



STA 6166 (14221)

Summer A 2020

Statistical Methods in Research I

Instructor: Demetris Athienitis

E-mail: athienit@ufl.edu

Teaching Assistant: Mingliang Ma

E-mail: mamingliang@ufl.edu

Course Website: [e-Learning](#)

Course Material: Teaching will be asynchronous except office hours and exams. Material will be provided in course website.

- Notes do deviate from textbook and you are responsible for material as taught in the notes.
- Slides. New slides to be created.
- Videos New videos to be created.

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

Course Communication:

- Discussion forum (link to Slack workspace available in course website).
- Live office hours 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](#) online and during class.

Assignments

- All **deadlines 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. For example you should not start an assignment at 23:58. 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 Honor 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**.
- 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 be provided within two business days from the assignment deadline.

Projects/Quizzes

Under each module in e-Learning,

- **Projects** that are based on (primarily) textbook exercises.
- **R assignments** that are based on the (secondary) textbook exercises.
- **Quizzes** that are *timed* and range from conceptual to applied.

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.*

- You must **show your work for full credit** or at least to receive partial credit if wrong.
- Exams are timed with a duration of 75 minutes (60 minutes with up to 15 minutes provided for the startup) and will be **available for one day**. Be sure to study the material and familiarize yourself with the procedures prior to the exam as time is limited. Start the exam at least 75 minutes before the hard deadline.
- Exams are available on the class page in Canvas for which you realistically have **only 1 attempt**.
- You are only allowed to use **one screen/monitor**.
- It is highly encouraged to use a **reliable device** with a **reliable internet connection**. Being disconnected means that you are no longer supervised which could potentially mean that your exam will not be graded.
- Most questions will have a text window for which to write your answer. Math equations can be added in much the same way as in the discussion forum, in that they both use L^AT_EX. So please familiarize yourself with inserting math equations in text windows. For practise please visit <https://www.codecogs.com/latex/eqneditor.php>. Practice sets will be provided in the same format.

Allowed material:

- Instructor provided formula sheet(s) and [R-reference sheet](#). All of which are also provided in e-Learning course page. It is recommended to have the material ready and available ahead of time (in case of technical issues, such as broken links).
- Permissible software during the exam are: RStudio and the website [Wolframalpha](#). Please make sure you have RStudio already installed on your device and must be working with a blank workspace/console/command window at the beginning of the exam.
- Two sheets of scratch paper.

Important dates:

Exam #1	May 22nd
Exam #2	June 5th
Exam #3	June 19th

Grading

Grade distribution:

Exams 1, 2 and 3	40%	(7% lowest, 14% second best, 19% best)
Quizzes	20%	(lowest quiz dropped, includes Intro quiz)
Projects	25%	(lowest project dropped)
R assignments	15%	
<hr/>		
Total	100%	
Extra Credit	0-2%	(class and discussion forum participation)

Final grade and can be calculated using:

$$\begin{aligned}\text{Final} = & 0(\text{worst exam}) + 0.13(\text{second best exam}) + 0.20(\text{best exam}) \\ & + 0.30 \left(\sum \text{projects} - \text{lowest} \right) \\ & + 0.20 \left(\sum \text{quizzes} - \text{lowest} \right) \\ & + 0.15 \left(\frac{\sum \text{R assignments}}{60} \times 100 \right) \\ & (+0 \text{ to } 0.02 \text{ class and discussion forum participation})\end{aligned}$$

Letter grade assignment:

There will be *no rounding up* of scores.

	A	91 to 100	A-	88 to < 91
B+	B	80 to < 84	B-	77 to < 80
C+	C	70 to < 74	C-	67 to < 70
D+	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 [Student Complaints On-Campus](#) or [On-Line Students Complaints](#)

UF and CLAS Policies

Dropping, Withdrawing and Incomplete

Dropping and Withdraw

For late course drops and course withdrawals please visit <https://catalog.ufl.edu/UGRD/academic-regulations/dropping-courses-withdrawals/>

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 policies and forms](#).

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.

Academic Misconduct

Students are held accountable to the [UF Honor 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	Suggested HW/Quiz
1	Summary Statistics	1.1-2	3.4-5	1
	Graphical Summaries	1.3	3.3,3.6	
2	Sample Space, Events and Probability	2.1-2	4.2-3	2.1
	Conditional Probabilities and Independence	2.3	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 (I)	3.1.1	5.2-5.3	3.1
	Inference for Population Mean (II)	3.1.2	5.4	
	Inference for Population Proportion	3.2	10.2	
	Inference for Population Variance	3.3	7.2	3.2
	Distribution Free Inference (I)	3.4	5.9*	
4	Inference for Population Means: Confidence Intervals	4.1.1	6.2, 6.4, 10.3	4.1
	Inference for Population Means: Hypothesis Tests	4.1.2	6.2, 6.4, 10.3	
	Inference for 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)	5.1.1-2	11.1-11.2	5.1
	Simple Linear Regression (II)	5.1.3-6	1.3-11.4	
	Checking Assumptions and Transforming Data	5.2	11.5*	
	Multiple Regression (I)	5.3.1-2	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				