Catalog Description: (3 units) Probability, Markov Chains, Poisson Process and its variants, queuing models, reliability models.

Prerequisites: SIE 305 – Introduction to Engineering Probability and Statistics, or equivalent. Knowledge of probability theory and calculus. It is important to have a solid probability background.

Time and Location: MWF 1:00 – 1:50pm, AME S212.

Instructor: Dr. Güzin Bayraksan
Office: ENGR 223, Tel: (520) 621-2605, Email: guzinb@sie.arizona.edu
Office Hours: Mon 4:30pm - 5:15pm, Wed 4:30 - 5:30pm
If you would like to meet another time, please call or email me to set up an appointment. Email is the best way to reach me.

Class website: We’ll be using D2L. All class materials, including HW, handouts, etc. will be distributed from D2L. I will also be sending emails to the whole class throughout the semester using the classlist in D2L. If you haven’t done so already, please make sure you forward your D2L email to an email account that you frequently use. Otherwise, you might be missing some important information.


References:


  Note: The above book is at a higher level.


Course Objective: The goal of this course is to apply probability theory to model and analyze systems with time varying randomness. Such stochastic systems are commonly encountered in engineering, computer science, biology, finance and public policy. This course is an introduction to the systematic study of such probabilistic systems.
**Grading:** Homework will be given throughout the semester (every one or two weeks). There will be two midterm exams and a comprehensive final. Make-up exams will not be given without a valid medical (or, other valid) excuse.

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<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>HW</td>
<td>24%</td>
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<tr>
<td>MidtermI</td>
<td>22%</td>
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<tr>
<td>MidtermII</td>
<td>22%</td>
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<tr>
<td>Final</td>
<td>32%</td>
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**Important Dates:**

- Midterm I will be on Friday, March 2nd. Please mark your calendars. (We will schedule Midterm II during the semester.)
- The last class day is Wednesday, May 2, 2011.
- The final exam is scheduled on Monday, May 7, 2012 from 1:00pm - 3:00pm, in the usual classroom.

**Note on Academic Integrity:** You are welcome to discuss HW questions with your classmates. It is a great way to learn the class material. However, I expect you to understand and write your own solutions. Also, if you have any references, do cite them, including your discussions with your classmates.
Course Outline

- Review of Probability Theory (and some new things)
  - sample space and events,
  - conditional probabilities, independence and Bayes’ formula
  - discrete/continuous random variables
  - expectation, jointly distributed random variables, etc.

- Discrete-Time Markov Chains (DTMC)
  - introduction and examples
  - Chapman-Kolmogorov Equations
  - classification of states
  - transient/limiting behaviors

- Poisson Process
  - introduction and interarrival/waiting time distributions
  - non-homogenous P.P.
  - compound P.P.
  - conditional P.P.

- Continuous-Time Markov Chains (CTMC)
  - introduction and examples
  - birth and death processes
  - transition probabilities
  - transient/limiting behaviors

- Queueing Theory
  - introduction and preliminaries
  - M/M/1 queues and variations
  - M/G/1 queues and variations
  - network of queues