

Engineering Statistics
STA 3032 (17168) Section 4437

Spring, 2024

Course Information

Time: Course lecture will be uploaded on MWF, each week

Instructor: Somnath Bhadra

Office: 105 Griffin Floyd Hall

E-mail: somnath.bhadra@ufl.edu

Office Hours: Zoom MWF 10:45AM-11:45AM

Zoom link: <https://ufl.zoom.us/j/4819574508>

Teaching Assistant: Yuhan Tian

Office Hours: Zoom T 9AM - 11 AM

E-mail: yuhan.tian@ufl.edu

Zoom link: <https://ufl.zoom.us/j/5556999302>

Textbook: Walpole, Myers, Myers, Ye, *Probability and Statistics for Engineers and Scientists* (9th ed). The book can be purchased via the following link: <https://www.pearson.com/en-us/subject-catalog/p/probability-statistics-for-engineers-scientists/P200000007119>
If you need help in purchasing the book, you can look at the following guide video: <https://www.youtube.com/watch?v=wp2nnqjprkU>

Davies, Tilman M, *The book of R*. The book can be found in the following link: https://web.itu.edu.tr/~tokerem/The_Book_of_R.pdf

Objective

Prerequisite

MAC 2311 or equivalent course.

Course Contents

A study of basic concepts in probability and statistics with engineering applications. Topics include descriptive statistics, probability, random variable, discrete and continuous distributions, sampling, estimation, hypothesis testing, ANOVA, simple and multiple linear regression.

Lectures will cover (roughly) chapters 1-12 (excluding 7) of the book (WMMY) and a bit introductory part of 13 and 14, and some basic uses of R (from the book of R).

Tentative Course Schedule

A tentative weekly schedule of the course will be as in table (1)

Week	Topic
Week 1	Descriptive Statistics and basic probability
Week 2	Probability rules and discrete random variables
Week 3	Continuous random variable and joint continuous random variable
Week 4	Familiar discrete distributions
Week 5	Normal distribution
Week 6	Sampling distribution, Confidence interval and hypothesis testing
Week 7	Inference for two independent proportions and confidence interval for one mean
Week 8	Hypothesis testing for one mean and inference for two independent means
Friday Mar 1	Exam 1
Week 9	Spring break
Week 10	Inference for two dependent means and proportions and goodness-of-fit test
Week 11	Homogeneity and independent test
Week 12	ANOVA of completely randomized design and multiple comparison of means
Week 13	ANOVA for randomized block design, two factor design with interaction and Simple Linear Regression
Week 14	SLR correlation, inference for parameter and output values and Multiple Regression
Week 15	Thanksgiving break
Week 16	MR ANOVA and correlation and inference for parameter and output values and model extensions
Week 17	Trying to complete things and review
Friday Apr 19	EXAM 2

Table 1: Tentative Schedule

Course/Exam modality

The course will be offered in online mode, asynchronously. Instructor will record the lectures in zoom and will upload them in the Canvas. The materials being covered in each day of lecture will also be uploaded in the Canvas separately. Important: Exams will be honorlock proctored or proctorU based.

Course Website

Students should log in to Canvas to complete Home-works, check announcements, take part in discussions. Visit the link <https://elearning.ufl.edu> to access the Canvas.

Grades

- There will be two exams (20% each, counting for 40% in total) and one project that will have to be done using R (20% of the total). There will be 6 home-work assignments (counting for 40% in total, the best 5 home-works will be considered in the grading).

A tentative grading scale will be as in table (2):

Exams

- The two (**non-cumulative**) exams are tentatively scheduled:

1. Exam 1: **Friday, Mar 1** (Syllabus: Everything covered in Week 1-8)
2. Exam 2: **Friday, Apr 19** (Syllabus: Everything covered in Week 9-17)

- Only one make-up exam will be offered and you must either let the instructor know well before the scheduled day of the exam which you need to be excused from (for a non-emergency reason), or produce a proof of emergency (or medical problem) as soon after the missed exam as possible.

Homework Exercises

- There will be a total of 6 home-works, typically will be scheduled to be submitted on each Friday, by midnight, on Canvas. Everyone should upload a **PDF** copy of their home-works. Late submissions will **NOT** receive credit.
- You are encouraged to discuss homework problems with other students; however, try to not make a copy paste of other students' home-work.
- The instructor and Teaching Assistant make every effort to ensure that grades assigned are scrupulously fair and reflect the quality of the work concerned. Due to this process of consultation and the use of uniform grading criteria, the TAs have complete authority in all actions that they undertake regarding the home-works, and the instructor is unlikely to rescind any of his decisions.

Suggested Additional Exercises

In order to master the course material it is essential that you work as many exercises as possible. For this reason, along with the homework exercises, additional suggested exercises from the textbook will also be posted on the course web-page on a regular basis. You are not expected to submit answers to these suggested exercises, but you should solve all of them to keep up with the pace of the course and thoroughly learn the material. This will also help you prepare for the exams.

Academic Integrity

UF students are required to adhere to both the Student Conduct Code and the Student Honor Code, <https://sccr.dso.ufl.edu/students/student-conduct-code/>, in all aspects of the course. On

Grade	Range
A	90-100
A-	86-89
B+	80-85
B	75-79
B-	72-75
C+	70-71
C	65-69
D	60-65
E	0-59

Table 2: Grading Scale

exams, students will write and sign the Honor Pledge: “On my honor, I have not given, received, or witnessed unauthorized aid on this exam.” Students are also bound by honor to report academic misconduct to the instructor. Any student found in violation of the Honor Code will receive a final course grade of “E” and may be subject to additional disciplinary action by the University. Thank you in advance for making a personal commitment to maintaining a high standard of integrity and for helping promote an atmosphere of respect for one another that is conducive to learning, both in class and online.

UF Grading Policies

The link to UF grading policy is as found here <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

Statement about accomodations and link to DRC

Students with disabilities who experience learning barriers and would like to request accommodations should connect with the Disability Resource Center and share their accommodations letter with their instructors as early as possible in the semester. <https://disability.ufl.edu/get-started/>

Statement about 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 following the instructions provided. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

Gen Ed Stuff

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.