Topics in Stochastic Process
STA 5807

Course personnel:

- Professor: Dr. Florentina Bunea
- Office: OSB 209 D
- flori@stat.fsu.edu
- Office Hours: Tue, Th 3:15 - 4:15 and by appointment.

Administrative Information

- Place: Room 301 MCH
- Time: Tue, Th 11:00 AM - 12:15 PM.

Prerequisite: MAA 4227, 5307, or the equivalent.

Required Texts:

(1) *Introduction to Probability Models*, Sheldon M. Ross, 10th Edition, Academic Press, 2010.

(2) *Essentials of Stochastic Processes,* Rick Durrett, Springer 1999.

Supplemental texts:

- *Stochastic processes*, Sheldon M. Ross, 2nd Edition, Wiley & Sons, 1996.
- *A first course in stochastic process*, Samuel Karlin and Howard M. Taylor, 2nd Edition, Academic Press, 1975.
- *Empirical Processes with applications to statistics*, Galen R. Shorack and Jon A. Wellner, Wiley & Sons, 1986.
- *Introduction to time series and forecasting*, Peter J. Brockwell and Richard A. Davis, 2nd Edition, Springer, 2002.

Course Objective:
To gain an understanding of the fundamental principles of stochastic processes theory, without a measure theoretic treatment. To gain proficiency in using stochastic processes tools for data modeling purposes.

Course Outline:

The lectures in STA 5807 will cover parts of **(1)** (Chapters 4, 5, 6, 10) and **(2)** (Chapters 1, 3, 4, 6). Additional topics will cover Sections 0 - 3 of Chapter 5 of Empirical Processes with applications to statistics (a copy of this chapter will be provided in class).

1. Discrete-time Markov Chains: C-K equations; the states of a Markov chain; limiting probabilities; branching processes; MCMC; hidden Markov Chains.
2. Poisson processes: counting processes; homogenous and nonhomogeneous Poisson processes; interarrival and waiting time distributions.
3. Continuous-time Markov chains: birth and death processes; limiting probabilities; time reversibility.
4. Brownian Motion, Brownian Bridge and applications. White noise and Gaussian processes. The principal component decomposition of a process. The Karhunen-Loéve decomposition of a process: Mercer's theorem and application to functional data analysis.
5. Stationary processes.

Grading Policies: The final grade will be based on: 20 % in class homework presentations, 40 % the mid-term exam and 40 % the final exam. All exams are in-class and closed book. There is no curving of grades in this course. Your grade is based entirely on your performance. If you are unable to take an exam, please get in touch with me beforehand.

93 or more	A	90 - less than 93	A-
86 - less than 90	B+	83 - less than 86	B
80 -less than 83	B-	76 - less than 80	C+
73 - less than 76	C	70 -less than 73	C-
66 - less than 70	D+	63 - less than 66	D
60 - less than 63	D-	less than 60	F

Academic Honor System: "The Academic Honour System of The Florida State University is based on the premise that each student has the responsability to: 1) Uphold the highest standards of academic integrity in the student's work, 2) Refuse to tolerate violations of academic integrity in the academic community, and 3)Foster a high sense of integrity and social responsability on the part of University community."

Please note that violations of this Academic Honor System will not be tolerated in this class. Specifically, incidents of plagiarism of any type or referring to any unauthorized material during examinations will be rigurously pursued by this instructor. Before submitting any work for this class, please read the "Academic Honor System" in its entirety (as found in the FSU General Bulletin and in the FSU Student Handbook) and ask the instructor to clarify any of its expectations that you do not understand.