

# LIN4930/6932 ADVANCED STATISTICS

W 3-6pm

Room: Matherly 108

Spring 2023

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<b>Office Hour:</b>	W 1:55-2:45pm	R 12:50-1:40pm
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## Course objectives

This course deals with more advanced issues in frequentist approaches to statistical analysis (mixed effects models, contrast coding, among other things), and provides an introduction to Bayesian statistics. Examples come from various fields of language science. **Familiarity with the programming language R and mixed effects models is assumed.**

By the end of class, students are expected to:

1. learn to analyze more complex quantitative data with frequentist frameworks;
2. learn to approach similar problems with a Bayesian way of thinking;
3. gain more familiarity with R.

## Prerequisite

LIN4005/LIN6007 Statistics for Linguists, or other equivalent background or coursework. Please contact the instructors to discuss your background if you have not taken LIN4005/LIN6007.

## Course website

Canvas will be used as the course website. All course materials will be posted on Canvas. Grades will be posted to the Canvas grade book.

## Textbook

There is no required textbook for this course. Readings will be drawn from publicly available resources, chapters from statistics books, and/or scientific publications.

## Laptop and software

Students are required to bring their laptop to class in order to do in-class assignment and group activities. Please have the latest version of R and R studio installed by the first session: [R \(www.r-project.org\)](http://www.r-project.org); [R-studio \(www.rstudio.com\)](http://www.rstudio.com).

## Attendance & Participation

- Coming to class prepared
- Doing the in-class exercises. These are practice exercises illustrating new concepts and techniques. Answers will be provided in class. Doing these exercises is critical, since this allows you to monitor your own understanding and receive immediate feedback.

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- Contributing to discussion in class
  - Helping others understand the concepts and problems in class

## Assignments

- Homework assignments are due about every week (about 10 in total), except in weeks when a test is due. Students have one week to make the homework, see schedule.
- Homeworks are made available on and should be submitted through the course website
- Typical homework assignments include: reading a data set into R and conducting analyses or visualizing the data, applying learned concepts to particular research scenarios, interpreting tables and graphs, interpreting results sections of published reports, making exercises for peers in which new terminology, concepts or techniques are illustrated and practiced.
- **Note:** in some weeks graduate students may get more or other homework exercises than undergraduate students.

## Tests

- There will be three open book tests over the course of the semester, approximately in weeks 6, 11 and 16. The format of the test (take-home, or in-class) will be decided closer to the dates.
- Test questions and problems are comparable to those practiced in class and in the homework assignments
- Tests will be made available through the course website
- These tests are non-cumulative, although basic knowledge is assumed of what has been dealt with earlier in the semester (especially concerning R).

## Participation in LIN/S&P/SLHS experiments (optional, extra credit)

To encourage awareness of different aspects of experimental research in language-related fields, you can elect to participate in 2 hours of language or communication research during the semester. For a list of studies that qualify, see the SONA website, <https://ufl-slhs.sona-systems.com/>. For details on how to use SONA, see [this document](#). You need to have participated in 2 hours of experiments before the last session of this course for you to receive credit. This assignment will be worth a maximum of 2% of your course grade. If you choose not to participate or do not qualify for any of the studies, you can receive the same amount of course credit for reading a short research article (provided by the instructor) and writing a 2 page synopsis. This paper must be turned in no later than the last session of this course.

## Grade breakdown

### Grade scale

We would be using the default canvas grading scheme.

### Academic Integrity

	Graduates	Undergraduates
<b>Attendance &amp; Participation</b>	5%	5%
<b>HWs and in-class assignments</b>	20%	35%
<b>Critique paper + data set analysis</b>	15%	N/A
<b>Tests</b>	60%	60%
<b>Extra credit</b>	2%	2%

A	94-100	A-	90-94	B+	87-90	B	84-87
B-	80-84	C+	77-80	C	74-77	C-	70-74
D+	67-70	D	64-67	D-	61-64	E	< 61

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 Honor Code](#) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, students are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If students have any questions or concerns, please consult with the Instructor or the TA.

### Classroom Conduct

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to professional behavioral standards may be subject to discipline. The Instructor pledges to treat each of the students with dignity, respect, and professional courtesy. Students are expected to do the same for the Instructor and for each other.

### Attendance Policy, Class Expectations, use of AI, Make-Up Policy, Cell-phone use

- Students are required to submit all assignments and tests before the class period they are due. Please contact the instructor in advance if you need to skip a class, or cannot make a deadline.
- Attendance is mandatory. If you are absent for more than three classes, you will get a warning. If absences persist the instructor can prohibit further attendance and assign a failing grade for excessive absences.
- Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: [catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/](https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/)
- Students need to disclose any use of AI in their assignments, and need to indicate their prompts and their critical (content) edits of the AI output. AI output without prompts or critical edits will not be accepted. AI needs to be properly cited (<https://apastyle.apa.org/blog/how-to-cite-chatgpt>).
- Cell-phone use is not allowed during class unless this is part of the course assignments. Laptops and tablets can only be used to take notes and for in-class assignments.

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## **Accommodation Policies**

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center. [Click here to get started with the Disability Resource Center](#). It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

## **Religious Observances**

A student should inform the Instructor of religious observances that will conflict with class attendance, tests or examinations, or other class activities prior to the class or occurrence of that test or activity. The Instructor is obligated to accommodate students' religious observances. See policy details [here](#).

## **Course 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 [here](#). 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 [here](#). Summaries of course evaluation results are available to students [here](#).

## **Recording lecture content**

Students are allowed to record class lectures. However, the only allowable purposes of these recordings are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. Specifically, students may not publish recorded lectures without the written consent of the instructor. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. A recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil action and/or discipline the Student Honor Code and Student Conduct Code.

## **Campus resources**

See tab on Canvas website

## **Course outline**

**Subject to change.**

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<b>Week</b>	<b>Date</b>	<b>Topics</b>	<b>Lead</b>
Week 1	1/10	Class Introduction Frequentist and Bayesian approaches Refresher of R and terminology	Kaan & Liu
Week 2	1/17	Refresher of (logistic) mixed effects models	Kaan
Week 3	1/24	Convergence issues, collinearity, contrast coding	Kaan
Week 4	1/31	Contrast coding	Kaan
Week 5	2/7	Power	Kaan
Week 6	2/14	Poisson regression	Kaan (& Liu)
Week 7	2/21	Capitalizing on random effects	Kaan
Week 8	2/27	Probability, Bayes Rules, Distributions	Liu
Week 9	3/6	Choosing prior and likelihood	Liu
Week 10		<b>Spring break</b>	
Week 11	3/20	Bayesian linear regression	Liu
Week 12	3/27	Bayesian mixed-effects models	Liu
Week 13	4/3	Bayesian mixed-effects models, continued	Liu
Week 14	4/10	Bayesian prior elicitation	Liu
Week 15	4/17	Bayesian contrast coding	Liu
Week 16	4/24	Taking stock	Kaan & Liu

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