



**DEPARTMENT:** Biostatistics and Bioinformatics

**COURSE NUMBER:** 591P    **SECTION NUMBER:**

**EMORY**

**CREDIT HOURS:** 3

**SEMESTER:** Spring 2020

**ROLLINS  
SCHOOL OF  
PUBLIC  
HEALTH**

**COURSE TITLE:** Biostatistical Methods II

**INSTRUCTOR:** Azhar Nizam

**SCHEDULE:** T & Th 2:30-3:50

**INSTRUCTOR CONTACT INFORMATION:**

EMAIL: anizam@emory.edu

PHONE: 404-729-6581

SCHOOL ADDRESS OR MAILBOX LOCATION: GCR 220

OFFICE HOURS: Tuesday and Thursday 1:15 – 2:15

**COURSE DESCRIPTION:** The course covers fundamental concepts in applied simple and multiple linear regression analyses, one- and two-way analysis of variance and binary logistic regression. Concepts in survival analysis will also be introduced. Students will learn when and how to apply these methods. The emphasis will be on practical data analysis skills rather than statistical theory; however, wherever possible and feasible, mathematical details of regression models will be presented. In-class data analysis examples will employ SAS and R software. Homework assignments, quizzes and exams will include data analyses using SAS and R, as well as other questions designed to reinforce concepts and assess foundational competencies. Teaching assistant office hours will consist of organized review/recitation sessions, and will also include opportunities for student questions. The course is required for Epidemiology students and is to be taken in the second semester of the first year.

**MPH/MSPH FOUNDATIONAL COMPETENCIES**

- Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate
- Formulate a research question and study aims
- Describe distributions of risk factors in terms of magnitude, time, place, and population
- Calculate and interpret basic design-specific measures of association and their standard errors
- Utilize advanced statistical programming in performing epidemiological analysis
- Interpret results of data analysis for public health research, policy or practice
- Select communication strategies for different audiences and sectors

**EVALUATION**

Attendance	5%
Homework	10%
Two Quizzes	25% each
Final Exam	35%

### Grading Scale:

≥ 95	A
90-94	A-
85-89	B+
80-84	B
76-79	B-
66-75	C
≤ 65	F

## COURSE STRUCTURE

### General Information

This class will provide a detailed look at applied linear regression, analysis of variance and binary logistic regression, as well as an introduction to survival analysis. Each week, students will be required to keep up with textbook and lecture note readings and homework assignments. Class materials will be posted on the course Canvas site; students will be required to visit the site daily.

Textbook: “Applied Regression Analysis and Other Multivariable Methods”, by Kleinbaum, Kupper, Nizam and Rosenberg. 5<sup>th</sup> Edition, ISBN: 9781285051086. Rental available on Amazon.com and elsewhere online.

As the instructor of this course I endeavor to provide an inclusive learning environment. However, if anyone experiences barrier to learning in this course, they should not hesitate to discuss them with me and the Office for Equity and Inclusion (404-727-9877).

### Website (canvas.emory.edu)

- Course announcements will be posted on Canvas.
- *Students will be expected to access the web site daily* to look for newly posted documents, announcements, and discussion board messages.
- Lecture notes will be posted on the Canvas. Students will be responsible for downloading notes in advance of each class. Copies will not be provided in class, unless they are posted less than 24 hours in advance of class.
- Homework assignments and solutions, and any other material necessary for the completion of assignments will be posted.
- Students should use the Canvas discussion boards as the primary means of asking questions related to lecture materials, when the questions do not require in-person help.

### How to Get Help

- Attend the weekly teaching assistant review/recitation sessions.
- Drop by during the instructor’s office hours.
- Email the instructor and request an appointment outside of the posted office hours. When doing so, include at least different 2 days when you will be able to meet, and at least two different times on each of those days. The subject of the email should begin with ‘BIOS591p Appt. Request’.
- Post your questions on the Canvas discussion board. The question, and the subsequent answer, will benefit everyone in the class. Questions will usually be answered within 24 hours on weekdays; please note that the board may not be monitored on Saturdays, Sundays and holidays.

### Homework

Homework will reinforce the material covered in class, and complement it where appropriate. Assignments will include word problems and data analysis problems that provide hands-on practice with formulas, concepts and calculations related to linear regression, as well as SAS and R programming and interpretation of regression analysis results. The assignments address the competencies listed on the first page of this syllabus.

Students will be expected to work on each assignment steadily throughout the week, doing a problem or two each day of the week (as opposed to doing the entire assignment a day or two before the due date).

Homework assignments will be collected and graded. Late homework will not be accepted.

Detailed answer keys will be posted. Students will be required to read and understand the answer keys, and to carefully compare their own assignments against the answer keys.

As part of the weekly homework, students will be expected to read the posted lecture notes and textbook readings *in advance of class*. To get the most out of the readings, they should be done twice: once before the corresponding lecture, and again after.

### Quizzes and Exams

There will be two quizzes, and a comprehensive final exam. Each will include an in-class portion, and a take-home portion. The quizzes and exam will include problems that test knowledge of formulas, concepts, calculations related to regression analyses, and the ability to interpret analysis results, and will address the competencies listed on the first page of this syllabus.

The quizzes and exam will be open-notes and open-book. The final exam date for this course will be determined by the RSPH.

### Recordings

Lectures and TA recitation sessions will be recorded whenever possible. However, availability of recordings is not guaranteed. Even when recordings are available, watching the recordings is not an adequate or acceptable substitute for attending lecture sessions.

## **COURSE POLICIES**

### Attendance

Attendance is required and will be recorded; one point will be deducted from student final course scores for each absence after the fourth (up to a maximum of a 5 point deduction).

## Quizzes and Exams

- Both quizzes must be completed in order to pass the class. Failure to complete either quiz will result in a failing course grade.
- The final exam must be completed in order to pass the class. Failure to complete the final exam will result in a failing course grade.
- Students must work alone on quizzes and exams; they may not communicate with anyone other than the course instructor about any aspect of quizzes and exams.

## **RSPH POLICIES**

### Accessibility and Accommodations

Accessibility Services works with students who have disabilities to provide reasonable accommodations. In order to receive consideration for reasonable accommodations, you must contact the Office of Accessibility Services (OAS). It is the responsibility of the student to register with OAS. Please note that accommodations are not retroactive and that disability accommodations are not provided until an accommodation letter has been processed.

Students who registered with OAS and have a letter outlining their academic accommodations are strongly encouraged to coordinate a meeting time with me to discuss a protocol to implement the accommodations as needed throughout the semester. This meeting should occur as early in the semester as possible.

Contact Accessibility Services for more information at (404) 727-9877 or [accessibility@emory.edu](mailto:accessibility@emory.edu). Additional information is available at the OAS website at <http://equityandinclusion.emory.edu/access/students/index.html>

### Honor Code

**You are bound by Emory University's Student Honor and Conduct Code.** RSPH requires that all material submitted by a student fulfilling his or her academic course of study must be the original work of the student. Violations of academic honor include any action by a student indicating dishonesty or a lack of integrity in academic ethics. *Academic dishonesty refers to cheating, plagiarizing, assisting other students without authorization, lying, tampering, or stealing in performing any academic work, and will not be tolerated under any circumstances.*

The RSPH Honor Code states: "Plagiarism is the act of presenting as one's own work the expression, words, or ideas of another person whether published or unpublished (including the work of another student). A writer's work should be regarded as his/her own property." ([http://www.sph.emory.edu/cms/current\\_students/enrollment\\_services/honor\\_code.html](http://www.sph.emory.edu/cms/current_students/enrollment_services/honor_code.html))

## COURSE CALENDAR / OUTLINE<sup>1</sup>

Date	Topics	Textbook <sup>2</sup> Chapters
1/14	Introduction to correlation and regression. Correlation analysis: Pearson correlation coefficient, inferences and interpretation. SAS and R correlation analysis examples.	1-6
1/16	Simple Linear Regression (SLR) model, method of least squares estimates and interpretation of model coefficients.	1-7
1/21	SLR: Model assumptions; confidence and prediction Intervals.	1-7
1/23	SLR: SAS and R data analysis examples.	1-7
1/28	SLR: ANOVA table. Overall F-test, coefficient of determination.	1-7
1/30	SLR: start-to-finish SLR examples using SAS and R.	1-7
2/4	Multiple linear regression model, method of least squares estimates and interpretation of model coefficients.	8, 9
2/6	Multiple regression: SAS and R data analysis examples.	8, 9
2/11	Quiz 1: SLR	
2/13	Multiple regression: ANOVA table, partial and multiple-partial tests.	8, 9
2/18	Multiple regression: SAS and R data analysis examples.	8, 9
2/20	Regression diagnostics: assumption checking, outlier detection, assessment of collinearity.	14
2/25	Regression diagnostics: SAS and R data analysis examples.	14
3/3	Categorical predictors in regression.	12
3/5	Categorical predictors in regression: SAS and R data analysis examples.	12
3/10	Spring Break	
3/12	Spring Break	
3/17	Quiz 2: Multiple linear regression.	
3/19	One-way fixed effects ANOVA: model, terminology, relationship to regression and two-sample t-tests, estimates, interpretations.	17
3/24	One-way ANOVA: Multiple comparisons –Tukey, Bonferroni	17
3/26	One-way ANOVA: SAS and R examples.	17
3/31	Two-way fixed effects ANOVA: model, estimates, interpretations,	19-20
4/2	Two-way fixed effects ANOVA: Multiple comparisons. SAS and R examples.	19-20
4/7	Binary logistic regression with a single binary predictor: model, maximum likelihood estimates, inferences on and interpretation of model coefficients and odds ratios, relationship to chi-square tests.	22
4/9	Binary logistic regression with multiple predictors: inferences on and interpretation of model coefficients and odds ratios.	22

4/14	Binary logistic regression: SAS and R examples	22
4/16	Binary logistic regression: SAS and R examples	22
4/21	Survival analysis: examples, censoring, life-tables, log-rank test	Notes
4/23	Survival analysis: introduction to the Cox proportional hazards model. SAS and R examples.	Notes

<sup>1</sup> This outline may change as the semester progresses; students should check Canvas frequently for updates.

<sup>2</sup> Kleinbaum, Kupper, Nizam and Rosenberg (5<sup>th</sup> edition).