

Syllabus

MAP 6472 – Probability and Potential Theory I

Time and Location: M-W-F, Period 5 (11:45 AM - 12:35 PM), LIT 221

Instructor: Arnaud Marsiglietti

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Course website: <https://people.clas.ufl.edu/amarsiglietti/courses/course-fall21-1/>

Office Hours

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

Textbook

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

- R. Durrett, Probability: Theory and Examples, 5th edition (**PDF available on Prof. Durrett's website**).
- D. Khoshnevisan, Probability, Graduate studies in mathematics vol. 80, 2007

Prerequisites

- Modern Analysis (MAA 5228 – MAA 5229)
- Probability Theory and Stochastic Processes (MAP 4102) or equivalent

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: Basic notions of probability theory, Random variables, Independence, Characteristic function, Modes of convergence, Laws of Large Numbers, Central Limit Theorem

Weekly Schedule

- W1: Basics of probability theory (probability space, construction of Lebesgue integral).
W2: Random variables, distribution of random variables, transfer lemma.
W3: Basic discrete and continuous distributions, moment generating function.
W4: Functions of random variables.
W5: Conditional probability and independence.
W6: Modes of Convergence: Almost sure convergence, convergence in probability, convergence in L^p .
W7: Modes of Convergence (*cont.*): Convergence in distribution, relationships between modes of convergence.
W8: Tightness, Helly and Prohorov theorems.
W9: Law of Large Numbers: Weak LLN, strong LLN.
W10: Characteristic function, Central Limit Theorem.
W11: Levy's continuity theorem.
W12: Lyapunov and Linderberg conditions.
W13: Berry-Esseen CLT, confidence interval.
W14: Simulation.

Homework

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

Grading System

- 2 Take Home Exams (dates are tentative)
 - Friday, September 17 (Due On Friday, September 24)
 - Wednesday, November 10 (Due On Wednesday, November 17)
- 1 Midterm Exam (dates are tentative)
 - Wednesday, October 13
- **Final Exam Date**
 - Wednesday, December 15 (12/15/2021) at 3:00 PM – 5:00 PM

Grading (100 points)

Scale

Attendance/Participation	10pts	A = 90+	B- = 77+
Take Home Exam	25pts each (total = 50pts)	A- = 87+	C+ = 73+
Midterm Exam	20pts	B+ = 83+	C = 70+
Final Exam	20pts	B = 80+	C- = 67+

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.