National University
School of Engineering & Computing

Instructor: **Kevin Duffy-Deno**
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Phone:

Course Outline

Course Title: Categorical Data Methods and Applications, ANA 625

Course Readings: Duffy-Deno, K.T. *Lectures on Categorical Data Analysis*, 2024 (download from Brightspace)

Additional readings on Brightspace.

Supplemental Textbooks: Agresti, A. *An Introduction to Categorical Data Analysis*, Wiley-Interscience; 3rd edition. ISBN-13: 978-0471226185

Stokes, M.E. *Categorical Data Analysis Using SAS*, SAS; 3rd edition. ISBN-13: 978-1607646648

Software: SAS Studio OnDemand

Course description:

Application of methods for analyzing categorical data for knowledge discovery. Analytic categorical data analysis concepts and methods are developed with practical skills in exploratory data analysis. Descriptive statistics of discrete data, contingency tables, and methods of generalized linear models are covered. Applying categorical methods using case studies and real-world data will leverage statistical assessment and interpretation.

Course Learning Outcomes:

Upon successful completion of this course, students will be able to:

1. Interpret the methods, tests, and assumptions in categorical data analysis.
2. Evaluate strategies to conduct data analysis with categorical response data.
3. Organize data for statistical analysis of categorical data.
4. Design technical and strategic objectives for analysis of categorical data.
5. Analyze categorical data using logistic regression to calculate adjusted odds of association and test hypothesis.
6. Evaluate results of a contingency table analysis using frequency tables and variable profiles.

Material covered in this course also introduces the following Program Learning Outcomes:

- PLO #2 Evaluate data management methods and technologies used to improve integrated use of data.
- PLO #4 Design an analytic strategy to frame a potential issue and solution relevant to the community and stakeholders.

Course Requirements:

In addition to successfully achieving the learning outcomes, students are expected to participate in all class activities, complete activities as scheduled, and turn in all assignments on time. Failure to do so may result in the loss of points or the lowering of one's grade.

Course Schedule:

Online session dates and times are shown. **Note that there will be 8 sessions. Each session will have a live (optional) and a pre-recorded (REQUIRED) version. Pre-recorded sessions ("Class Exercise") are available on Brightspace.**

Week	Session	Date	Time (Pacific)
1	**1**	Tuesday March 4	5:30 – 8:00 PM
	2	Thursday March 6	5:30 – 8:00 PM
2	**3**	Tuesday March 11	5:30 – 8:00 PM
	4	Thursday March 13	5:30 – 8:00 PM
3	**5**	Tuesday March 18	5:30 – 8:00 PM
	6	Thursday March 20	5:30 – 8:00 PM
4	**7**	Tuesday March 25	5:30 – 8:00 PM
	8	Thursday March 27	5:30 – 8:00 PM

All assignments for the week are due at **8:00am Pacific Time on the assigned date**. Here is an overview of the course resources and the due dates for each assignment:

Week 1	**T,TH: March 4,6**
Lecture Slides	Case Study Example – Tables 1,2 & 3
Readings	Background Reading - Biostatistics for Medical and Biomedical Practitioners (BMBP): Ch 1: Basic Statistical Concepts Ch 3: Some Practical Aspects Ch 5: Basic Probability Ch 10: Hypothesis Testing: Type I Error Ch 11: Hypothesis Testing: Type II Error Core Reading: BMBP – Ch 14: Categorical and Cross-Classified Data (pp 183-208) SAS Categorical Data Analysis (CDA) – Ch 1: 1.1, 1.2 Duffy-Deno, Lectures on CDA – Ch 1 – 5

Videos	Class Exercise #1 – Odds Ratios Class Exercise #2 - Confounding
Graded Activities	Homework #1 (**Due March 10**) Progress Check #1 (**Due March 10**) Project Objective Preso (**TBD**)
Week 2	**T,TH: March 11,13**
Lectures	Case Study Example – Tables 1,2 & 3
Readings	Core Reading: SAS CDA – Ch 2, 4.2, 4.3 Logistic Regression Using SAS – Ch 2 Duffy-Deno, Lectures on CDA – Ch 6,7
Videos	Class Exercise #3 – Logistic Regression Class Exercise #4 – Logistic Regression II
Graded Activities	Homework #2 (**Due March 17**) Progress Check #2 (**Due March 17**) Project Objective Preso (**TBD**)
Week 3	**T,TH: March 18,20**
Lectures	Case Study Example – Tables 1,2 & 3
Readings	Core Reading: SAS CDA – Ch 3.3, 4.1 Logistic Regression Using SAS – Ch 3.1 – 3.8, 4.1 – 4.3 Duffy-Deno, Lectures on CDA – Ch 8,9
Videos	Class Exercise #5 – Confounding II Class Exercise #6 – Interactions and Effect Modification
Activities	Homework #3 (**Due March 24**) Progress Check #3 (**Due March 24**) Project Objective Preso (**TBD**)
Week 4	**T,TH: March 25,27**
Lectures	Case Study Example – Tables 1,2 & 3
Readings	Core Reading: BMBP – Ch 2: Statistical Use and Misuse in Scientific Publications Duffy-Deno, Lectures on CDA – Ch 10 Advanced Topics (skim so you are aware): SAS CDA – Ch 5 Logistic Regression Using SAS – Ch 5, Ch 6 Duffy-Deno, Lectures on CDA – Ch 11,12

Videos	Class Exercise #7 – Model Building Class Exercise #8 – Reporting Effect Modifying ORs
Activities	Course Project (**Due March 31**) Progress Check #4 (**Due March 31**) Project Objective Preso (**TBD**)

Course Expectations:

ANA 625 covers material typical to a 10-week course in just 4 weeks. Students are expected to be able to commit the time necessary to be successful in this compressed learning environment. While students will be supported in their efforts by the instructor, students must recognize that significant out-of-class time may be necessary to be successful in this course.

Course Grading:

Course grading will be a combination of objective and subjective measurements to evaluate student performance based on homework assignments and progress checks.

Homework (100 points Week 1; 150 points each for Weeks 2-3)	400
Progress Checks	200
Project Objective (class presentation)	100
Course project	300
Total Points	1000

The Final Letter Course Grade converted from percentage:				
A	100-96%		C	74-76%
A-	90-95%		C-	70-73%
B+	87-89%		D+	67-69%
B	84-86%		D	64-66%
B-	80-83%		D-	61-63%
C+	77-79%		F	0-60%

Grades that are in-between will be rounded up/down to the nearest whole number. For example, 94.4 and below will become 94%, while 94.5 and above will round up to 95%.

A Outstanding Achievement
B Commendable Achievement
C Juneginal Achievement
D Unsatisfactory *
F Failing *

* Student receiving this grade in a course that is required for his/her degree program must repeat the course.

I: **Incomplete:** A grade given at the discretion of the instructor when a student who has completed **at least two-thirds of the course class sessions** and is unable to complete the requirements of the course because of *uncontrollable* and *unforeseen* circumstances. The student must convey these circumstances (preferably in writing) to the instructor prior to the final day of the course. If an instructor decides that an "Incomplete" is warranted, the instructor must convey the conditions for removal of the "Incomplete" to the student in writing. A copy must also be placed on file with the Office of the Registrar until the "Incomplete" is removed or the time limit for removal has passed. An "Incomplete" is not assigned when the only way the student could make up the work would be to attend a major portion of the class when next offered.

An "I" that is not removed within the stipulated time becomes an "F." No grade points are assigned. The "F" is calculated in the grade point average.

W: Withdrawal: **Signifies that a student has withdrawn from a course after beginning the 3rd class session.** Students who wish to withdraw must notify their admissions advisor before the beginning of the 6th class session in the case of graduate courses. **Instructors are not authorized to issue a "W" grade.**

Homework (400 points total weeks 1-3; 40% of course grade)

The educational goal of homework is to assess student's ability to apply the weekly learning material using the SAS language. The homework also helps students prepare for the course project.

Progress Checks (200 points total weeks 1-4; 20% of course grade)

The educational goal of the progress checks is to assess student's comprehension of the weekly lecture material.

Project Objective Presentation (100 points total weeks 1-4; 10% of course grade)

The educational goal of the "Projective Objective" presentation is to help students gain confidence in their ability to explain analytical concepts in an understandable manner. In addition, it will ensure that students are on the "right track" in terms of their Course Project paper.

Signature Assignment (300 points; 30% of course grade)

This secondary data analysis assignment will utilize a database collected by someone other than you for the purpose of answering a real-world question.

Please refer to the separate file entitled "Final Project Rubric" for a detailed description and how the points are assigned for each of the paper's required elements.

How to find a data set:

1. Define the question you want to study

2. Specify the population you want to study person/place/time (e.g., children, adults? US national sample? Time frame?)

3. Determine characteristics/variables needed for analysis and confirm they exist in your planned data source

4. Determine which type of data would be most appropriate for your analytic objective

5. Determine strengths, limitations, and quality of data.

Alternatively, beginning with a data set and designing an analytic question that may be addressed using these may be the best way for you to go. In this case, assess variables available to you, the time period of the study, the study population available, and work to create a novel question (do a literature review) that you can answer.

Progress checks, homework assignments and the course project paper should be submitted to Brightspace as Word documents (**no PDF or PAGES formats**). When submitting assignments, please use the following file name format:

Your last name_homework_Week#
For example: Smith_Homework_Week1

Late Policy

A late penalty of 5% will be applied if an assignment is submitted <= 24 hours after the due date. A late penalty of 10% will be applied if an assignment is submitted > 24 and <= 48 hours after the due date. A late penalty of 15% will be applied if an assignment is submitted > 48 and <= 72 hours after the due date.

No assignments will be accepted beyond 72 hours of the assignment due date without instructor prior approval.

Academic Honesty:

When answering questions on homework assignments, it is acceptable to refer to current course material, other reference materials (**excluding** answers to past ANA 625 course assignments) as well as fellow students. But it is **not acceptable** to substantially copy the wording from these materials or from other students. **Answers to assessments must be written in your own words**. This applies also to all computer code submitted (if required) along with assignments. All code must be, for the most part, unique to the individual student (i.e., code cannot be copied from another student).

In addition, the use of AI technology, such as ChatGPT, to answer homework and/or progress check questions is **expressly forbidden**.

If the instructor judges that the answer is worded substantially the same as in the course or reference material (including online content) or as submitted by another student, it will be considered academic dishonesty and subject to consequences described in the university catalog. For example, if textbook material or another student's wording is copied and pasted into the

answer for a homework question, a score of zero will be given for that question and a warning will be issued by the instructor. Repeat offenses will result in a score of zero given for the entire assignment, reporting of the incident to the NU Judicial Affairs Office, and a failing grade in the class.

The above consequences also apply if the instructor judges that ChatGPT or other similar AI technology has been used to answer homework and/or progress check questions.

Special note to students who are retaking this course:
In addition to the prohibitions stated above, students who are retaking this course are expected to delete/destroy (and thus not refer to) answers to all ANA625 assignments and progress checks they received when they took this course in the past.

National University Library:

National University Library supports academic rigor and student academic success by providing access to scholarly books and journals both electronically and in hard copy. Print materials may be accessed at the Library in San Diego or through document delivery for online and regional students. Librarians are available to provide training, reference assistance, and mentoring at the San Diego Library and virtually for online or regional students. Please take advantage of Library resources:

- URL: **http://www.nu.edu/library**.
- Contact the Library:
  - **RefDesk@nu.edu**
  - (858) 541-7900 (direct line)
  - 1-866-NU ACCESS x7900 (toll free)
- Use the Library Training Tools (on the Library Homepage) for additional help
  - Recorded class presentations
  - Tutorials & Guides (APA/MLA, Peer-Review, and more)

Writing Center:

Assistance in meeting the written requirements for the course is available from the on-site and on-line Writing Centers. Students may submit drafts of papers and outlines to the writing assistants and meet with them to discuss strategies for improving their papers. More information is available from the NU Writing Center Web Page:
http://www.nu.edu/Academics/StudentServices/WritingCenter.html

National University Policies and Procedures:

See the following website for all the academic policies and procedures:
http://www.nu.edu/OurPrograms/StudentServices/AcademicPoliciesandP.html

Students with Disabilities: Students seeking special accommodations due to a disability must submit an application with supporting documentation, as explained under this subject heading in the General Catalog. Instructors are required to provide such accommodations if they receive written notification from the University.

Writing Across the Curriculum: Students are expected to demonstrate writing skills in describing, analyzing and evaluating ideas and experiences. Written reports and research papers must follow specific standards regarding citations of an author's work within the text and references at the end of the paper. Students are encouraged to use the services of the University's Writing Center when preparing materials. The following website provides information on APA, MLA, and other writing and citation styles that may be required for term papers and the like: http://www.nu.edu/LIBRARY/ReferenceTools/citations.html

National University Library: National University Library supports academic rigor and student academic success by providing access to scholarly books and journals both electronically and in hard copy. Print materials may be accessed at the Library in San Diego or through document delivery for online and regional students. Librarians are available to provide training, reference assistance, and mentoring at the San Diego Library and virtually for online or regional students. Please take advantage of Library resources http://www.nu.edu/library.

Plagiarism: Plagiarism is the presentation of someone else's ideas or work as one's own. Students must give credit for any information that is not either the result of original research or common knowledge. If a student borrows ideas or information from another author, he/she must acknowledge the author in the body of the text and on the reference page. Students found plagiarizing are subject to the penalties outlined in the Policies and Procedures section of the University Catalog, which may include a failing grade for the work in question or for the entire course. The following is one of many websites that provide helpful information concerning plagiarism for both students and faculty:
http://www.indiana.edu/~wts/pamphlets/plagiarism.shtml

Ethics: Ethical behavior in the classroom is required of every student. The course will identify ethical policies and practices relevant to course topics.

Technology: Students are expected to be competent in using current technology appropriate for this discipline. Such technology may include word processing, spreadsheet, and presentation software. Use of the internet and e-mail may also be required.

Diversity: Learning to work with and value diversity is essential in every class. Students are expected to exhibit an appreciation for multinational and gender diversity in the classroom.

Civility: As a diverse community of learners, students must strive to work together in a setting of civility, tolerance, and respect for each other and for the instructor. Rules of classroom behavior (which apply to online as well as onsite courses) include but are not limited to the following:

- Conflicting opinions among members of a class are to be respected and responded to in a professional manner.
- Side conversations or other distracting behaviors are not to be engaged in during lectures, class discussions or presentations.
- There are to be no offensive comments, language, or gestures.