# Reading List
# MATH 6660, Fall 2015

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## Reading List has been updated to include material assigned on

September 3, 2015

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All readings will be listed here, organized by topic. Dates indicate the class by which you should have read the indicated material. Some readings may be announced here before they are announced in class, in case you want to read ahead. Sometimes, particularly if I am traveling, you may find some references posted at the library class reserves before they are linked here.
If a reading does not have a date, you don't have to worry about it yet.

PDF links probably won't be operational until shortly before the semester starts.

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## Fundamentals of Probability Theory and Stochastic Processes

### Assigned Readings

- Karlin & Taylor, *A First Course in Stochastic Processes*, Sec. 1.1A-F (PDF) (09/10/15)

### Optional Readings

- Kloeden & Platen, *Numerical Solution of Stochastic Differential Equations,* Sec. 1.1-1.3 (PDF)

## Finite-State, Discrete-Time Markov Chains

### Assigned Readings

- Lawler, *Introduction to Stochastic Processes*, Ch. 1 (PDF) (10/02/15)

### Optional Readings

- Karlin & Taylor, *A First Course in Stochastic Processes*, Secs. 2.1-2.3 (PDF)
  - examples of Markov chain models
- Resnick, *Adventures in Stochastic Processes*, Secs. 2.1-2.3 (PDF)
  - Discussion of stochastic update rule and more Markov chain model examples
- David F. Gleich, "PageRank Beyond the Web," SIAM Review, **57** (2015), 321-364. (PDF)
- Resnick, *Adventures in Stochastic Processes*, Secs. 2.12-2.15 (PDF)
  - Complete probabilistic proof of existence and uniqueness of stationary distribution, and law of large numbers for Markov chains. Also some further discussion of recurrence/transience classification techniques and computational

techniques for stationary distribution.
- Karlin & Taylor, *A First Course in Stochastic Processes*, Secs. 3.1-3.2 (PDF)
  - Analytical (rather than probabilistic) method of proving limit theorems for Markov chains
- Karlin & Taylor, *A First Course in Stochastic Processes*, App. 2 (PDF)
  - Perron-Frobenius theory for positive matrices
- Haken, *Synergetics*, Secs. 4.6-4.8 (PDF)
  - Stationary distributions: Detailed balance, microreversibility, and Kirchoff's method of solution
- Resnick, *Adventures in Stochastic Processes*, Secs. 2.5-2.6 (PDF)
  - Dissection principle for Markov chains and some theory on recurrence and transience when the n-step probability transition densities can be computed explicitly.
- Guttorp, *Stochastic Modeling of Scientific Data*, Sec. 2.1 (PDF)
  - Maximum likelihood method for choosing parameters in Markov chain

## Countable State, Discrete-Time Markov Chains

### Assigned Readings

- Lawler, *Introduction to Stochastic Processes*, Ch. 2 (PDF)
- Karlin & Taylor, *A First Course in Stochastic Processes*, Ch. 2 and 3 (PDF)

### Optional Readings

- Feller, *An Introduction to Probability Theory and its Applications*, Volume I, Ch. XII.5 (PDF)
  - Applies branching process ideas to queueing theory
- S. Melnik, A. Hackett, M. A. Porter, P. J. Mucha, and J. P. Gleeson, "The Unreasonable Effectiveness of Tree-Based Theory for Networks with Clustering," *Physical Review E* **83** (2011), 036112. (PDF)
  - Study of how branching process approximations work in dynamics on networks

## Countable State, Continuous-Time Markov Chains

### Assigned Readings

- Lawler, *Introduction to Stochastic Processes*, Ch. 3 (PDF)
- Karlin & Taylor, *A First Course in Stochastic Processes*, Ch. 4 (PDF)

### Optional Readings

- J. Goutsias, G. Jenkinson, "Markovian dynamics on complex reaction networks," *Physics Reports* **529** (2013), 199-264 (PDF)
  - Models and techniques for continuous-time Markov chains, written from a physicist's viewpoint

- Karlin & Taylor, *A First Course in Stochastic Processes*, Sec. 6.8 (PDF)
  - Markov times for continuous-time stochastic processes
- Reichl, *A Modern Course in Statistical Physics*, Ch. 5 (PDF)
  - A concise discussion of Markov chains and stochastic differential equations from a physicist's perspective. A nice collection of concepts, but there are some misleading statements!
- Andersson and Britton, *Stochastic Epidemic Models and Their Statistical Analysis*, Ch. 2 (PDF)
  - A stochastic epidemic model together with martingale techniques developed to analyze it.

## Renewal Processes

### Assigned Readings

- Karlin & Taylor, *A First Course in Stochastic Processes*, Secs. 5.1-5.6 (PDF)
- Karlin & Taylor, *A First Course in Stochastic Processes*, Secs. 5.8 B&C (PDF)
- Resnick, *Adventures in Stochastic Processes*, Secs. 3.3 & 3.4 (PDF)

### Optional Readings

- Karlin & Taylor, *A First Course in Stochastic Processes*, Sec. 5.7C (PDF)
  - Renewal processes with two phases per renewal period
- Karlin & Taylor, *A First Course in Stochastic Processes*, Sec. 5.7G (PDF)
  - Application of renewal theory to calculating bankruptcy risk for insurance company
- Karlin & Taylor, *A First Course in Stochastic Processes*, Sec. 5.9 (PDF)
  - Limit theorems for superposition of rare renewal processes being well approximated by Poisson point process

- B. Lindner, "Superposition of many independent spike trains is not generally a Poisson process," *Physical Review E* **73** (2006), 022901 (PDF)

## Martingales

### Assigned Readings

- Karlin & Taylor, *A First Course in Stochastic Processes*, Sec. 6.1-6.4 (PDF)
- Lawler, *Introduction to Stochastic Processes*, Secs. 5.1-5.3 (PDF)
- Andersson & Britton, *Stochastic Epidemic Models and Their Statistical Analysis*, Ch. 2 (PDF)