Syllabus
STA 3032, Engineering Statistics
Fall 2024
Department of Statistics, University of Florida

Course information.

Lectures. M, W, F from 3:00 PM to 3:50 PM in CSE A101			
Instructor.	Ziqian Yang	*Teaching assist.*	Binul Ganithage
office.	116D Griffin Floyd	*office.*	234 Griffin Floyd
email.	zi.yang@ufl.edu	*email.*	binulgulawitagan@ufl.edu
office hours.∗	3:50 - 5:00 PM (M, 116D) 9:00 - 10:00 AM (T, [Zoom])	*office hours.*	3:00-5:00 PM(R, 234 FLO)
Teaching assist.	Shenyu (John) Zhou	*Teaching assist.*	Yunbin Tan
email.	zhoushenyu@ufl.edu	*email.*	tan.yunbin@ufl.edu
office hours.	4:00-6:00 PM (F, 201 FLO)	*office hours.*	1:00-3:00 PM (W, 201 FLO)

∗: *Or by appointment*

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.

Course Objective.

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.

Prerequisites. MAC 2311 (or equivalent calculus course).

Course webpage. Course materials (e.g., homework assignments and due dates) will be posted to Canvas https://elearning.ufl.edu/, where students' grades will be posted. **Please check this site regularly for updates and announcements**. Course documents and important information – including homework exercises, homework solutions, sample exams, and special announcements – will be posted here.

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, it is more efficient to see the instructor or TAs during the office hours.
- I will post my phone number on Canvas. Please use it **only** for emergencies.

Office hours. Both the instructor's and teaching assistant's office hours will at a time and location to be announced during the first week of class. Table above is for your reference, see Canvas for latest office hour schedule and updates.

Textbook. *Probability & Statistics for Engineers & Scientists,* 9^{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.

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.

Assessment. Course grades will be based on approximately 5 homework assignments and 3 examinations. The homeworks account for 25% of the course grade. Each of the three exams will account for 25% of the course grade.

- **Tentative exam dates**.
    1. Monday, September 30th
    2. Friday, November 1st

3. Wednesday, December 4th

Exams will be held in class.

You will need to bring a 4-function scientific calculator. Cell phone and any similar device usage will not be permitted. Cheat sheets will be allowed, but (1) should be in one A4 sheet (two-sided) (2) must be hand written by yourself (3) must turn in their note sheet along with their exam. Failing to turn in a note sheet or using another student's note sheet is an academic integrity violation and will result in an automatic 25% deduction on the respective exam.

- *Tenative homework due dates.*
  Homework assignments will be given roughly every two weeks. Their due dates would be given in the assignment as well as on Canvas. Homework should be submitted in one file.

  Homework assignments will be submitted and graded electronically through the course eLearning site. Homework will be due at midnight on days that they are due, unless otherwise specified in the announcements on Canvas. **Please make sure to submit your homework at least 5 minutes before the due to avoid possible internet crash.** Homework late for less than 1 day will receive a 10% penalty. **Late homework for more than 1 day, or after the post of the solution, will not be accepted.**

  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 scales. Letter grades will be assigned based on the following cutoffs:

Grade	Percentile
A	100% - 90%
A-	90% - 87%
B+	87% - 83%
B	83% - 80%
B-	80% - 77%
C+	77% - 73%
C	73% - 70%
C-	70% - 67%
⋮	⋮
E	60% -

This course has been designated a General Education course. Note that the **minimum passing grade for General Education credits is a C**.
There might be curving applied to the final grade, which will be determined by the instructor at the end of the semester. The final grade after curving will be equal to or slightly higher

than the grade before.
For calculation of the GPA, see UF GRADES AND GRADING POLICIES

Table 1: Tentative Course Outline

Module	Week	Content	Textbook Section
1	1-2	Summary Statistics: Location and Spread	1.1-1.5
		Graphical Summaries	1.6
2	2-3	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
	4	Random Variables	3.1-3.4, 4.1-4.4
		Discrete Probability Distributions	5.1-5.2, 5.4-5.5
	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	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
	7	Inference on Population Variance	9.12, 10.10
		Signed-Rank Test	16.1-16.2
4	8	Inference on Two Population Means: Confidence Intervals	9.8, 9.11
		Inference on Two Population Mean: Hypothesis Tests	10.5, 10.9
		Inference on Two Population Variance	9.13, 10.10
	9	Contingency Tables: Test for Independence	10.12
		Wilcoxon Rank-Sum Test	16.3
Exam 2			
5	10	Simple Linear Regression	11.1-11.6, 11.8
	11	Checking Regression Assumptions and Transforming Data	11.10
		Quantile and Probability Plots	8.8
	11-12	Multiple Regression	12.1-12.2, 12.4-12.6
		Qualitative Predictors	12.8-12.9
6	13-15	One-Way ANOVA: Completely Randomized Design	13.1-13.3
		Multiple Comparisons	13.6
		Randomized Complete Block Designs	13.7-13.8, 13.11
	15	Review	
Exam 3			

Schedule might be changed due to various reasons. See Canvas for update.

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

- **Content**

1. Identify, describe, and explain the basic concepts, theories, and terminology of natural science and the scientific method, and apply them to analyze various systems.
2. 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.
3. Interpret graphs and descriptive statistics for one and two variables, drawing meaningful insights from the data.
4. Understand and apply the basic probability rules, as well as concepts of expected value and variance for both discrete and continuous variables.
5. Apply the Central Limit Theorem effectively for inference, providing a foundation for statistical reasoning.
6. Formulate mathematical models and arguments, utilizing statistical models to address real-world situations and provide effective solutions.
7. Assessments will be made with textbook based assignments, coding assignments, quizzes, and exams.

- **Critical Thinking**

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

- **Communication**

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

Working with classmates: While students are encouraged to discuss homework exercises with one another, it is expected that students work independently on homework assignments unless otherwise specified in writing, and it is **required** that students write up their solutions

independently. A failure to do so would constitute a violation of the student honor code and will be treated as such: see https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/. No collaboration of any kind is allowed on exams, with no exception.

Student honor code: Materials which may be referenced during exams will be explicitly mentioned before the exam and on the cover of the exam sheet. See the homework section for expectations about homework assignments. Please refer to the UF student honor code (linked above) for more.

Missed exam. Missed exams will receive a grade of zero, except in the cases of emergency. If an exam will be missed for a non-emergency reason, the student must notify the instructor *at least one weeks prior* to the exam date and provide proper documentation. Refer to https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/ for specifics on course attendance policy and missed exam policy.

Incomplete policy. The grade of "Incomplete" can be assigned at the discretion of the instructor when, due to extraordinary circumstances, e.g., hospitalization, a student is prevented from completing the work of the course on time. In particular, an "Incomplete" will be given if the student presents evidence from a certified professional that the student is unable to complete the course. In addition, the student must have a passing grade at the time of the incomplete request in order to receive the "Incomplete". An "Incomplete" requires a written agreement between instructor and student found here
https://clas.ufl.edu/files/2019/02/CLASIncompleteGradeContract.pdf.

Students with Disabilities. Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Online course evaluation process. 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/`.

Academic dishonesty. UF students are bound by The Honor Pledge which states, We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all

work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment. The Conduct Code specifies a number of behaviors that are in violation of this code and the possible sanctions. The Conduct Code can be found here: `https://sccr.dso.ufl.edu/process/student-conduct-code/`. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Health and wellness resources.

- U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit U Matter, We Care website to refer or report a concern and a team member will reach out to the student in distress.
- Counseling and Wellness Center: Visit the Counseling and Wellness Center website or call 352-392-1575 for information on crisis services as well as non-crisis services.
- Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the Student Health Care Center website.
- University Police Department: Visit UF Police Department website or call 352-392-1111 (or 9-1-1 for emergencies).
- UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; Visit the UF Health Emergency Room and Trauma Center website.

Academic resources.

- E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at helpdesk@ufl.edu.
- Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.
- Library Support: Various ways to receive assistance with respect to using the libraries or finding resources.
- Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.
- Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.
- Student Complaints On-Campus: Visit the Student Honor Code and Student Conduct Code webpage for more information.
- On-Line Students Complaints: View the Distance Learning Student Complaint Process.