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BIOS 8130 – Advanced Topics in Biostatistics

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Georgia Southern University
Jiann-Ping Hsu College of Public Health
BIOS 8130 – Advanced Topics in Biostatistics
Fall 2016

<u>Instructor:</u>	Robert Vogel
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<u>E-Mail Address:</u>	rvogel@georgiasouthern.edu
<u>Office Hours:</u>	Monday and -Wednesday: 10:00am-12:00am; and by appointment
<u>Web Page:</u>	
<u>Class Meets:</u>	Friday: 8/19, 9/16, 10/14, and 11/11 from 9:00am until 12:00pm Hendricks 3001 and in cyber space

NOTE: 11:59 pm is exactly 1 minute before midnight and not 1 minute before noon! Keep this in mind when submitting assignments and due dates and times.

Prerequisites: PUBH 6141, or equivalent

Web-CT Address:

Catalog Description: This course provides an overview of advanced biostatistical descriptive and inferential methods including multiple regression, logistic regression, longitudinal data, survival analysis, and repeated measures with applications to public health and biomedical studies. Emphasis will be placed on developing statistical reasoning and critical thinking skills in addition to programming skills using statistical software (SAS) to analyze public health and biomedical data.

Required Textbook: None – all material is provided in the online modules.

DrPH Core Student Learning Outcomes (CORE)

1. Demonstrate their readiness to work with communities to address public Health Problems.
2. Select and apply theoretical based interventions to address public health problems.
3. Apply appropriate research methods to address community health problems, particularly among rural and underserved populations.

DrPH 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. Demonstrate required skills for translating public health practice objectives to the appropriate biostatistical framework for analysis and interpretation of results.
3. Illustrate sufficient substantive knowledge of advanced biostatistical methods such as multiple regression, logistic regression, survival analysis, longitudinal data analysis, and Bayesian and adaptive methods to interact with biostatisticians and related public health researchers in a meaningful and productive fashion.
4. Communicate biostatistical principles and concepts to lay and professional audiences through both oral and written communication.

DrPH Biostatistics Core Competencies:

Upon graduation a student with a DrPH should be able to:

1. Construct a public health and biomedical research question for which a survey or an experiment is to address.
2. Demonstrate skills for translating public health practice objectives to the appropriate biostatistical framework for analysis.
3. Defend reasons for selecting various biostatistical methods of analysis of survey and experimental data from readings and case studies.
4. Summarize data to present effective tabular and graphical displays of data obtained from large health surveys, vital statistics, and other public health and biomedical data sources.
5. Interpret effectively descriptive data from public health and biomedical studies.
6. Interpret inferential methods such as confidence intervals and significance tests results for answering public health research questions.
7. Explain commonly used aspects of sampling methodology including simple random, stratified, and cluster sampling as well as telephone and internet sampling.
8. Define strategies for design-based and model-based analysis of sample survey data.

9. Design a questionnaire for measuring objectives of a public health and biomedical research question.
10. Explain commonly used methods for handling non-response and missing data found in public health and biomedical surveys.
11. Illustrate sufficient substantive knowledge of advanced biostatistical methods such as multiple regression, logistic regression, survival analysis, factor analysis, and repeated measures in order to interact with a biostatistician in a meaningful way.
12. Prepare written and oral presentations of individual and collaborative public health practice-based projects using biostatistical methods of analysis.
13. Interrelate effectively among biostatisticians and professionals in other areas of public health in order to plan, conduct, interpret, and communicate biostatistical analyses in a meaningful way.

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

1. Analyze the effect of continuous and categorical predictors on binary public health and biomedical data using logistic regression methods. (Activity 1)
2. Recognize the need for hierarchical modeling when public health and biomedical data contain a hierarchical structure in which data is nested within several levels and variables are measured at each level. (Activity 2)
3. Interpret a Kaplan-Meier curve for survival data (Activity 3)
4. Apply a proportional hazards model using SAS for investigating the effect of several variables on survival. (Activity 4)
5. Prepare written presentations of individual and collaborative public health practice-based projects using biostatistical methods of analysis. (Activity 5)

Assessment of Student Learning:

Activity 1: Use course lectures, class discussion and self-contained modules to explain continuous, and categorical data and how it is used as predictors on public health and biomedical data using logistic regression methods. Competence will be evaluated through assignments attached to learning modules 1, 2, 3, 4, 6, 11, 12, and 13)

Activity 2: Use course lectures, class discussion and self-contained modules to explain the need for hierarchical modeling when public health and biomedical data contain a hierarchical structure in which data is nested within several levels and variables are measured at each level, Competence will be measured through the assignments attached to learning modules 5, 7, 8, 9, 10)

Activity 3: Use course lectures, class discussion and self-contained modules to explain and compute Kaplan-Meier curves. Competence will be measured through the assignments attached to learning modules 14 and 15.

Activity 4: Use course lectures, class discussion and self-contained modules to explain and compute proportional hazards models. Competence will be measured through the assignments attached to module 16.

Activity 5: Competence in written presentations of individual and collaborative public health practice based projects will be measured by 1.) Written reports associated with assignments for learning modules 13, 14, 15, 16 and the critical review of a Public Health Article from APHA.

Overview of the Content to be Covered During the Semester:

Module	Topic	Readings	Assignment
1	Confidence Intervals for proportions and probabilities	M1 Confidence Intervals for Proportions and Probabilities	M1 Assignment, Due: August 26 11:59pm
2	Measures of Risk	M2 Measures of Risk	M2 Assignment, Due: August 6 , 11:59pm
3	Large Sample Distribution of Risk	M3 Large Sample Distribution of Risk	M3 Assignment Due: September 2 11:59pm
4	Large Sample Tests	M4 Large Sample Tests	M4 Assignment Due: September 2 11:59pm
5	Other Measures of Differential Risk	M5 Other Measures of Differential Risk	M5 Assignment Due: September 9 11:59pm
6	Sample Size, Power and Efficiency	M6 Sample Size, Power and Efficiency	M6 Assignment Due: September 16 11:59pm
7	Mantel-Haenszel Part 1: Stratified-Adjusted	M7 Mantel-Haenszel Part 1: Stratified-Adjusted	M7 Assignment Due: September 23

	Analysis for Two Independent Groups	Analysis for Two Independent Groups	11:59pm
8	Mantel-Haenszel Part 2: Stratified-Adjusted Analysis for Two Independent Groups	M8 Mantel-Haenszel Part 2: Stratified-Adjusted Analysis for Two Independent Groups	M8 Assignment Due: September 30 11:59pm
9	Unmatched Retrospective Sampling	M9 Unmatched Retrospective Sampling	M9 Assignment Due: October 7 11:59
10	Matching Prospective and Cross Sectional Studies	M10 Matching Prospective and Cross Sectional Studies	M10 Assignment Due: October 14 11:59pm
11	Logistic Regression,	M11 Logistic Regression, Part 1	M11 Assignment Due: October 21 11:59pm
12	Computing the Odds Ratio in Logistic Regression	M12 Computing the Odds Ratio in Logistic Regression	M12 Assignment Due: October 28 11:59pm
13	Inferences in Logistic Regression	M13 Inferences in Logistic Regression	M13 Assignment Due: November 4 11:59pm
14	Introduction to Survival	M14 Introduction to Survival Analysis	M14 Assignment Due: November 11 11:59pm
15	Kaplan-Meier Survival Curves and the Log Rank Test	M15 Kaplan-Meier Survival Curves and the Log Rank Test	M15 Assignment Due: November 18 11:59pm
16	Cox-Proportional Hazard	M16 Cox-Proportional Hazard Model	M16 Assignment Due: November 25 11:59pm
Paper	APHA Review Paper		Due: December 5 Noon – 12:00pm NOON - 12:00PM

Instructional Methods:

This course is a blended course in which almost all instruction is provided online. We will meet on the following days to discuss any problems with the material: 8/21, 9/18, 10/16 and 11/15 from 9:00 am until noon These times were picked by the Dean of the Jiann-Ping Hsu College of Public Health and are not negotiable. It is extremely important that you attend on the days we Are scheduled to meet.

Grading:

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

Assignments (based on 325 points) (activities 1-5)	81.25%
Critical Review of Public Health article (75 points) (activity 5)	18.75%

The following point scale will be utilized in grading:

90% - 100%	A
80% - 90%	B
70% - 80%	C
60% - 70%	D

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.

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.