

Syllabus: MAP 6472 Probability and Potential Theory 1 **(Fall 2024)**

Instructor: Dr. Yeor Hafuta

Office: LIT 411

yeor.hafuta@ufl.edu

Time and location: MWF 11:35-12:25 AM, LIT 221

Office hours (tentative): MWF 10-11 am or by appointment

Textbook

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

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

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 Basics 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 variable, distribution of random variable, 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: Convergence in distribution, relationships between modes of convergence.

W8: Tightness, Helly and Prohorov theorems.

W9: Law of Large Numbers: weak LLN, strong LLN.

W10: Central Limit Theorem: characteristic function.

W11: Levy's continuity theorem.

W12: Lyapunov and Linderberg conditions.

W13: Berry-Esseen CLT, confidence interval.

W14: Simulation.

Homework

Some Homework will be assigned, but will not be graded

Grading System

There will be two take home exams and a final exam on the last day of class. The tentative dates for the take home exam are September 30 and October 7. Each exam is worth 30 points. Attendance is worth 10 points.

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.u.edu/UGRD/academic-regulations/attendance-policies/>

Students with Disabilities

Students with disabilities requesting accommodations should first register with the Disability Resource Center:

352-392-8565, <https://disability.uf.edu/>

by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure 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.u.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://uf.bluera.com/uf/>

Summaries of course evaluation results are available to students at

<https://gatorevals.aa.u.edu/public-results/>