

MA 783 - Advanced Stochastic Processes-Fall 2022

**Instructor:** Konstantinos Spiliopoulos

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**Course web-page:** <http://math.bu.edu/people/kspiliop/MA783Fall2022.html>

**Meets:** TuTh... 11:00-12:15 at CAS 314

**Readings:** We will combine many different sources, including selections from textbooks and research articles.

**Primary Texts:**

1. *Stochastic differential equations*, Øksendal B., Springer Berlin Heidelberg, 2003
2. *Brownian motion and stochastic calculus*, Karatzas I., Shreve S., Springer, 2012.
3. *Stochastic Processes*, Bass RF, Cambridge University Press, 2011.
4. *Stochastic Processes and Applications*, Grigorios A. Pavliotis, Springer Texts in Applied Mathematics, 2014.

**Prerequisites:** MA 779 and MA 780, Probability Theory I and II, or their equivalents; or consent of instructor. The students are required to have a solid understanding of graduate level probability and calculus.

**Course Description:** Proof-based approach to stochastic processes. Topics may include: Sigma algebra, filtrations, optional sampling theorems, stopping times, martingale theory, Markov processes, Brownian motion, Poisson processes, stochastic integral and related properties, stochastic differential equations, Ito formula, calculus for semimartingales, Markov property, connections to partial differential equations, Fokker-Planck equation.

**Tentative grading policy:** Your grade will be based on :(a) Homework (55%), (b) midterm exam (20%) and final exam (25%). The grading policy may change according to the progress of the class.

**Exams:** There will be one midterm exam and one final exam. The exam material for each one of the two exams will be announced in class and posted on the webpage of the course.

**Homeworks:** There will be several homeworks, both theoretical and more of applied flavor. The due date of each homework will be announced in class and it will usually be 7-10 days after. The lowest homework will be dropped if you participate in class. Late homeworks will NOT be accepted.

**Late homework policy:** No late homework will be accepted.

**Make-up policy:** Make up exams will be given only in extreme circumstances, and only when accompanied by appropriate documentation. Any student with a valid reason to be given a make up exam must contact me prior to the exam, either by email or in person, and present documentation at the next class session attended.

**Cheating:** No form of cheating or plagiarism will be tolerated. University's policy and my policy are very strict here.