STA 4504 (20430)

Spring 2024

Categorical Data Analysis

MWF 1:55 PM - 2:45 PM in AND 0034

Course Overview

Instructor: Xavier Mak

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Teaching Assistant: Ziqian Yang

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Office Hours: See Canvas.

Course Description: This course will cover a wide range of analysis techniques used when dealing with categorical data. Course content includes description and inference for binomial and multinomial observations using proportions and odds ratios; multiway contingency tables; generalized linear models for discrete data; logistic regression for binary responses; multi-category logit models for nominal and ordinal responses; loglinear models; and inference for matched pairs correlated clustered data.

Prerequisite: STA 3100 and (STA 3024 or STA 3032 or STA 4210 or STA 4322). It is highly recommended to be familiar with ordinary least squares regression.

Course Objectives:

1. Be able to identify and analyze categorical variables.

2. Be able to calculate and interpret odds ratios and relative risks and associated inference procedures.

3. Be able to apply statistical tools to make inference about a single binomial proportion or two sample proportions.

4. Understand and be able to calculate the different goodness of fit statistics.

5. Understand and explain the properties of different measures of association by estimating various forms of measures of association from retrospective, cross-sectional and prospective studies.

6. Be able to analyze three-way tables.

7. Understand the fundamental importance of the logistic model.

Required Text:

> *An Introduction to Categorical Data Analysis*, 3rd Edition.
> **Author(s):** A. Agresti; **ISBN-13:** 9781119405269

Be careful not to confuse this text with Agresti's *Categorical Data Analysis*.

Materials: You will need a calculator capable of basic arithmetic operations and taking square roots will be needed for in-class exams. Internet-enabled electronic devices, such as cell phones or tablets, cannot be used as calculators during exams.

Course Website: e-Learning

Course Communication:

- Use e-mail to contact the instructor regarding administrative matters. Make sure to include **STA 4504** in the subject line.

- For questions regarding course content, please see the instructor or TA(s) 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. If you have any problems downloading R or RStudio, please contact the instructor or TA(s).

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

Exams: Exams will be held in-class during regular class times. See below for exam dates. You will need to bring a scientific calculator and your UF ID. Any other electronic devices, such as a cell phone, will not be permitted during the exam. You will be allowed a double-sided, one-page formula sheet on the exam. This sheet *must* be handwritten and be on a standard 8.5" by 11" sheet of paper.

Exam Dates (tentative):

Any changes in exam dates will be announced in class and on the course website.

> Exam #1 . . . . February 9
> Exam #2 . . . . March 22
> Exam #3 . . . . April 24

Grade Corrections: If you believe there was a mistake made in the grading of an assignment, please contact the instructor or TA(s) who graded the assignment within *one week* after the grade has been posted.

Grading

Grade Distribution:

Homework	30%
Exams 1, 2, and 3	70% (Each exam is weighted equally.)

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 final letter grades are *non-negotiable*.

Attendance and Missed Assignments

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 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.

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.

Classroom Behavior: During class, students should refrain from eating, listening to music, excessive talking and all other behaviors that are distracting and disrespectful to the instructor and their fellow students.

COVID-19: In response to COVID-19, the following recommendations are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to further the health and safety of ourselves, our neighbors, and our loved ones.

- If you are sick, stay home. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 to be evaluated.

- As with any excused absence, you will be given a reasonable amount of time to make up work.

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.

UF Grading Policies: For more information regarding current UF grading policies on assigning grade points, see
`https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/`.

U Matter, We Care: U Matter, We Care offers care related resources and programs focused on health, safety, and holistic well-being.

Tentative Course Schedule

Week(s)	Content	Textbook Section
1-2	Introduction to Categorical Response Data	1.1-1.2
	Statistical Inference for a Proportion	1.3-1.4, 1.6
2-5	Analyzing Contingency Tables	2.1-2.4, 2.6-2.7
Exam 1		
6-7	Introduction to Generalized Linear Models	3.1-3.2, 3.4-3.5
7-9	Logistic Regression	4.1-4.6
9-10	Building and Applying Logistic Regression Models	5.1-5.3
Exam 2		
11-12	Multicategory Logit Models	6.1-6.2
13-14	Loglinear Modeling of Count Response Variables	7.6
14-15	Models for Matched Pairs (if time permits)	8.1, 8.5
Exam 3		