

## Syllabus

### MAP 4102 – Probability Theory and Stochastic Processes

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**Time and Location:** M-W-F, Period 7 (1:55 PM – 2:45 PM), FLI 111

**Instructor:** Arnaud Marsiglietti

**Office:** 410 Little Hall

**E-mail:** a.marsiglietti@ufl.edu

**Phone:** 352-294-2310

**Course Website:** <https://people.clas.ufl.edu/amarsiglietti/courses/spring23-2/>

→ The course is on **Canvas**

#### Office Hours

Monday 10:30am – 11:20am, Wednesday 10:30am – 11:20am, or by appointment

#### Textbook

The following textbook is suggested:

- 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, February 1

  - Wednesday, April 12

- 1 Take Home Exam

  - Wednesday, March 22 (Due On Wednesday, March 29)

- 1 Midterm Exam

  - Wednesday, March 1

- **Final Exam Date**

  - Thursday, May 4 (5/04/2023) at 3:00 PM – 5:00 PM

### Grading (100 points)

### Scale

Quizzes	15pts each (total = <b>30pts</b> )	A = 90+	C+ = 73-76
Take Home Exam	<b>15pts</b>	A- = 87-89	C = 70-72
Midterm Exam	<b>25pts</b>	B+ = 83-86	C- = 67-69
Final Exam	<b>30pts</b>	B = 80-82	D+ = 63-66
		B- = 77-79	D = 60-62

## **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.