ISE 331 **Introduction to Operations Research: Stochastic Models** **Spring 2022**

Mon/Wed 2:00-3:20pm
SGM 601

Instructor: J.L. Higle
Office: Zoom (details provided on Blackboard)
Email: higle@usc.edu
Office Hours: TBD

Prerequisite: ISE 220 Probability Concepts in Engineering (or equivalent)
By topic: calculus-based probability (i.e., axioms of probability, discrete and continuous distributions, independence, expectation).
Recommended Preparation: ISE 330 Intro to Operations Research: Deterministic Models (*not really*)

Goals: The objective of this course is to familiarize students with some of the probabilistic models available for the analysis and solution of common ISE problems in which uncertainty and randomness are particularly important. Upon completion of ISE 331, the student should

1) Be able to develop an appropriate probabilistic model from a verbal description of a problem
2) Have an understanding of the restrictions associated with various modeling assumptions
3) Be able to extract relevant information from various types of models

Outcomes: Students will develop an understanding of modeling with exponential and Poisson random variables, methods for formulating and analyzing Markov Chains (both discrete-time and continuous-time), and analytical models used to study the queueing behavior of systems.

Textbook: *Introduction to Probability Models*, 12th Edition. (S.M. Ross, Academic Press, 2019).

Instructional Assistant: Michael Hintlian
Office Hours: TBD
Email: hintlian@usc.edu

Grading Policy: The following percentages will be used in calculating the final score for each student:

Homework	10%
First Exam	30%
Second Exam	30%
Final Exam	30%

Each component will be normalized to a total of 100 points prior to applying the percentages listed above. Course grades will be determined by the final score. To the extent possible, "natural gaps" in the grade distribution will be used to assign grades.

Homework will be assigned most weeks. Assignments are due at the start of class one week on the indicated due date. **Late assignments will not be accepted for credit.** In calculating the homework score, the lowest grade for each student will be discarded.
Note: If you rely on or use one or more sources of information or assistance, you must properly acknowledge the source. Failure to do so is a violation of the University Student Conduct Code and will be dealt with accordingly. Additional information can be found in the "Homework Policy" document.

Assuming that we are meeting "in-person":

Mid-term Exams will last for the full class period. Both exams will be "in-class" and "closed book". However, each student is allowed to bring one 8½" x 11" sheet of hand-written notes for use during the exam. This sheet must be turned in with the exam. Two such sheets of notes will be

allowed during the final exam. Each exam will draw upon the material presented up to, and including, the class period in which the exam date is announced.

Assuming that we are still meeting via "Zoom":

Mid-term Exams will follow an alternate format, which will be announced once we have clarity with respect to our meeting protocols. There is a high probability that such exams would include an oral component.

A review of potential errors in the grading of an exam can be requested, per the following steps:

- The request must be submitted during the first class period after the graded exams are returned to the class. Requests will not be accepted on the day the exams are returned to the class, nor will they be accepted after the date of the first class period following the return of the graded exams.
- The request must include a note identifying the perceived grading error(s). The note should clearly indicate the nature of the error(s) from the student's perspective.
- The error(s) identified in the note will be reviewed, and the exam will be returned to the student as soon as possible.

Final Exam: The time schedule indicates that the final exam will be held on **May 9 (Mon.), 2:00-4:00pm**. The final exam will be comprehensive, and will include at least one question on material covered after the second mid-term exam. The format of the final exam will be impacted by the manner in which class is meeting by the end of the term.

Academic Integrity

The Epstein Department of Industrial and Systems Engineering adheres to the University's policies and procedures governing academic integrity as described in SCampus. Students are expected to be aware of, and to observe, the academic integrity standards described in SCampus. Students should expect that those standards will be enforced in this course.

Accommodations for Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure that the letter is delivered to the instructor as early in the semester as possible. DSP is located at STU 301 and is open from 8:30 am – 5:00 pm Monday – Friday. The phone number for DSP is 213.740.0076.

Approximate Course Schedule

Topic	Source Material	Approximate Duration
Review of Basic Probability	Ross, Ch 1,2	3 classes
Conditional Probability & Conditional Expectation	Ross, Ch 3	5 classes
Mid-Term Exam[1]		
Discrete Time Markov Chains	Ross, Ch 4	5 classes
Exponential Distribution & Poisson Processes	Ross, Ch 5	5 classes
Mid-Term Exam[1]		
Continuous Time Markov Chains; Basic Queueing Theory	Ross, Ch 6, 8	6 classes
Additional Topic, as time permits	TBD	TBD

[1] The actual timing of the exams, both in terms of dates and topics, will depend heavily on the time required to cover the various topics. This schedule represents my best guess prior to the start of the semester.