Syllabus

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MAP 6467 – Stochastic Differential Equations

Time and Location: M-W-F, Period 5 (11:45 AM - 12:35 PM), LIT 219
Instructor: Arnaud Marsiglietti
Office: 411 Little Hall
E-mail: a.marsiglietti@ufl.edu
Phone: 352-294-2310
Course website: https://people.clas.ufl.edu/amarsiglietti/courses/fall23-1/

Office Hours
Monday 1:55pm – 2:45pm, Wednesday 1:55pm – 2:45pm, or by appointment

Textbook
There is no required text, but the following textbooks are suggested:

- G. F. Lawler, Stochastic Calculus: An Introduction with Applications (**PDF available on Prof. Lawler's website**).

- P. E. Protter, Stochastic Integration and Differential Equations, Springer.

- R. Durrett, Probability: Theory and Examples, 5th edition (**PDF available on Prof. Durrett's website**).

- P. Mörters and Y. Peres, Brownian Motion, Cambridge University Press (**PDF available on Prof. Mörters' website**).

Prerequisites
MAP 6472-6473 — Probability and Potential Theory

Scope of the Course
The aim of the course is to provide students with strong foundations in the area of probability theory. At the end of the course, students will be acquainted with the language of probability and will gain sufficient experience to successfully apply probabilistic tools to most areas of pure and applied sciences.

The course is intended for graduate students as part of their PhD requirement, and for students considering studying probability theory at a research level.

Topics Covered
Topics include: Continuous time Martingales, Brownian motion, Stochastic integral, Itô calculus, Stochastic differential equations.

Weekly Schedule

W1: Review of Lebesgue integral.
W2: Review of conditional expectation.
W3: Continuous time martingales.
W4: Backward martingale and Lévy's downward theorem.
W5: Review of Brownian motion.
W6: Review of Riemann integral.
W7: Construction of stochastic integral.
W8: Properties of the stochastic integral.
W9: Itô calculus.
W10: Stochastic differential equations.
W11: Ornstein-Ulhenbeck process, Black-Scholes model in finance.
W12: Simulation.
W13-W14: Change of measure, Girsanov theorem.

Homework

Homework will be assigned on a regular basis, but will not be graded

Grading System

∘ 3 Take Home Exams (dates are tentative)
  → Wednesday, September 27 (Due On Wednesday, October 4)
  → Wednesday, November 1 (Due On Wednesday, November 8)
  → Friday, December 1 (Due On Friday, December 8)

Grading (100 points)		Scale	
Attendance/Participation	**25pts**	A = 90+	B− = 75-79
Take Home Exam 1	**25pts**	A− = 87-89	C+ = 70-74
Take Home Exam 2	**25pts**	B+ = 83-86	C = 65-69
Take Home Exam 3	**25pts**	B = 80-82	C− = 60-64

Course Policies:

Absence from Exams

Missing an exam is permitted **ONLY** for the most compelling reasons. Please notify me **IN ADVANCE**, if possible, if an exam is to be missed. Otherwise you will be given a 0.

Class Attendance

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:

> https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Honor Code

UF students are bound by The Honor Pledge which states: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code". On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code, which can be found at:

https://sccr.dso.ufl.edu/process/student-conduct-code/

specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor in this class.

Students with Disabilities

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center (DRC) by visiting

https://disability.ufl.edu/students/get-started/

It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Students' Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at

https://gatorevals.aa.ufl.edu/students/

Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via

https://ufl.bluera.com/ufl/

Summaries of course evaluation results are available to students at

https://gatorevals.aa.ufl.edu/public-results/

Diversity, Equity, and Inclusion Statements

The Mathematics Department at the University of Florida is committed to diversity and inclusion of all students. We acknowledge, respect, and value the diverse nature, background and perspective of students and believe that it furthers academic achievements.

It is our intent to present materials and activities that are respectful of diversity: race, color, creed, gender, gender identity, sexual orientation, age, religious status, national origin, ethnicity, disability, socioeconomic status, and any other distinguishing qualities.