77 - 79.99 -> B-
73 - 76.99 -> C+
70 - 72.99 -> C
67 - 69.99 -> C-
63 - 66.99 -> D+
60 - 62.99 -> D
57 - 59.99 -> D-
Less than 57 -> E

All grades are final and non-negotiable.

Attendance and Missed Assignments

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. For further information, refer to the university attendance policies.

Every effort should be made to attend the exam on the specified exam dates. Makeup exams are warranted only under exceptional circumstances. Contact the instructor as soon as you realize you will be unable to take the exam at the scheduled time. Each case will be reviewed individually. Valid and detailed documentation is required for scheduling a makeup.

UF and CLAS Policies

UF Grading Policies: Grades and Grading Policies < University of Florida (ufl.edu)

COVID-19: In response to COVID-19, the following recommendations are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to further the health and safety of ourselves, our neighbors, and our loved ones.

- If you are not vaccinated, get vaccinated. Vaccines are readily available and have been demonstrated to be safe and effective against the COVID-19 virus. Visit one.uf for screening/testing and vaccination opportunities.

- If you are sick, stay home. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 to be evaluated.

- Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work.

- Wearing a mask during class is recommended.

Academic Misconduct: You are required to abide by the Student Honor Code. Any violation of the academic integrity expected of you on an assignment or exam will result in a minimum academic sanction of a failing grade on the assignment or exam.

Accommodation for Students with Disabilities: Students requesting accommodation for disabilities must first register with the Disability Resource Center (DRC). The DRC will provide documentation to the students who must then provide this documentation to the instructor. A request must be made to the instructor at least one week prior to the date for which the accommodation is requested. Accommodations will not be made retroactively.

Dropping Courses and Withdrawal: For questions relating dropping courses and withdrawals, please refer to the UF catalog.

Evaluations: Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

Incomplete Grade: An incomplete grade may be assigned at the discretion of the instructor as an interim grade for a course in which the student has completed a major portion of the course with a passing grade, been unable to complete course requirements before the end of the term because of extenuating circumstances, and obtained agreement from the instructor and arranged for resolution of the incomplete grade. Instructors are not required to assign incomplete grades. For further detail, please refer to the CLAS Academic Advising Center page on incomplete grades.

U Matter, We Care: U Matter, We Care offers care related resources and programs focused on health, safety, and holistic well-being.

Tentative Course Outline

Module	Week	Content	Textbook Section
1	1	Summary Statistics: Location and Spread	1.1-1.5
		Graphical Summaries	1.6
2	2-5	Sample Space, Events, and Probability	2.1-2.2, 2.4-2.5
		Counting Methods: Permutations and Combinations	2.3
		Conditional Probabilities and Independence	2.6-2.7
		Random Variables	3.1-3.4, 4.1-4.4
		Discrete Probability Distributions	5.1-5.2, 5.4-5.5
		Continuous Probability Distributions	6.1-6.4, 6.7, 8.6-8.7
		Central Limit Theorem	8.3-8.4
		Exam 1	
3	6-8	Inference on Population Mean: Confidence Intervals	9.1-9.5
		Inference on Population Mean: Hypothesis Tests	10.1-10.4
		Inference on Population Proportion	9.10, 10.8
		Inference on Population Variance	9.12, 10.10
		Signed-Rank Test	16.1-16.2
4	9-10	Inference on Two Population Means: Confidence Intervals	9.8, 9.11
		Inference on Two Population Means: Hypothesis Tests	10.5, 10.9
		Inference on Two Population Variances	9.13, 10.10
		Contingency Tables: Test for Independence	10.12
		Wilcoxon Rank-Sum Test	16.3
		Exam 2	
5	11-12	Simple Linear Regression	11.1-11.6, 11.8
		Checking Regression Assumptions and Transforming Data	11.10
		Quantile and Probability Plots	8.8
		Multiple Regression	12.1-12.2, 12.4-12.6
		Qualitative Predictors	12.8-12.9
6	13-14	One-Way ANOVA: Completely Randomized Design	13.1-13.3
		Multiple Comparisons	13.6
		Randomized Complete Block Designs	13.7-13.8, 13.11
		Exam 3	