STA 3032: Engineering Statistics

Spring 2024

Instructor
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Office Hours: 9:20pm-10:20pm MWF
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Class Information

Classroom: LIT 0101
Meeting Times: 10:40-11:30 MWF

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

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

Note that the minimum passing grade for GE credits is a C. Grades will be based on the following scale:

Grade	Range
A	94-100
A-	90-93
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-73
D+	67-69
D	63-66
D-	60-63
E	0-59

In total, there will be 3 exams, 6 homework assignments, and 4 quizzes. The corresponding weights are:

Assignment	Weight
Exam 1	20%
Exam 2	20%
Exam 3	25%
Homework	20%
Quizzes	15%

Attendance and Make-Ups

Attendance is expected and will be essential for performing well in the class. There is however, no attendance grade. See university attendance policies here. Late homework will be graded with a 15% deduction per day late. More than 3 days late will receive a 0.

Make-up exams and assignment extensions will be granted in extreme circumstances provided the instructor has been notified.

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

UF Grading Policies
https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

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/.

Recordings
This class is 100% in-person, there will be no recordings of the lectures.

Dropping and Withdraw
For late course drops and course withdrawals check the catalog.

Incomplete
An incomplete grade may be assigned at the discretion of the instructor as an interim grade fora 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 in the next term. Instructors are not required to assign incomplete grades. For complete details please visit CLAS incomplete grade policy and contract.

Accommodating 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 when requesting information. You must

submit this documentation prior to submitting any assignments for which you are requesting accommodation.

U Matter, We Care

U Matter, We Care, through the Dean of Student's Office, offers care related resources and programsfocused on health, safety, and holistic well-being

Weekly Course Outline

Here is a tentative weekly schedule for the class:

Week 1
- Probability
  - Sample Space and Events (2.1-2.5)
  - Conditional Probability and Independence (2.6)
  - Bayes' Rule (2.7)

Week 2
- Probability continued
- Homework 1 Due

Week 3
- Random Variables and Probability Distributions (3.1-3.4, 4.1-4.4)
- Quiz 1

Week 4
- Discrete Distributions (5.1-5.5)
- Homework 2 Due

Week 5
- Continuous Distributions (6.1-6.8)
- EXAM 1 on Friday

Week 6
- Sampling Distributions
- Central Limit Theorem (8.3-8.7)
- Methods of finding estimators

Week 7
- Intro to Hypothesis Testing (10.1 - 10.3)
- One Sample Tests (10.4)
- Types of Error
  - Level
  - Power
- Quiz 2

Week 8
- Two Sample Tests (10.5)
- More Tests (10.8-10.13)
- Homework 3 Due

Week 9
- Confidence Intervals (9.1-9.5)

Week 10
- Confidence Intervals Continued (9.6, 9.8-9.13)
- Homework 4 due
- EXAM 2 on Friday

Week 11
- Contingency Tables
- Chi-Squared Tests
- Simple Linear Regression (11.1-11.8)
- Quiz 3

Week 12
- Multiple Regression (12.1-12.6)
- Categorical Predictors (12.8-12.9)
- ANOVA
- Homework 5 Due

Week 13
- CI and tests in Regression

Week 14
- Transformations
- Polynomial regression
- Additive Models
- Homework 6 Due

Week 15
- Experiments
- Completely Randomized Design (13.1-13.3)
- Multiple Comparisons (13.6)
- Quiz 4

Week 16
- Review
- EXAM 3

If this document is updated, an announcement will be made in class, and the new version will be uploaded to the course website in canvas.