Syllabus
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MAP 4102 – Probability Theory and Stochastic Processes

Time and Location: M-W-F, Period 7 (1:55 PM – 2:45 PM), MAEB 0229
Instructor: Arnaud Marsiglietti
Office: 410 Little Hall
E-mail: a.marsiglietti@ufl.edu
Course Website: https://people.clas.ufl.edu/amarsiglietti/courses/spring24-2/

⟶ The course is on **Canvas**

Office Hours
Monday 10am – 10:50am, Wednesday 10am – 10:50am, or by appointment

Textbook
The following textbook is suggested but not required:

- Sheldon M. Ross, Introduction to Probability Models, 11th Edition

  ⟶ The course will cover Chapters 1, 2, 3, 4, 5, 10, and 11.

  (PDF available online)

Prerequisites
STA 4321 — Introduction to Probability, or equivalent

Scope of the Course
The course is an introduction to probability theory and stochastic processes. Many realistic models of real-world phenomena must take into account the possibility of randomness. Students will learn the language of probability and will gain experience in solving problems from pure and applied sciences using probabilistic arguments. Although the course provides mathematical background and an abstract framework is presented, the course will not discuss measure theory.

The course helps in the pursuit of careers in statistics, engineering, and computer science, and is strongly recommended for students who want to pursue graduate studies in mathematics, especially in the field of probability theory.

Topics Covered
Topics include: Probability Space, Discrete and Continuous Random Variables, Conditional Probability, Independence, Markov chains, Poisson Process, Brownian Motion, Gaussian Process, and Simulation.

Weekly Schedule
W1: Language of probability, Sample space, Events, Random variables, Expectation
W2: Conditional probability, Bayes' formula, Independence, Application: the Monty Hall paradox
W3: Markov chains, Transition function and transition matrix
W4: Chapman-Kolmogorov equations, Markov property
W5: First passage time
W6: Classification of states
W7: Invariant measures
W8: Random walk on $\mathbb{Z}$
W9: Borel-Cantelli Lemmas, Application: the monkey typewriter paradox
W10: Poisson process, Counting process
W11: Inter-arrivals and waiting times, Application: the bus waiting paradox
W12: Brownian motion, Hitting times
W13: Gaussian process
W14: Simulation

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

Grading System
(Dates are tentative)

- 2 Quizzes
  → Wednesday, January 31
  → Wednesday, April 10

- 1 Take Home Exam
  → Wednesday, March 20 (Due On Wednesday, March 27)

- 1 Midterm Exam
  → Wednesday, February 28

- **Final Exam Date**
  → Wednesday, May 1 (5/01/2024) at 10:00 AM – 12:00 PM

Grading (100 points)		**Scale**			
Quizzes	15pts each (total = **30pts**)	A	= 90+	C+	= 73+
Take Home Exam	**15pts**	A−	= 87+	C	= 70+
Midterm Exam	**25pts**	B+	= 83+	C−	= 67+
Final Exam	**30pts**	B	= 80+	D+	= 63+
		B−	= 77+	D	= 60+

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.