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BIOS 6531 – Categorical Data Analysis

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Georgia Southern University
Jiann-Ping Hsu College of Public Health
BIOS 6531 – Categorical Data Analysis
Fall 2019

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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.

CEPH MPH Competencies

Evidence-based Approaches to Public Health

1. Apply epidemiological methods to the breadth of settings and situations in public health practice
2. Select quantitative and qualitative data collection methods appropriate for a given public health context
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate
4. Interpret results of data analysis for public health research, policy or practice

Public Health & Health Care Systems

1. Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings
2. Discuss the means by which structural bias, social inequities and racism undermine health and create challenges to achieving health equity at organizational, community and societal levels

Planning & Management to Promote Health

1. Assess population needs, assets and capacities that affect communities' health
2. Apply awareness of cultural values and practices to the design or implementation of public health policies or programs
3. Design a population-based policy, program, project or intervention
4. Explain basic principles and tools of budget and resource management
5. Select methods to evaluate public health programs

Policy in Public Health

1. Discuss multiple dimensions of the policy-making process, including the roles of ethics and evidence
2. Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes
3. Advocate for political, social or economic policies and programs that will improve health in diverse populations
4. Evaluate policies for their impact on public health and health equity

Leadership

1. Apply principles of leadership, governance and management, which include creating a vision, empowering others, fostering collaboration and guiding decision making
2. Apply negotiation and mediation skills to address organizational or community challenges

Communication

1. Select communication strategies for different audiences and sectors
2. Communicate audience-appropriate public health content, both in writing and through oral presentation
3. Describe the importance of cultural competence in communicating public health content

Interprofessional Practice

1. Perform effectively on interprofessional teams

Systems Thinking

1. Apply systems thinking tools to a public health issue.

CEPH MPH Learning Objectives

Profession & Science of Public Health

1. Explain public health history, philosophy and values
2. Identify the core functions of public health and the 10 Essential Services
3. Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health
4. List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program
5. Discuss the science of primary, secondary and tertiary prevention in population health, including health promotion, screening, etc.
6. Explain the critical importance of evidence in advancing public health knowledge.

Factors Related to Human Health

1. Explain effects of environmental factors on a population's health
2. Explain biological and genetic factors that affect a population's health
3. Explain behavioral and psychological factors that affect a population's health
4. Explain the social, political and economic determinants of health and how they contribute to population health and health inequities
5. Explain how globalization affects global burdens of disease
6. Explain an ecological perspective on the connections among human health, animal health and ecosystem health (eg, One Health)

MPH Concentration Competencies in Applied Public Health

1. Demonstrate how data and information are used to improve individual, program, and/or organizational performance (e.g., selection and use of valid and reliable quantitative and qualitative data, data-driven decision making, data management, performance measurement).
2. Explain the importance of evaluations for improving programs, and services.
3. Target/Tailor messages for disseminating public health data and information (e.g., social media, newspapers, newsletters, journals, town hall meetings, libraries, neighborhood gatherings).
4. Recognize the role of cultural, social, and behavioral factors in the accessibility, availability, acceptability, and delivery of public health services.
5. Engages community members to improve health in a community (e.g., input in developing and implementing community health assessments and improvement plans, feedback about programs and services).
6. Participate with stakeholders in identifying key public health values and a shared public health vision as guiding principles for community action.

MPH Concentration Competencies in Biostatistics

1. Provide the biostatistical components of the design of a public health or biomedical experiment.
2. Demonstrate proficiency in SAS programming to solve biomedical problems.

3. Demonstrate comprehension of ethical issues in biomedical studies, such as treatment efficacy and patient safety.
4. Translate the biomedical experimental objectives into biostatistical questions via hypothesis testing or confidence interval framework.
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:

Grading:

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

Midterm Exam	100 points (20%)
Final Exam	100 points (30%)
Presentation	100 points (10%)
Assignments	100 points (40%)

Total Possible Points		300 points (100%)
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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. 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.

General Expectations

1. For every one-credit hour, you should expect to work roughly two hours outside the classroom each week. For example, for a three credit hour course, during a regular fifteen week semester, you should expect approximately ninety hours of work outside of class.
2. Students are expected to keep up with the class, to read the required material, and to submit assignments and activities by due dates and times.
3. Students are expected to independently complete all activities, exercises, assignments, and assessments including exams.
4. Students are expected to produce quality work. Typos and grammar errors should be kept to a minimum. The format and readability of submissions will be taken into consideration when assigning a grade.
5. Remember to check when assignments are due. It is recommended that you stay ahead of schedule on the assignments, so if an emergency happens, your assignment will be completed and ready to submit within the designated time frame. It is your responsibility to keep track of the due dates for each assignment.

Response Times

During a normal work week (i.e., Monday 9:00 AM through Friday 5:00 PM) students can expect responses as follows:

- Email: within 48 hours
- Discussion posts: within 72 hours
- Assignment grades: within 72 hours of submission date.

Exceptions: I may not check FOLIO or GSU email over the weekends. If you send me an email after 5:00 PM on Friday, please do not expect a response until the following Monday.

All assignments will be graded 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. Extensions are not guaranteed and will be granted solely at the discretion of the instructor.

Course Expectations

Texting and Use of Cell Phones (and Other Technologies)

Please do not text in class or use your cell phone during class! Texting during class (or in a meeting) is disruptive and rude...at least to me. My preference is that you put cell phones away during class meetings, so they are not a source of temptation. Offenders will be asked to leave.

Class Attendance and Participation Policy

Federal regulations require attendance be verified prior to distribution of financial aid allotments. Regular attendance is expected. Your attendance will be verified at the first regular class session.

It is the policy of the University to permit students, faculty, and staff to observe those holidays set aside by their chosen religious faith. The faculty should be sensitive to the observance of these holidays so that students who choose to observe these holidays are not seriously disadvantaged. It is the responsibility of those who wish to be absent to make arrangements in advance with their instructors.

Students participating in authorized activities as an official representative of the University (i.e., athletic events, delegate to regional or national meetings or conferences, participation in university-sponsored performances, and **JPHCOPH funded**) will not receive academic penalties and, in consultation with the instructor of record, will be given reasonable opportunities to complete assignments and exams or given compensatory assignment(s) if needed. The student must provide written confirmation from a faculty or staff advisor to the course instructor(s) at least 10 days prior to the date for which the student will be absent from the class. The student is responsible for all material presented in class and for all announcements and assignments. When possible, students are expected to complete these assignments before their absences. In the event of a disagreement regarding this policy, an appeal may be made by either the student or the instructor of record to the corresponding college dean. (*University Graduate Catalog*)

Academic Misconduct

As a student registered at this University, it is expected that you will adhere to only the strictest standards of conduct. It is recommended that you review the latest edition of the *Student Conduct Code* book, as well as the latest *Undergraduate & Graduate Catalog* to familiarize yourself with the University's policies in this regard. Your continued enrollment in this course is an implied contract between you and the instructor on this issue; from this point forward, it is assumed that you will conduct yourself appropriately.

Plagiarism:

According to the Academic Dishonesty Policy of Georgia Southern University, 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 plagiarism 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 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."

Accommodations for Individuals with Disabilities

In compliance with the Americans with Disabilities Act (ADA), Georgia Southern University will honor requests for reasonable accommodations made by individuals with disabilities. Students must self-disclose any disability for which an accommodation is being sought to the Student Disability Resource Center (SDRC) before academic or other accommodations can be implemented. For additional information, please call the Director of EEO and Title IX at (912) 478-5136 / TDD (912) 478-0273 or the SDRC Director at (912) 478-1566 / TDD (912) 478-0666. The TDD phone numbers are intended for individuals with hearing impairments.

University Calendar for the Semester

The University Calendar is located with the semester schedule, and can be found at:
<http://em.georgiasouthern.edu/registrar/resources/calendars/>

One Final Note

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 to ensure better student learning. The instructor will announce any such changes in class. It is the responsibility of the student to know what changes have been made in order to successfully complete the requirements of the course.

This syllabus, my lecture notes, and all materials distributed and presented during this course are protected by copyright law. You are authorized to take notes in this class but that authorization extends to only making one set of notes for your personal use and no other use. You are not authorized to sell, license, commercially publish, distribute, transmit, display, or record notes from this class unless you have my written consent to do so.

STUDENT CONDUCT CODE

The Student Conduct Code is the official University publication governing student conduct and behavior. It is the responsibility of each student to become familiar with the rules and regulations governing student life. Student conduct procedures, appeal procedures, and disciplinary sanctions are found in the Student Conduct Code at <http://students.georgiasouthern.edu/conduct>. I acknowledge that I have read and understand this statement referencing the Student Conduct Code.

ACADEMIC DISHONESTY

The University goal is to foster an intellectual atmosphere that produces educated, literate people. Because cheating and plagiarism are at odds with that goal, they shall not be tolerated in any form. Students are expected to adhere to the rules and regulations as set forth in the Student Conduct Code. Therefore, all work submitted by a student must represent that student's own ideas and effort; when the work does not, the student has engaged in academic dishonesty. Plagiarism occurs when a person passes in another person's work as his or her own, borrows directly from another person's work without proper documentation, and resubmits his or her own work that has been previously submitted without explicit approval from the instructor. For example, academic dishonesty occurs whenever a student participates in any of the following: Cheating submitting material that is not yours as part of your course performance; using information or devices that are not allowed by the faculty; obtaining and/or using unauthorized materials; fabricating information, research, and/or results; violating procedures prescribed to protect the integrity of an assignment, test, or other evaluation; collaborating with others on assignments without the faculty's consent; cooperating with and/or helping another student to cheat; demonstrating any other forms of dishonest behavior. Plagiarism directly quoting the words of others without using quotation marks or indented format to identify them; using sources of information (published or unpublished) without identifying them; paraphrasing materials or ideas without identifying the source; self-plagiarism - resubmitting work previously submitted without explicit approval from the instructor; unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic material. NOTICE: The list above is intended only to provide general guidelines for recognizing and avoiding common types of academic dishonesty. It is in no way an exhaustive or comprehensive list of all the types of academic dishonesty. For more information about academic honesty, see the Student Conduct Code at <http://students.georgiasouthern.edu/conduct>. I acknowledge that I have read and understand the Academic Dishonesty Policy.

I have read the syllabus and understand the contents and course requirements.

Student Name (print)

Student Signature

Date