Shanghai University of Finance & Economics

2020 Summer Program

STAT 201 Probability Theory

Course Outline

Term: June 1 – June 26, 2020

Class Hours: 8:00-9:50 (Monday through Friday)

Course Code: STAT 201

Instructor: Professor Vadim Olshevsky

Home Institution: University of Connecticut

Office Hours: TBA and by appointment

Email: olshevsky@gmail.com

Credit: 4

Class Hours: This course will have 52 class hours, including 32 lecture hours, professor 8 office hours, 8-hour TA discussion sessions, 4-hour review sessions.

Course Description:

Introducing probability and statistical inference. The course has a prerequisite of differential and integral calculus. We will use the textbook "A first course in Probability" by Sheldon Roth, 9th edition.

Course Objectives: A student who satisfactorily completes this course will be able to:

- understand the basic rules of probability conditional probability. and expectation
- apply Bayes' theorem on changing conditional probabilities with new evidence;
- understand the difference between discrete and continuous random variables;
- work easily with several common distributions, discrete and continuous;
- understand the central limit theorem;
- understand the difference between point estimates and inference by confidence intervals, the strengths and limits of both;
- engage in critical evaluation of statistical evidence, and experimental design.

Required Textbooks: A first course in Probability" by Sheldon Roth, 9th edition, 2014, Pearson, ISBN: 9780321794772.

Homework: We will use Pearson My Lab web site for daily homework assignments.

Grading & Evaluation		**Grade**	**Range**
Attendance and participation: 10%		A	90-100
Homework:	30%	B	80-89
Midterm:	30%	C	70-79
Final:	30%	D	60-69
		F	0-59

Course Schedule
Week1
Monday Chapter 1. Axioms of probability, sampling, review of counting, infinitely many outcomes.
Tuesday Probabilities defined on events, Conditional probabilities
Wednesday Independent events, Bayes' formula.
Thursday Chapter 2. Random variables, Discrete random variables (Bernoulli, Binomial, Geometric, Poisson).

Week2
Monday Continuous random variables. Expectation of a random variable.
Tuesday Jointly distributed random variables, Moment generating functions.
Wednesday Limit theorems, stochastic processes.
Thursday Midterm exam.

Week3
Monday Chapter 3. Conditional probability and conditional expectation. Discrete and continuous cases.
Tuesday Computing probabilities and expectations by conditioning.
Wednesday Chapter 4. Chapman-Kolmogorov equations. Classification of states. Limiting probabilities.
Thursday Markov chains. Monte Carlo methods. Markov Decision processes.

Week4
Monday Chapter 5. Exponential distributions. The Poisson process.
Tuesday Chapter 6. Continuous-time Markov chains. The transition probability function.
Wednesday Limiting probabilities. Time reversibility.
Thursday Final exam.

Student responsibilities/expectations: The main course material will be presented through lectures. A discussion session, to be held every Friday will offer an opportunity for students to discuss course material and assigned problems with a teaching assistant (TA). Students are advised to keep pace with the course material as it is being presented. Consequently, students should endeavor to attend all class meetings and discussion sessions, be early for class, and spend sufficient time working on assigned

homework problems. If for any reason a student misses a class, he/she should endeavor to obtain the notes and learn the missed material before the next class meeting. Students should not hesitate to ask questions or seek additional assistance to ensure that they are staying on pace with the class. Students will be expected to come to class prepared and ready to participate actively. Please, turn off your cell phones and put aside any unrelated material before class begins. Students must be responsible and show respect towards fellow students. Late coming to class or early departure from class meetings will not be allowed.

Examinations: There will be one midterm exam plus one cumulative final exam. The exams will contain problems to solve and definitions, brief explanations of concepts, and simple proofs.