STA 6166 (13900)

Summer A 2021

Statistical Methods in Research I

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Course Website: e-Learning

Course Material: Teaching will be 100% online and mostly asynchronous except office hours. Material will be provided in course website.

- Notes do deviate from textbook and you are responsible for material as taught in the notes.
- Slides. Brief slides based off the class notes.
- Videos. Pre-recorded videos.

Required Text(s):

1. *An Introduction to Statistical Methods and Data Analysis*, 7th Edition
   Author(s): R. Lyman Ott, Michael T. Longnecker; **ISBN-13:** 9780495017585
2. *The Book of R*
   Author(s): Tilman M. Davies; **ISBN-13:** 978-1593276515

Materials and Supplies Fees: Honorlock for proctoring.

Course Communication:

- Discussion forum (link to Microsoft Teams available in course website).
- Live office hours and lectures via Zoom (available in course website).
- E-mail for questions regarding course policies. (Ensure that STA **6166** is in the subject line. Failure to do so may result in a non-response.)

Course Description: Introduce basic data analysis tools and to train graduate students in statistical tools associated with hypothesis testing and linear models. The aim is to promote sound scientific research and experimentation based on good statistical thinking and practice. Class notes will be posted online.

Prerequisite(s): STA 2023 or equivalent
Credit Hours: 3

Software: You will need a computer for the homework assignments and practise. The main software used in class will be R.

Course Goals and 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 quantitative 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.

Course Policies

The instructor reserves the right to update any parts of this syllabus as necessary.
Students will promptly be notified of any changes.

Demeanor

All members of the class are expected to follow rules of common courtesy in all classroom discussions, email messages, threaded discussion and chats. Please refer to expected class netiquette.

Assignments

- All **deadlines (excluding exams) are at 23:59** of the due/end date. These are ***hard* deadlines** meaning that any open or ongoing assignments will automatically be submitted at the deadline. No late assignments will be accepted under any circumstances.
- Students are expected to work independently, unless otherwise specified in writing. **Offering** and **accepting** solutions from others is an act of **plagiarism**, which is a serious offense and **all involved parties will be penalized according to the UF Student Honor and Conduct Code**. Discussion amongst students is encouraged, but when in doubt, direct your questions to the instructor.

- Students are expected to **show and explain their work** where necessary.
- All electronically **submitted work must be as one merged file**. In Canvas, all uploaded files automatically get a grade of 0, until the teaching assistant grades them.
- Feedback will provided within two business days from the assignment deadline.

Under each module in e-Learning,

- **Projects** that are based on (primarily) textbook exercises.
- **Quizzes** that are *timed* and range from conceptual to applied. Only 1 attempt and administered via Honorlock.
- **R assignments** that are similar to (secondary) textbook exercises.

All deadlines are posted on e-learning. **Assignments are automatically submitted at deadline even if in progress.**

Exams

After the completion of certain modules, exams will be administered via Honorlock. For (more) complete information about Honorlock please visit the "Start Here" page of the class website. *Due to the nature of online exams via Canvas, it is important to keep in mind that technical issues may arise and although we try to implement failsafes, please try to plan accordingly by saving work, documenting issues and preparing any material ahead of time.*

- Exams are timed with a duration of about 75 minutes (60 minutes with up to 15 minutes provided for the startup) and will **start (for all) at 08:30 on the day of the exam**. Be sure to study the material and familiarize yourself with the posted in Canvas procedures prior to the exam.
- Only 1 attempt.
- Only allowed **one screen/monitor**.
- It is highly encouraged to use a **reliable device** with a **reliable internet connection**. Being disconnected means that you are no being longer supervised which could potentially mean that your exam will not be graded.
- Practice problems (not practice exams) will be provided.

Allowed material:

- Instructor provided (in Canvas) formula sheet(s) and R-reference sheet. It is recommended to have the material ready and printed ahead of time (in case of technical issues).
- Access to R or WolframAlpha (when needed) will be provided through the exam.
- One sheet of blank scratch paper.

Important dates:

Exam #1	May 26th
Exam #2	June 9th
Exam #3	June 18th

Grading

Grade distribution:

Exams 1, 2 and 3	45%	(7% lowest, 17% second best, 21% best)
Projects	20%	
Quizzes	20%	(includes Intro quiz, lowest quiz dropped)
R assignments	15%	
Total	100%	
Extra Credit	0-1%	(class and discussion forum participation)

Final grade and can be calculated using:

$$\begin{aligned}\text{Final} =& 0.07(\text{lowest exam}) + 0.17(\text{second best exam}) + 0.21(\text{best exam}) \\ &+ 0.20\left(\frac{\sum \text{projects}}{300} \times 100\right) \\ &+ 0.20\left(\frac{\sum \text{quizzes} - \text{lowest}}{100} \times 100\right) \\ &+ 0.15\left(\frac{\sum \text{R assignments}}{60} \times 100\right) \\ &(+0 \text{ to } 0.01 \text{ class and discussion forum participation})\end{aligned}$$

Letter grade assignment:

There will be *no rounding up* of scores.

		A	91 to 100	A-	88 to < 91
B+	84 to < 88	B	80 to < 84	B-	77 to < 80
C+	74 to < 77	C	70 to < 74	C-	67 to < 70
D+	64 to < 67	D	60 to < 64	D-	55 to < 60
E	< 55				

Final grades shown on e-Learning are not accurate because they do not account for the conditional weighing of exams.

To view the result of the letter grades to your GPA please visit the UF Grade and Grading Policies.

Make-up

Requirements for class attendance and make-up exams, assignments, and other work in this course as well as policies regarding absences, religious holidays, illness and student athletes are consistent with UF Attendance Policies.

Additional make-up policy requirements:

- Every effort should be made to complete the assignment/exam during the open period. Only extreme situations will warrant a makeup. Contact the instructor prior to the exam - as soon as you realize you will be unable to take the assignment/exam at the scheduled time. Each

case will be reviewed individually. Valid and detailed documentation is a prerequisite for scheduling a makeup under such extenuating circumstances.

- If you have an emergency on the day of the assignment/exam, the instructor must be contacted by midnight of the day of the assignment/exam.
- Make-ups need to be scheduled within a week from the assignment deadline. Student is responsible for scheduling.
- Additional Note: Being on vacation or booking a trip prior to the completion of the semester is not a valid reason to request a makeup. Please reference the most recent Academic Calendar.

Addressing Issues

Technical difficulties

Please contact the UF Help desk via e-Learning "Help" tab or UF IT Service Portal. Any requests for make-ups due to technical issues must be accompanied with appropriate documentation/proof including screenshots and communication with the help desk. You MUST contact your instructor within 24 hours of the technical difficulty if you wish to request a make-up.

Grievances/Commendations

Should you have any grievances or commendations with your experience in this course you can always address them

- to the instructor at athienit@ufl.edu, or
- the Department of Statistics.

For issues that are not satisfactorily resolved at the department level or which seem to be broader than one department, students are referred to the Office of the Ombuds.

UF and CLAS Policies

Dropping, Withdrawing and Incomplete

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 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 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 offers care related resources and programs focused on health, safety, and holistic well-being.

Academic Misconduct

Students are held accountable to the UF Student Honor and Conduct Code.

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/`

Tentative Course Outline

⋆ Additional topics included

Modules	Content	Class notes	Textbook	Project/Quiz
1	Summary Statistics	1.1-1.2	3.4-3.5	1
	Graphical Summaries	1.3	3.3,3.6	
2	Sample Space, Events and Probability	2.1-2.2	4.2-4.3	2.1
	Conditional Probabilities and Independence	2.3	4.4-4.5	
	Random Variables: Properties (I)	2.4	4.6⋆	
	Random Variables: Properties (II)	2.4	4.6⋆, 4.10⋆	
	Random Variables: Properties (III)	2.4	⋆	2.2
	Random Variables: Common distributions	2.4	4.8(Bin.), 4.9-4.10	
	Central Limit Theorem	2.5	4.12-4.13	
	Normal Probability/Quantile Plot	2.6	4.14⋆	
Exam 1				
3	Inference for Population Mean: Confudence Intervals	3.1.1	5.2-5.3	3.1
	Inference on Population Mean: Hypothesis Tests	3.1.2	5.4	
	Inference on Population Proportion	3.2	10.2	
	Inference on Population Variance	3.3	7.2	3.2
	Distribution Free Inference (I)	3.4	5.9⋆	
4	Inference on Population Means: Confidence Intervals	4.1.1	6.2, 6.4, 10.3	4.1
	Inference on Population Means: Hypothesis Tests	4.1.2	6.2, 6.4, 10.3	
	Inference on Population Variances	4.2	7.3	
	Distribution Free Inference (II)	4.3	6.3⋆, 6.5⋆, 7.4	4.2
	Contingency Tables: Tests of Independence	4.4	10.5	
Exam 2				
5	Simple Linear Regression (I)	5.1.1-5.1.2	11.1-11.2	5.1
	Simple Linear Regression (II)	5.1.3-5.1.6	11.3-11.4	
	Checking Assumptions and Transforming Data	5.2	11.5⋆	
	Multiple Regression (I)	5.3.1-5.3.2	12.1-12.3	5.2
	Multiple Regression (II)	5.3.3	12.4-12.7	
	Qualitative Predictors	5.4	12.1⋆	
6	Completely Randomized Design (I)	6.1.1	14.1-14.2	6.1
	Completely Randomized Design (II)	6.1.2	14.5	
	Completely Randomized Design: Distribution Free	6.1.3	⋆	
	Randomized Block Design	6.2.1	15.1-15.2	6.2
	Randomized Block Design: Distribution Free	6.2.2	15.5	
Exam 3				