

Instructor: Professor J.L. Higle
Office: OHE 310H (someday ...)
Office Hours: TBD (currently by appointment on Zoom, until further notice)
Email: higle@usc.edu

Instructional Assistant: Ying Peng
Office Hours: Dates/Times are TBD; Zoom.
Email: yingpeng@usc.edu

Schedule: Mon/Wed 2:00-3:20pm Online – Zoom (see Blackboard for details)

Prerequisite: By topic: calculus-based probability (i.e., axioms of probability, discrete and continuous distributions, expectation). At USC, ISE 220 Probability Concepts in Engineering is sufficient.

Course Description: Random variables, stochastic processes, birth and death processes, continuous- and discrete-time Markov chains with finite and infinite number of states, renewal phenomena and queuing systems.

Learning Objectives: Students will develop an understanding of modeling with random variables and stochastic processes, the formulation and analysis of Markov Chains (both discrete-time and continuous-time), and analytical models used to study the queueing behavior of systems.

Textbook: *Introduction to Probability Models*, 11th Edition. (S.M. Ross, Academic Press, 2014). Earlier editions (e.g., 8th or later) may be used, although various numbers (pages, theorems, problems) vary from one edition to the next, so students will be responsible for ensuring that they are working on the assigned problems.

Grading Policy: There will be no graded homework assignments, no exams, and no quizzes. There will be 5-6 projects assigned throughout the semester, which will constitute 80% of your final score, with each project contributing the same amount. Thus, if there are n projects, each project will contribute $80/n$ toward the final score. There are 20 PlusPoints that account for the remainder of the score. Thus, the following percentages will be used in calculating the final score for each student:

Item	Contribution
Projects <ul style="list-style-type: none"> A total of n projects, $5 \leq n \leq 6$, each contributing $80\%/n$ toward your final score 	80%
PlusPoints	20%

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. With respect to the projects, points allocated will be equally divided between: a) Technical Development, b) Illustration of Results, c) the Written Report.

Projects topics will be “taken from the headlines” throughout the semester. Students are encouraged to work in pairs on these assignments. 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.

Projects that are submitted late will be penalized: 10% reduction in points if one day late; 25% reduction if two days late; 50% if three days late. Projects that are submitted more than three days late will receive zero points.

PlusPoints will be announced from time to time throughout the semester. These are likely to be quirky “little” assignments, and you can pick and choose which ones you’d like to work on.

Problem Sets, taken primarily from the textbook will be recommended. They are intended to help develop skills and fluency with the course materials, but will not be graded.

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	4 classes
Renewal Theory	Ross, Ch 7	3 classes
Exponential Distribution & Poisson Processes	Ross, Ch 5	5 classes
Discrete Time Markov Chains	Ross, Ch 4	4 classes
Continuous Time Markov Chains; Basic Queueing Theory	Ross, Ch 6, 8	5 classes
Semi-Markov Processes	Ross, Ch 4	(time permitting)

This represents today’s thoughts on how the semester might play out. I’m just guessing, so it will almost surely change during the semester as we come to understand our pacing better.

Monday			Wednesday		
Date	Topic	Project	Date	Topic	Project
Aug 24	Review		Aug 26	Review	
Aug 31	Review		Sep 2	Conditioning	1 st Proj. out
Sep 7	Labor Day; No Class		Sep 9	Conditioning	1 st Proj. Discuss
Sep 14	Conditioning		Sep 16	Conditioning	1 st Proj. Due; 2 nd Proj. out
Sep 21	Renewal	2 nd Proj Discuss	Sep 23	Renewal	1 st Proj. Present?
Sep 28	Renewal	2 nd Proj Due	Sep 30	Exponential RVs	
Oct 5	Poisson Process		Oct 7	Poisson Process	3 rd Proj. out; 2 nd Proj Present?
Oct 12	Poisson Process	3 rd Proj Discuss	Oct 14	Poisson Process	
Oct 19	DTMC	3 rd Proj Due; 4 th Proj out	Oct 21	DTMC	
Oct 26	DTMC	4 th Proj Discuss; 3 rd Proj Present	Oct 28	DTMC	
Nov 2	CTMC		Nov 4	CTMC /QT	4 th Proj Due
Nov 9	CTMC / QT		Nov 11	CTMC / QT	5 th Proj Out; 4 th Proj Present?
Nov 16	CTMC / QT	5 th Proj Discuss	Nov 18	SMP	
Nov 23	SMP	5 th Proj Due			

Proj Out: Distributed/Assigned

Proj Discuss: In-Class Discussion
 Proj Present?: Possible Presentations for PlusPoints

Proj Due: Due date for full credit