Engineering Statistics : STA 3032/13623

Summer B 2023

Course Overview

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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, regression, and analysis of variance.

Prerequisite: MAC 2311

Course Objectives:

1. Access, manipulate and analyse 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 multiple regression and analysis of variance.
9. Know and apply basic quality control procedures.

Required Text:

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

Materials and Supplies Fees: This course is participating in UF's All Access Textbook Affordability Program. Students will OPT IN to receive digital access to your text at a reduced price and pay for those materials via your UF Student Account. The ebook will be accessed directly through Canvas. There is a deadline to opt in within a few days of the start of class in order to receive the discount. There are hardback textbooks in the bookstore on campus (and other retailers online) if you wish to have a printed resource. Opt in at https://www.bsd.ufl.edu/G1CO/IPay1f/start.aspx?TASK=INCLUDED.

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.

Software: We will use R, a free statistical computer language. It is also highly recommended to run R through the free-of-charge Desktop version of the Rstudio IDE.

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 week to be turned in on Canvas as one file. Students are expected to work independently on homework assignments unless otherwise specified in writing.

Exams: You can bring your own formula sheet hand-written in a A4 paper (you can use both side of that). A scientific or graphing calculator without external communication capability may be used. No other aids (physical, electronic or otherwise) will be permitted. 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.

Exam Dates (tentative):

Exam #1 ..... July 14^{th}
Exam #2 ..... July 28^{th}
Exam #3 ..... August 11^{th}

Grade Corrections: If you believe there was a mistake made in the grading of your homework assignment or exam, please see the instructor within *one week* after the grade has been posted. Questions regarding homework assignments should be first sent to the TA who graded it.

Grading

Grade distribution:

Homework	25%
Exams 1, 2, and 3	75% (35% best, 25% second best, 15% lowest)

Letter grade assignment:

The following grade cutoffs are adopted and may be relaxed.

		A	93 to 100	A-	90 to < 93
B+	87 to < 90	B	83 to < 87	B-	80 to < 83
C+	77 to < 80	C	73 to < 77	C-	70 to < 73
D+	67 to < 70	D	63 to < 67	D-	60 to < 63
E	< 60				

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

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	1-2	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	3	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	4	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	5-6	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	6	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			