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Spring 2015

BIOS 6541 - Biostatistics

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GEORGIA SOUTHERN UNIVERSITY
Jiann-Ping Hsu College of Public Health
BIOS 6541-Biostatistics.
Spring, 2015

<u>Instructor:</u>	Dr. Hani Samawi
GAs:	Yisong Huang
<u>Office:</u>	1006 Hendricks Hall
<u>Phone:</u>	
<u>E-Mail Address:</u>	hsamawi@georgiasouthern.edu
<u>Office Hours:</u>	Tuesday and Thursday:10:00 am-noon Monday 1:00 pm-2:00 pm Other times by appointment
<u>Web Page:</u>	http://works.bepress.com/hani_samawi/
<u>Class Meets:</u>	Tuesday and Thursday 12:30pm-1:45pm Engineering Building Room 2116

-- Course schedules can be found at: <http://www.collegesource.org/displayinfo/catalink.asp> --

Prerequisites: none

Catalog Description: This course examines statistics in public health and related sciences, including sampling, probability, basic discrete and continuous distributions, descriptive statistics, hypothesis testing, confidence intervals, categorical data analysis, regression, and correlation. Emphasis will be on the development of critical thinking skills and health data analysis applications with computer software.
4 credit hours.

Required Textbook: 1- Le, Chap, T. (2003), *Introductory Biostatistics*: John Wiley and Sons.

MPH Core Student Learning Outcomes (CORE)

At the end of the MPH program, the students will be able to:

1. Demonstrate proficiency and effectiveness in the communication of core public health principle and practices, both oral and written
2. Demonstrate proficiency in integration of the core public health discipline (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 Concentration Student Learning Outcomes

At the end of MPH program, students will be able to:

1. Construct a public health and biomedical research questions 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 trials pertaining to a public health and biomedical research questions in order to collect the data needed to meet objectives of public health research.
3. Select appropriate statistical tools, methodology alternatives and graphical descriptive to analyze and summarize public health and biomedical data.
4. Interpreted 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. Biostatistics Competencies:

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:

At the completion of this course, the student will be able to:

1. Demonstrate the understanding of fundamental probabilistic notions, properties, and applications to the analysis of public health and biomedical data. (Activity 1)
2. Demonstrate the capabilities to compute statistical quantities such as descriptive statistics, distribution functions, and more complex statistics. (Activities 1, 2 and 3)
3. Conduct statistical inference through defining hypotheses to be tested, type I error, type II error, p-value, and proper interpretation of the final results. (Activities 1, 2 and 3)

4. Perform simple and multiple regression, logistic regression, survival data analysis and interpret the statistical output to make proper inference. (Activities 1, 2 and 3)
5. Develop the skills of statistical computation, report writing, and oral presentations to effectively *communicate* biostatistical analysis of a public health study. (Activities 1, 2, 3 and 4)

Assessment of students Learning

Activity 1: Use course lectures and class discussions to explain the basic terminology and definitions of biostatistics, including but not limited to, fundamental probabilistic notions, properties, and applications to the analysis of public health, biomedical data descriptive statistics, distribution functions, more complex statistics, statistical inference through defining hypotheses to be tested, type I error, type II error, p-value, proper interpretation of the final results, simple and multiple regression, logistic regression, and survival data analysis. Competence in basic terminology will be evaluated using two activities: (1) weekly homework (2) two equally weighted exams.

Activity 2: Use course lectures, class discussions and class exercises illustrate calculation and interpretation of basic biostatistical measures, including but not limited to, probabilities, descriptive statistics, distribution functions, more complex statistics, statistical inference, estimation and hypotheses testing, type I error, type II error, p-value, simple and multiple regression, logistic regression, and survival data analysis. Competence in biostatistical measures will be evaluated using two activities: (1) weekly homework (2) two equally weighted exams.

Activity 3: Use course lectures, class discussions and real data projects to explain the basic applications of biostatistical principles, as well as the integration of these principles across the public health spectrum. Competence in ability to integrate concepts will be evaluated using final class project using real data.

Activity 4: Competence in written and oral communication to the lay professional audience will be evaluated using final project written report and oral presentation evaluation.

<i>Date</i>	<i>Topic</i>	<i>Readings</i>	<i>Assignment</i>
Week 1& 2 1/13-1/22	Descriptive Methods for categorical data	Chapter 1	1, 2, 8, 10, 12, 13, 15, 20, 25, 31, 39
Week 3& 4 1/27-2/5	Descriptive methods for continuous data	Chapter 2	2, 5, 6, 20, 23, 29
Week 5&6 2/10-2/19	Probability and Probability Models	Chapter 3	1, 2, 3, 5, 7, 8, 15, 18, 19
Week 7&8 2/24-3/5	Estimating Parameters	Chapter 4	1, 5, 6, 7, 13, 20, 24, 31
Week 9 3/10-3/12	Introduction to Statistical Tests of Significance	Chapter 5	1, 2, 6, 9, 10, 12, 15
Week 10 3/16-3/20	Spring Break		
Week 11 3/24-3/26	Comparison of Population proportions	Chapter 6	1, 2, 5, 10, 15, 21, 27
Week 12 3/31-4/2	Comparison of Population Means	Chapter 7	1, 2, 5, 14, 16, 22, 23
Week 13 4/7-4/9	Correlation and Regression	Chapters 8	1, 5, 6, 9, 10,11, 12
Week 14 4/14-4/16	Logistic Regression	Chapters 9	1
Week 15 4/21-4/23	Count Data	Chapters 10	1
Week 16 4/28-4/30	Survival Analysis	Chapters 11	5, 8, 9, 12, 14
Week 17 5/5-5/7	Final Exams		

Instructional Methods:

Class meeting will be a combination of lecture, class discussion and active participation. PowerPoint presentations (you can find and download from Folio) will be used in the lecture portion of this course. Prior to each lecture, the student is encouraged to complete the recommended reading and actively participate in the class discussion. In this way, it is

hoped that the learner will be better prepared to successfully accomplish the learning objective of each lecture experience.

Exam Schedule and Final Exam:

First exam (30%) on Tuesday March 24, 2015 (Activities 1 & 2)

Project (10%) (Activities 3 & 4)

Final Examination (30%): Tuesday, May 5, 2015: at 12:30-2:30 PM (Activities 1 & 2)

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

In class Exam (Activities 1 & 2) 30%

Final Exam (Activities 1 & 2) 30%

Assignments and Final Project (Activities 1, 2, 3 and 4) 40%

100%

The following point scale will be utilized in grading:

[90%-100%] A

[80%-90%) B

[70%-80%) C

[60%-70%) D

[0%-60%) F

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.

NO EXTRA CREDIT PROJECTS WILL BE ASSIGNED!

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.

Academic integrity relates to the appropriate use of intellectual property. The syllabus, lecture notes, and all materials presented and/or distributed during this course are protected by copyright law. Students are authorized to take notes in class, but that authorization extends only to making one set of notes for personal (and no other) use. As such, students are not authorized to sell, license, commercially publish, distribute, transmit, display, or record notes in or from class without the express written permission of the instructor.

Academic Handbook: Students are expected to abide by the Academic Handbook, located at <http://students.georgiasouthern.edu/sta/guide/>. Your failure to comply with any part of this Handbook may be a violation and thus, you may receive an F in the course and/or be referred for disciplinary action.

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>.

Attendance Policy: Federal regulations require attendance be verified prior to distribution of financial aid allotments. Attendance will not be recorded after this initial period.

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. The instructor will make every effort to inform students 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.