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Fall 2017

BIOS 6135 - Topics of Inference in Biostatistics

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BIOS 6135: Topics of Inference in Biostatistics
Fall 2017

A statistician is a person who stands in a bucket of ice water, sticks their head in an oven and says "on average, I feel fine!"
- K. Dunnigan

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Website: Folio
Grading Assistant:
Time: Tuesday & Thursday, 2:00 – 3:15 PM
Location: Hendricks Hall 1008
Office Hours: Thursday: 10:00am-12:00pm Wednesday: 9am-12pm
                Other times by appointment

Course Description (taken from *2017-18 Course Catalog*): This course provides an introduction to the fundamental knowledge of derivatives, integrals, and matrix algebra found in biostatistical inference. The course will introduce the theory of quadratic forms and their applications to distributions, the method of maximum likelihood estimation, likelihood ratio tests, restricted maximum likelihood, and the basis for inferences derived from hypothesis testing and confidence intervals. Emphasis will be placed on how these techniques are used in biostatistical problems and applications using examples from the pharmaceutical industry.

Required Textbook: Morris H. DeGroot, Mark J. Schervish (2002) *Probability and Statistics, 4th Edition*. Addison Wesley. ISBN 0-321-50046-6

MPH Core Student Learning Outcomes (CORE)

1. Demonstrate proficiency and effectiveness in the communication of core public health principles and practices, both oral and written.

2. Demonstrate proficiency in the integration of the core public health disciplines (Biostatistics, Epidemiology, Environmental Health, Health Policy/Management, and

Social/Behavioral Science) in practice and research.

3. Demonstrate proficiency in problem solving, critical thinking, and public health leadership.

MPH Biostatistics Student Learning Outcomes

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.

M.P.H. Core Competencies in Biostatistics:

Upon graduation a student with an M.P.H. in Biostatistics should be able to:

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

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

1. Random variables (Activity 1,2),
2. Expectation and its properties (Activity 1,2),
3. Elementary probability theory, including conditional probability (Activity 1,2),
4. Bayes' Theorem(Activity 1,2),
5. Selected probability distributions (Activity 1,2),
6. Maximum likelihood estimation and its properties (Activity 1,2), and
7. Central limit theorem (Activity 1,2).

Assessment of Student Learning

Activity 1: homework

Activity 2: exam

Grading Scheme and due day:
Homework: 40%
Midterm: 30%
Final Exam: 30%

Note: 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.

Grading Scale:
A   90 - 100%
B   80 - 89%
C   70 - 79%
D   60 - 69%
F   0 - 59%

Exams: There will be 2 exams: a Midterm (Thursday, October 19), and a Final (Tuesday, December 5 between 3:00 –5:00 PM – taken from the university's Fall 2017 Final Exam Schedule). Each exam will be administered in class. Although each exam may be cumulative, the primary material covered on a current exam will consist of material covered since the previous exam.

Homework: Homework accounts for 40% of your course grade. The following table lists assignments for each chapter to be covered throughout the class. Assigned problems will be collected for grading.

You may work together or individually on these assignments, however each student must submit his/her own assignment and state with whom he/she worked, if applicable. What does 'working together' mean? You are welcome to solve problems and discuss explanations in groups, however it is not acceptable to submit assignments with identical wordings and explanations. Furthermore, on submitted assignments it is possible that only randomly selected problems will be graded. In this instance, your maximum possible homework grade for that assignment will be based only on those selected for grading. Finally, if any additional problems are added to assigned or suggested problems, sufficient notice will be provided. I will cheerfully address any homework questions during office hours.

Chapter & Topic	Assigned Problems
1: Introduction to Probability	P15: 5,6,7; P21: 1,3,4,7,11,14; P25: 2,4,8; P32: 2,3,4,8;P41:3,4,6,9,12,17,18; P45: 2; P50: 2,3,6; P53: 1,3,5.
2: Conditional Probability	P65: 2,5,9; P75: 1,7,9,10,11; P84: 4,5,6; P90: 2, 4, 6, 8, 9, 13,23,27.
3: Random Variables and Distributions	P100: 2,3,6,10; P107: 5,8; P116: 2,4,6; P129: 2,4,5,7; P140: 2,3,4,6,9,10; P151: 2,4,7,8.
4: Expectation	P216: 2,5,6; P224: 1,3,7,8; P233: 5,7; P240: 1,3,6,9,10; P247: 2,3,5,7; P255: 3,10,12,14; P264: 2,7,9,12,13.
5: Special Distributions	P280: 3,5,6,13; P287: 2,3,6,8; P296: 3,7,8,10,15; P301: 4,12; P315: 5,6,8,9,11,13,15; P325: 1,9,12,15; P333: 5,8; P345: 1,3,4,6,10,12,18,25.
6. Estimation	P425: 2,3,6,7,9.
7.Sampling Distributions of Estimators	

Academic Integrity: Students are expected to follow guidelines outlined in the *Student Conduct Code 2010-11* 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 2012-13* (http://students.georgiasouthern.edu/judicial/SCC_12-13.pdf).

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.

University Calendar
for the Semester: The University Calendar is located with the semester schedule, and can be found at:
http://www.collegesource.org/displayinfo/catalink.asp.

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 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
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."