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Fall 2017

### BIOS 6541 - Biostatistics

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## Course Syllabus

**Instructor:** Dr. Haresh Rochani

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**Graduate Assistant:** Sarbesh Pandeya ([sp03459@georgiasouthern.edu](mailto:sp03459@georgiasouthern.edu)) (Skype id : sarbesh88)

**Graduate Assistant Office Hours:** Wednesday 1 – 3 pm

Thursday 11am to 1 pm

**Office Hours:** Monday : 10am - 12pm & Tuesday: 10 am to 1pm. or by appointment or by Skype (id : harry2467)

**Course Credit:** This is a four-credit hour course designed to encompass more content than a standard three-credit hour course for the M.P.H. core curriculum. The additional credit hour will allow you time to navigate statistical software (SAS) in order to complete assignments, projects, and be prepared for exams.

### **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.

### **Required Textbook:**

Sullivan, L. M. (2017). *Essentials of biostatistics in public health*. Jones & Bartlett Learning. *Third edition*.



### **M.P.H. Competencies**

#### *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)

### **Biostatistics Concentration**

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 evaluation.

**Assignments and Discussions:** Assignments account for 30% and discussions account for 10% of your course grade. The table below lists assignments for each chapter to be covered throughout the class. 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.**

Assignments must be submitted by the due dates and via Dropbox for each module. **The data needed for some of your homework are in a separate module. SAS computational Software is required to do some of the homework questions.**

### **Instructional Methods:**

<i>Date</i>	<i>Topic</i>	<i>Readings</i>	<i>Assignment</i>	<i>Due Date for Assignment</i>
Week 1 & 2	Introduction	Chapter 1	Introductions M1 Discussion	Introduction due by 8/18/2017

				M1 discussion is due by 8/23/2017
Week 3	Study Design	Chapter 2	2, 5, 6, 20, 23, 29 M2 Discussion	8/30/2017
Week 4	Quantifying the Extent of Disease	Chapter 3	1, 2, 3, 5, 7, 8, 15, 18, 19 M3 Discussion	9/6/2017
Week 5	Summarizing Data Collected in the sample	Chapter 4	1, 5, 6, 7, 13, 20, 24, 31 M4 Discussion	9/13/2017
Week 6&7	The Role of Probability	Chapter 5	1, 2, 6, 9, 10, 12, 15 M5 Discussion	9/27/2017
Week 8	Confidence Interval Estimates	Chapter 6	1, 2, 5, 10, 15, 21, 27 M6 Discussion	10/4/2017
Week 9			<b>Mid Term Exam</b>	10/18/2017
Week 10&11	Hypothesis Testing procedures	Chapter 7	1, 2, 5, 14, 16, 22, 23 M7 Discussion	11/01/2017
Week 12	Power and Sample Size Determination	Chapter 8	1, 5, 6, 9, 10, 11, 12 M8 Discussion	11/08/2017
Week 13	Multivariate Methods	Chapter 9	1 M9 Discussion	11/15/2017
Week 14	<b>Thanks Giving Break</b>			
Week 15	Non-parametric Tests	Chapter 10	1 M10 Discussion	11/29/2017
Week 16	Final Exams			12/06/2017

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:**

Mid-term Exam (20%) on 10/18/2017 (Activities 1 & 2)

Discussions (10%) (Activities 3 & 4)

Final Examination (30%): Wednesday, Dec 6, 2017 (Activities 1 & 2)

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

Mid-term Exam (Activities 1 & 2)	20%
Final Exam (Activities 1 & 2)	30%
Assignments (Activities 1, 2, 3 and 4)	40%
Discussions	10%
	_____
	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** be posted in folio. 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.

**IMPORTANT:** For all exams and any hand-written assignments, please make certain that your hand-writing is legible.

**University Writing Center:** For those of you who may need assistance with improving your writing for assignments, the data analysis project, or for general writing, I encourage you to visit the University Writing Center. To learn more, visit their website:<http://class.georgiasouthern.edu/writingc/>.

**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 *Academic Dishonesty* policy found online in the course catalog. 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 online *GSU Catalog*.

**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/conduct/resources/faculty/academic-dishonesty/>) 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/conduct/resources/faculty/academic-dishonesty/>

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).

1. 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 students 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:

1. 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 Deans level will ensure that the students work is evaluated in an appropriate manner.

**Attendance Policy & Class Participation:** Federal regulations require attendance be verified prior to distribution of financial aid allotments. So attendance of all classes is required.

**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

