DEPARTMENT: Biostatistics

COURSE NUMBER: 512 **SECTION NUMBER: 1**

CREDIT HOURS: 4 **SEMESTER: Fall/2019**

COURSE TITLE: Introduction to Probability Theory

CLASS HOURS AND LOCATION: CNR 1055

INSTRUCTOR NAME: Rebecca Zhang

INSTRUCTOR CONTACT INFORMATION

EMAIL: hzhang3@emory.edu

PHONE: (404) 727-1311

SCHOOL ADDRESS: RSPH GCR 310

OFFICE HOURS: Friday 11:50am – 12:50pm

Teaching Assistant(s): Gavin Tian, Qingyu Wang

COURSE DESCRIPTION

Required course for first year BIOS MSPH and Ph.D. students.
Pre-requisites: Multivariate calculus, Linear algebra.

Introduction to Probability, random variables, distributions, conditional distributions, expectations, moment generating functions, order statistics, and convergence concepts.

MSPH/PhD Foundational Competency assessed	Representative Assignment
Use central concepts in statistical theory and inference.	Final exam

Competency is assessed through final exam.

EVALUATION

Homework: 25%
Test 1: 20%
Test 2: 20%
Final Exam: 35%

Final grades: $\geq 93\% = A$, $[90, 93)\% = A_-$, $[87, 90)\% = B_+$, $[83, 87)\% = B$, $[77, 83)\% = B_-$, $[70, 77)\% = C$, $< 70\% = F$

COURSE POLICIES

There is a weekly homework assignment. It is due the following week in class. Homework turned in late is accepted with 20% deduction for each day that is late, with no more than 3 days. Tests and final exam are in class as specified on the given dates.

As the instructor of this course I endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me and the Office for Equity and Inclusion, 404-727-9877.

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. 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)

COURSE CALENDAR

Test 1: Oct. 11
Test 2: Nov. 15
Final Exam: Dec. 11

COURSE OUTLINE

- Elements of Probability: sets and events; probabilities in a discrete sample space; combinatoric rules; conditional probability and independence; Bayes’ theorem
- Random Variables and Their Distributions: Discrete random variables, Continuous random variables, some properties of expected values, Moment generating functions
- Special Probability Distributions:
  Special discrete distributions: Bernoulli, Binomial, Geometric, Negative Binomial, Hypergeometric, Poisson
  Special continuous distributions: Uniform, Normal, Gamma, $\chi 2$, Exponential, Beta, Log-Normal, Cauchy
- Joint Distributions: Joint discrete distributions, joint continuous distributions, independent random variables, Conditional distributions, Random samples
- Identities and inequalities
- Properties of Random Variables: Properties of expected values, Correlations, Conditional expectation, Joint moment generating
- Functions of Random Variables: The CDF technique, Transformation methods, Sums of random variables, Order statistics
- Limiting Distributions: Sequences of random variables, convergence concepts, types of convergence. Weak law of large numbers, Strong law of large numbers, The Central Limit Theorem, Approximations for the binomial distribution, Asymptotic normal distributions, Asymptotic normal distributions.