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BIOS 6531 – Categorical Data Analysis

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BIOS 6531 – Categorical Data Analysis
Fall 2018

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Time: Monday 4 to 5:15 pm
        Wednesday 4 to 5:15 pm
Location: Education Building 3163
Office Hours: Monday 10 AM - 12 PM
                Thursday – 10 AM – 12 PM

Prerequisites:	PUBH 6541
Catalog Description:	(taken from 2017-18 Course Catalog): This course introduces statistical methods for analyzing both univariate and multivariate categorical data and count in medical research and other health-related fields. The course will introduce how to distinguish among the different measurement scales, the commonly used statistical probability distribution and inference methods for categorical and count data. Emphasis will be placed on the application of the methodology and computational aspects rather than theory. The students will learn how to apply SAS procedures to data and interpret the results.
Required Textbook:	Agresti, Alan. An Introduction to Categorical Data Analysis. Second Edition. New York: John Wiley and Sons. ISBN: 978-0-471-22618-5
Reference Texts:	Agresti, Alan (2002). Categorical Data Analysis. Second Edition. New York: John Wiley and Sons.
	Stokes ME, Davis CS, Koch GG. (2000). Categorical data analysis using the SAS system. Cary, NC: SAS Institute, INC.

Cross-cutting Competencies

1. Demonstrate effective written and oral skills for communicating with different audiences in the context of professional public health activities. (Communication and Informatics)
2. Use information technology to access, evaluate, and interpret public health data. (Communication and Informatics)
3. Describe the roles of history, power, privilege and structural inequality in producing health disparities. (Diversity and Culture)
4. Explain how professional ethics and practices relate to equity and accountability in diverse community settings. (Diversity and Culture)
5. Develop public health programs and strategies responsive to the diverse cultural values and traditions of the communities being served. (Diversity and Culture)

MPH Concentration Competencies in Biostatistics

1. Provide the biostatistical components of the design of a public health or biomedical experiment by: clarifying the research objectives or questions; determining data and endpoints to be collected appropriate for the objectives; translating the objectives into biostatistical questions via hypothesis testing or confidence interval frameworks; determining the appropriate sample size; and writing the statistical analysis section of the experiment.
2. Apply appropriate statistical analysis methods using SAS to analyze both categorical and quantitative data.
3. Develop written and oral reports to communicate effectively to research investigators pivotal aspects of a study, including its design, objectives, data, analysis methods, results, and conclusions ensuring that results and conclusions are valid and reliable and address the research objectives.
4. Create a collaborative environment for working on written and oral reports and developing critical thinking skills.
5. Describe key concepts and theory underlying biostatistical methodology used in probability and inferential, analytical, and descriptive statistics.

MPH Biostatistics Student Learning Outcomes (BIOS)

1. Construct a public health and biomedical research question from ideas, conditions, and events that exist in a rural and urban community, region, state, and nation using critical thinking skills.

2. Design an experiment, survey or clinical trial pertaining to a public health and biomedical research question in order to collect the data needed to meet objectives of public health

research.

3. Select appropriate statistical tools, methodological alternatives and graphical descriptives to analyze and summarize public health and biomedical data

4. Interpret results of biostatistical analyses so that valid and reliable conclusions regarding a public health and biomedical research question may be drawn from the analyses.

5. Communicate biostatistical principles and concepts to lay and professional audiences through both oral and written communication.

Performance-Based Objectives Linked to Course Activities (Note: Activities Described in Next Section)

1. Distinguish categorical data and continuous data.(Activity 1, 2)
2. Determine when categorical data analysis should apply and choose appropriate methods. (Activity 1, 2).
3. Compare the different categorical data analysis methods. (Activity 1, 2).
4. Interpret the analysis result. (Activity 1, 2).
5. Correctly use the SAS procedures to analyze the categorical data. (Activity 1, 2).
6. Create a collaborative environment for working on assignments and developing critical thinking skills. (Activity 1,2)

Activity 1:- Knowledge of cancer dataset will be provided to the class which had two categorical variables knowledge and Gender. Furthermore, Knowledge had two levels "Yes" and "NO" and Gender had two levels "Male" and "Female". Students will be asked to make inferences on the association between "Knowledge" and "Gender" by performing appropriate statistical tests. They were also required to make a detailed report for their analysis.

Activity 2:- Disparity in education level dataset will be provided to the class which had few categorical variables such as education levels, Ethnicity, Disability status, Gender and Ability to perform assign task (Yes or NO). Students will be asked to perform appropriate statistical analysis by using SAS to address the effects of covariates (Education levels, ethnicity, Disability status and Gender) on the probability of response variable Ability to perform assigned task. They will be also asked to build the appropriate logistic regression model by different model selection methods as well.

Overview of the Content to be Covered During the Semester:

Week	Topic	Readings	Assignment
1-2	Introduction (learning objectives: 1,2)	Chapter 1	1.1, 1.4, 1.8, 1.12, 1.14
3-4	Contingency tables (learning objectives: 2,3,4,5,6)	Chapter 2: A.S.A.	2.2, 2.6, 2.13, 2.14, 2.16, 2.18, 2.22, 2.27, 2.30, 2.33, 2.38
5-6	Generalized linear models (learning objectives: 2,3,4,5,6)	Chapter 3: A.S.A	3.1, 3.7, 3.8, 3.13, 3.20 (Bonus)
7-8	Logistic regression (learning objectives: 2,3,4,5,6)	Chapter 4: A.S.A.	4.2, 4.8, 4.14, 4.18, 4.20, 4.22, 4.24
9-10	Building and Applying Logistic Regression Models (learning objectives: 2,3,4,5,6)	Chapter 5: A.S.A.	5.4, 5.10, 5.18, 5.21
11-12	Multicategory logit models (learning objectives: 2,3,4,5,6)	Chapter 6: A.S.A.	6.2,6.6,6.11,6.22
13-14	Loglinear models for contingency tables (learning objectives: 2,3,4,5,6)	Chapter 7: A.S.A.	TBA
15-16	Models for matched pairs (learning objectives: 2,3,4,5,6)	Chapter 8: A.S.A.	TBA

Samples of your work may be reproduced for search purposes and/or inclusion in the professor's teaching portfolio. You have the right to review anything selected for use, and subsequently ask for its removal.

Instructional Methods: Class meetings will be a combination of lecture, class discussion, and computer software demonstration. Written homework assignments and examinations constitute the basis of student evaluation.

Exam Schedule and
Final Examination: Midterm Examination: TBA
Final Examination: December 3, 2018

Grading: Weighting of assignments for purposes of grading will be as follows:

Midterm Exam   …….…………………….   100 points (25%)
Final Exam   …….…………………….   100 points (35%)
Presentation   ……….…………………….   100 points (10%)
Assignments   …….…………………….   100 points (30%)

_____

Total Possible Points   300 points (100%)
_____

The following point scale will be utilized in grading:

360-to-400 points (90%) A

320-to-359 points (80%) B

280-to-319 points (70%) C

240-to-279 points (60%) D

A cumulative total of 239 points or less will be considered as failing.

For calculation of your final grade, all grades above will be included.

Your grades **_will not_** be posted. All exams and assignments will be graded and returned promptly so that students may accurately calculate their grades at any point in time during the semester.

There are times when extraordinary circumstances occur (e.g., serious illness, death in the family, etc.). In such circumstances, and/or if you need additional time to satisfactorily complete any course requirement, please consult with the instructor within a reasonable amount of time. *Nota Bene:* Extensions are not guaranteed and will be granted solely at the discretion of the instructor.

Computing: In a world where technology is increasingly pertinent to everyday tasks, we will learn how the statistical software packages *SAS* is used in simplifying statistical computation and analysis.

You can Purchase a student copy of SAS as follows: 1- Sign in My.Georgiasouthern.edu account. 2- Go down to Discount Software and click on it. 3- Go and click to Personal Store. 4. Sign in or create an account and sign in. 5- Click on Software and then on SAS. 6- Click on the Software and add to the cart.   OR you can have a virtual access to University edition of SAS free of charge by going on SAS UNIVERSITY EDITION website.

Academic Integrity: Students are expected to follow guidelines outlined in the *Student Conduct Code 2009-10* policy regarding academic dishonesty. Any student found in violation of academic honesty will receive a grade of 'F' for the course. It is the student's responsibility to familiarize him/herself with the student policies and expectations set forth in the GSU *Student Conduct Code 2009-10* (http://students.georgiasouthern.edu/judicial/).

Attendance Policy: Due to the nature and structure of this course, class attendance is of utmost importance. You are responsible for any material covered or distributed in class, including any announcements made in class, whether or not you are present. Furthermore, federal regulations require attendance be verified prior to distribution of financial aid allotments. Attendance will not be recorded after this initial period.

Class Participation & Etiquette: Attendance, attention, and participation are expected for each class! I believe it is important to foster student-teacher and student-student interactions within class, so you will discover that I will ask questions to you throughout the class. Although class participation is not a formal part of your course grade, I will use it as a factor if your final grade is on the border between two letter grades. Otherwise, I do not round final numerical grades to the nearest letter.

On a final note of etiquette, please turn off all cell phones during class, since ring tones are disruptive to others.

Important Dates to Remember:
http://calendar.georgiasouthern.edu/?c=35

Disclaimer: The contents of this syllabus are as complete and accurate as possible. The instructor reserves the right to make any changes necessary to the syllabus and course material. The instructor will make every effort to inform you of changes as they occur. It is the responsibility of the student to know what changes have been made in order to successfully complete the requirements of the course.

Plagiarism
"According to the Academic Dishonesty Policy of GSU, Plagiarism includes (but is not limited to):

A. Directly quoting the words of others without using quotation marks or indented format to identify them.
B. Using published or unpublished sources of information without identifying them.
C. Paraphrasing material or ideas without identifying the source.
D. Unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic material.

If you are accused of plagarism by a JPHCOPH, the following policy, as per the Judicial Affairs website (http://students.georgiasouthern.edu/judicial/faculty.htm) will be enforced:

PROCEDURES FOR ADJUDICATING ACADEMIC DISHONESTY CASES

First Offense - In Violation Plea
1.If the professor and the Dean of Students agree that the evidence is sufficient to warrant a charge of academic dishonesty, the professor should contact the Office of Judicial Affairs to determine if this is a first violation of academic dishonesty. The incident will be reported via the following website: http://students.georgiasouthern.edu/judicial/faculty.htm
2. If it is a first violation, the professor should talk with the student about the violation. If the student accepts responsibility in writing and the professor decides to adjudicate the case, the following procedures will be followed:
a.The student will be placed on disciplinary probation for a minimum of one semester by the Office of Judicial Affairs.
b.The student will be subject to any academic sanctions imposed by the professor (from receiving a 0 on the assignment to receiving a failing grade in the class).
c.A copy of all the material involved in the case (Academic Dishonesty Report Form and the Request For Instructor to Adjudicate Form) and a brief statement from the professor concerning the facts of the case and the course syllabus should be mailed to the Office of Judicial Affairs for inclusion in the student's discipline record.

First Offense - Not In Violation Plea (student does not admit the violation)
If the professor and the Dean of Students agree that the evidence is sufficient to warrant a charge of academic dishonesty, the professor should contact the Office of Judicial Affairs to determine if this is the first or second violation of academic dishonesty. The student will be charged with academic dishonesty and the University Judicial Board or a University Hearing Officer would hear the case. If the student is found responsible, the following penalty will normally be imposed:
a.The student will be placed on Disciplinary Probation for a minimum of one semester by the Office of Judicial Affairs.
b.The student will be subject to any academic sanctions imposed by the professor.

Second Violation of Academic Dishonesty
If the professor and the Dean of Students agree that the evidence is sufficient to warrant a charge of academic dishonesty, and if it is determined this is the second violation, the student will be

charged with academic dishonesty and the University Judicial Board or a University Hearing Officer would hear the case.

If the student is found responsible, the following penalty will normally be imposed:

a.Suspension for a minimum of one semester or expulsion.

b.The student will be subject to any academic sanctions imposed by the professor.

NOT RESPONSIBLE FINDING

When a student is found not responsible of academic dishonesty, the work in question (assignment, paper, test, etc.) would be forwarded to the Department Chair. It is the responsibility of the
Department Chair to ensure that the work is evaluated by a faculty member other than the individual who brought the charge and, if necessary, submit a final grade to the Registrar. For the protection of the faculty member and the student, the work in question should not be referred back to the faculty member who charged the student with academic dishonesty.

In the case of a Department Chair bringing charges against a student, an administrator at the Dean's level will ensure that the student's work is evaluated in an appropriate manner.

CONFIDENTIALITY

In accordance with provisions of the Family Educational Rights and Privacy Act of 1974 and the Georgia Open Records Act, any information related to a violation of academic dishonesty or the outcome of a judicial hearing regarding academic dishonesty, is prohibited and must be treated as confidential by members of the faculty."