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A. Course overview

Course description

Analysis of discrete data, including 2x2 tables; cross-sectional, prospective, and retrospective studies; measures and tests of association; log linear models; association graphs; and analysis of stratified tables.

Course goals

At the end of this course, I hope that you will:

1. Appreciate the pervasiveness of discrete data in science and society.
2. Understand the properties of and develop the skills to conduct standard univariate inference about the parameters for typical discrete distributions (Poisson, Bernoulli, Binomial, Multinomial.)
3. Develop the skills to conduct standard inference about typical measures of association between two (or more) discrete variables.
4. Understand the difference between experiments and observational studies (cohort or case-control) and how to appropriately interpret the results of these studies.
5. Develop the skills to model associations among discrete random variables via log-linear and logistic models, including assessment of model fit.
6. Understand the special statistical issues with matched pair study designs, and develop the skills to appropriately make inference using such data.

Throughout the course, weekly overview pages posted on Carmen will give you guidance about meeting each of those goals through the activities and assignments.

Prerequisites

STAT 5302 (530), STAT 6450 (645), STAT 6950, PUBHBIO 6203, PUBHBIO 703, or permission of instructor. Not open to students with credit for STAT 665. Essentially, you should be familiar with basic concepts of probability and inference, as well as comfortable with analysis of variance (ANOVA) and linear regression.

Faculty information



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Office Hours: **Wednesday, 10:20-11:15am, and by appointment.** I also encourage you to ask short questions via email.

About me: I really like healthcare. All parts of it. I even find it fascinating to be on the receiving end! I am most interested in figuring out what healthcare interventions work (and are safe) and for whom they work (and are safe). Fortunately, there is often lots of data relevant to these questions. However, the best way to combine or subset data to get reasonable answers to meaningful questions is not so straightforward, and is my current focus of research. Many of these applications - especially the safety ones - involve categorical variables, and so discrete data analysis is something I think about almost every day. Perhaps unfortunately for you, I will probably be using a lot of healthcare examples this semester. I will try to mix it up, so please let me know of any idea you might have for another application to discuss - often students provide fantastic examples!

On a more personal note, I've been teaching here at OSU and living in Columbus since 2006. I love to walk everywhere -- in my office and in the city (you may catch me on High Street on a nice evening), as well as in the great outdoors. The photo above is a selfie on the top of [Mount Cardigan](#) from a visit to Dartmouth College. I also like to travel, and have been to 4 of the 7 continents. Can you guess which ones? When I'm not on the road, I'm curled up at home in Short North.

B. Course materials

Textbook

[Alan Agresti \(2007\) *An Introduction to Categorical Data Analysis, Second Edition.* Wiley.](#)

You can also read this online (one at a time) via the e-book at the OSU library. Here's the link: <http://site.ebrary.com/lib/ohiostate/docDetail.action?docID=10278250>

This text is affectionately known as 'Little Agresti.' It is essentially a subset of the much more substantive 'Big Agresti,' aka [Categorical Data Analysis](#). Make sure you are looking at the 'Little' one for assignments.

Supplemental reading assignments will be posted on Carmen

Other references

While not required, you might find the following references useful:

- Agresti (2002) Categorical Data Analysis, Second Edition.
- Bishop, Fienberg & Holland (1975) Discrete Multivariate Analysis.
- Christensen (1994) Log-Linear Models.
- Fienberg (2007) The Analysis of Cross-Classified Categorical Data, 2nd edition.
- Hosmer & Lemeshow (2013) Applied Logistic Regression, 3rd edition.
- Santner & Duffy (1989) The Statistical Analysis of Discrete Data.

C. Technology

Course website

All information regarding this course will be posted to [Carmen](#). However, all announcements in class supersede previous Carmen posts.

Necessary equipment

Access to current computer running a Windows, OSX, or Linux operating system and with reasonable internet connectivity via a modern browser.

Computing

We will use computing for a variety of purposes, including simulating and analyzing discrete data. In this course, we will be using the R software, which is freely available for most operating systems (<http://www.r-project.org/>). R itself is a programming language that would require you to write code directly.

Please install R on your computer by following the steps:

- Install R by following the instructions in the "Getting Started" box in the center of the website

<http://www.r-project.org/>. A "mirror" is simply a duplicate server so that you can have a faster internet connection for the download. I recommend that you choose the Case Western mirror if you are in Ohio. If you're having trouble, you might find the [first tutorial linked below](#) to be helpful. Also feel free to ask.

If you are interested in learning more about R programming directly (without Rcmdr) there are a plethora of online tutorials available. I recommend the video tutorials by Dan Goldstein you can find in the links below. Some of the interface with the PC is a bit outdated, but the essentials of working with R are pretty solid.

- <http://youtu.be/ZmtkqaRVTDC>
- <http://youtu.be/GcmorHXygoI>

A colleague also recommended the tutorials here <https://www.datacamp.com/courses/introduction-to-r> though I haven't looked through them, so I can't comment on their quality from personal experience.

D. Assignments and grading

The graded activities of this term course will consist of 5 graded homework assignments, one 110-minute midterm exam, and one take-home final exam.

Due Dates and Final Grade Calculation

Activity	Due Date	% Final Grade
Homework 1	January 20	5%
Homework 2	January 27	5%
Homework 3	February 3	5%
Homework 4	February 10	5%
Midterm Exam	February 17	35%
Homework 5	February 24	5%
Final Exam	March 3	40%

Grading scale

The grades in this class will be calculated according to the OSU standard grading scale.

Homework logistics

Homework assignments are due at **12:00 noon** on their due date. No late homework will be accepted. Please contact the instructor as soon as possible if a situation arises where you may be prevented from submitting your homework on time.

All homework must be uploaded to the appropriate dropbox on [Carmen](#). No paper homework will be accepted. To be complete and acceptable, each homework submission **must**:

1. Contain your name both **inside** the file and as **part of the file name**.
2. Be a **single** .pdf file
3. Be in the same order as the assignment (typically numerical order).

You do not need to typeset your homework submission. You may take **clear, legible** photos of your written work, and then combine these into a single .pdf file. Here's instructions from a previous TA on how to accomplish this via MS Word:

- To insert a picture of your handwritten homework into a Word file:
 - Open a Word file.
 - Click Insert where you would like the picture to go.
 - Click Picture.
 - Choose your homework picture. The picture of your homework should become a part of the Word document you have just created.
 - Arrange the pictures in the right order in the Word file. (This **does** need to be legible, but does **not** need to be beautiful.)
- To save your Word file as a .pdf file:
 - Click File.
 - Choose Save as.
 - Click on the box "Save as type" (Windows) or "Format" (Mac). A menu of types of files should be shown.
 - Choose pdf.

You may discuss all homework assignments with your classmates, but the work you submit should be your own.

Midterm exam logistics

The midterm exam will take place during class on Tuesday, January 17. You may bring a calculator, and a single regularly-sized sheet of paper (approximately 8.5x11 inches) with notes of any kind on both

sides of the sheet. Of course, no cell phones or tablets will be allowed. You may not discuss your exam with your classmates during the exam time.

Final exam logistics

The final exam will be released via Carmen on February 26, at 11:59pm. You must upload your final exam submission to Carmen by 12 noon on Tuesday, March 3. Specific instructions for the submission will be included in the exam instructions. You may use resources such as your textbook, but you **may not discuss any aspect of the exam with anyone other than the instructor (either in person or electronically) until 12 noon on March 3**. I will take any case of suspected cheating (including such communication) to the Committee on Academic Misconduct, as described below.

E. Participation and communication

All students are expected to attend and participate during the scheduled class sessions, Tuesdays and Thursdays, 12:40 - 2:30pm. In addition, I will open discussion boards within Carmen. In all this communication, I expect you to be respectful and part of creating a supportive learning community.

F. Accessibility and support

Requesting accommodations

Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs. In addition, please contact the Office for Disability Services to register any documented disabilities. Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; <http://www.ods.osu.edu/>.

More resources regarding accessibility can be found here:

<http://ada.osu.edu/resources/Links.htm>.

Accessibility of course technology

This course requires use of Carmen (Ohio State's learning management system). Information about Carmen (Desire2Learn) accessibility can be found here:

<http://www.desire2learn.com/products/accessibility/>. If you need additional services to use these technologies, please request accommodations with your instructor.

Academic and Student Support

The University provides resources and services for academic and student support. More information about these resources is here: <http://artsandsciences.osu.edu/current-students/university-resources> and here: <http://ssc.osu.edu>.

G. Academic integrity

Academic integrity in this course

Exams. You must complete the midterm exam yourself, without any external help or communication.

Written homework assignments. Your written assignments should be your own original work. You should formally cite the ideas and words of your research sources. You are encouraged to ask a trusted person to proofread your assignments before you turn them in--but no one else should revise or rewrite your work.

Reusing past work. In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with the instructor.

Falsifying research or results. All research you will conduct in this course is intended to be a learning experience; you should never feel tempted to make your results or your research look more

successful than it was. The course evaluation emphasizes the methodological choices over the actual results.

Collaboration and informal peer-review. The course includes many opportunities for formal collaboration with your classmates. Study groups and peer-review are encouraged, but you should only turn in work that is yours. If you're unsure about a particular situation, please feel free just to ask ahead of time.

Ohio State's academic integrity policy

Cheating, plagiarism and other forms of academic dishonesty will not be tolerated. It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. The instructor will report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct: <http://studentlife.osu.edu/csc/>.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact the instructor.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- The Committee on Academic Misconduct web pages ([COAM Home](#))
- *Ten Suggestions for Preserving Academic Integrity* ([Ten Suggestions](#))

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