DEPARTMENT: Biostatistics and Bioinformatics
COURSE NUMBER: 510   SECTION NUMBER: 1               SEMESTER: Fall
CREDIT HOURS: 4
COURSE TITLE: Probability Theory I

INSTRUCTOR NAME: Rebecca H. Zhang

INSTRUCTOR CONTACT INFORMATION
EMAIL: hzhang3@sph.emory.edu
PHONE: (404) 727-1311
OFFICE HOURS: Monday 12:00 noon – 1:00 pm
TA: Emily Mitchell
TA EMAIL: emitch8@emory.edu
TA OFFICE HOUR: Thursday 1:00 pm – 2:00 pm, GCR 367

BRIEF COURSE DESCRIPTION
Introduction to Probability, random variables, distributions, conditional distributions, expectations, and moment generating functions.

TOPICS:
• 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, Special continuous distributions, Location and scale parameters
• Joint Distributions: Joint discrete distributions, joint continuous distributions, independent random variables, Conditional distributions, Random samples
• 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, The central limit theorem, Approximations for the binomial distribution, Asymptotic normal distributions, Properties of stochastic convergence, Additional limit theorems

ACADEMIC HONOR CODE
The RSPH requires that all material submitted by a student in fulfilling his or her academic course of study must be the original work of the student.
LIST SCHOOL LEVEL, DEPARTMENT, AND/ OR PROGRAM COMPETENCIES

- Estimate the appropriate sample size for conducting the study
- Perform the appropriate statistical analyses of study data
- Assist in the interpretation of study results
- Interpret statistical results of biomedical studies effectively
- Conduct appropriate statistical analyses for a broad range of applications
- Communicate the results of statistical studies both orally and in writing

LIST LEARNING OBJECTIVES ASSOCIATED WITH THE COMPETENCIES

- Assist in the development of new statistical theory as needed to address public health or medical problems
- Assist in teaching and/or teach statistical theory or statistical methodology at different levels
- Apply statistical theory to medical and public health problems
- Apply new and existing statistical theory to a broad range of complex medical or public health problems

EVALUATION: There will be a test and a final exam. Both of them will be in-class, closed book.

Homework: 30%
Test: 30%
Final Exam: 40%