MATH 418 Probability / MATH 544 Probability I **2024W Term 1, Sep-Dec, 2024**

Credit value: 3

Instructor: Dr. G. Slade, MATX 1211, 604-822-3781, slade@math.ubc.ca

Teaching Assistant: The TA for the course is Yuliang Shi. For concerns about marking please send email to yuliang@math.ubc.ca or attend his office hour.

Office hours: See Canvas for details.

Course webpage: Course materials will be found on Canvas: https://canvas.ubc.ca/courses/147589

Piazza: There is a link to Piazza on Canvas. Please use Piazza for questions that arise in your learning and for questions about all issues related to the course. For private matters, contact Dr. Slade in person or by email.

Prerequisites: The following are essential:
For MATH 418: A mark of 68% or higher in MATH 321.
For MATH 544: A solid background in undergraduate analysis, equivalent to Chapters 1–8 of Rudin's *Principles of Mathematical Analysis*.

Text: J.S. Rosenthal, A First Look at Rigorous Probability Theory, 2nd ed., World Scientific (2006).
A solutions manual for the even-numbered exercises is available at: http://www.probability.ca/jeff/grprobbook.html.
Corrections to the text are available at: http://www.probability.ca/jeff/ftpdir/errata2.pdf.

Other useful references: P. Billingsley, Probability and Measure, 3rd ed., Wiley, (1995).
L. Breiman, Probability, SIAM, (1992).
K.L. Chung, A Course in Probability Theory, 2nd ed., Academic Press, (1974).
R. Durrett, Probability: Theory and Examples, 5th ed., Cambridge University Press, (2019). Available online at: https://services.math.duke.edu/~rtd/PTE/PTE5_011119.pdf.

Outline: The course provides a mathematically rigorous introduction to probability theory based on measure theory. Prior knowledge of measure theory (or taking MATH 420/507 concurrently) is useful but not essential; the necessary measure theory will be developed as part of the course. Topics will be selected primarily from the first 13 chapters of Rosenthal's text. They include:

1. Probability spaces, random variables, independence, Borel–Cantelli lemma, Kolmogorov 0-1 law.
2. Expectation.
3. Modes of convergence, laws of large numbers.
4. Characteristic functions, weak convergence, central limit theorem.

A list of relevant sections from the text can be found on Canvas.

Evaluation: There will be nine assignments, a midterm test, and a final exam.

Homework: Nine assignments will be given and marked for credit. Assignments are to be submitted on Canvas by 09:59 a.m. on the due date. This is a strict deadline: *no late assignments will be accepted.* The assignment schedule is as follows:

Assignment given	Assignment due
September 6	September 13
September 13	September 20
September 20	September 27
September 27	October 11
October 18	October 25
October 25	November 1
November 1	November 8
November 8	November 22
November 22	November 29

Test: There will be one 50-minute test held in person during the regularly scheduled class hour on:
Friday, October 18.

Final exam: There will be a final examination during the December examination period.

Final mark: The final mark will be calculated (subject to possible scaling) as follows:
Homework: 35% (best eight assignments)
Test: 25%
Final exam: 40%

Course policies: You are encouraged to discuss assignment problems with each other; it is a good way to learn. However, the solutions that you write up should be in your own words. Never copy your solutions from each other or from any other source. If you find a solution on the internet, a book, or elsewhere, cite your source.

Missing an assessment without a valid reason results in a mark of zero. Missing an assessment for a valid reason normally results in the weight of that assessment being transferred to the final exam. Examples of valid reasons include illness and travel to play a scheduled game for a varsity team. Examples of reasons that are not valid include conflicts with personal travel schedules or conflicts with work schedules. Any student who misses an assessment is to present to their instructor the Department of Mathematics self-declaration form for reporting a missed assessment within 72 hours of the due date. The form is here: `https://www.math.ubc.ca/Ugrad/ugradForm/Student_Declaration_Academic_Concession_MATH.pdf`. This policy conforms with the UBC Vancouver Senate's Academic Concession Policy V-135 and students are advised to read this policy carefully: `http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,329,0,0`.

General syllabus information: Further information concerning Departmental and University policies can be found here: `https://www.math.ubc.ca/general-syllabus-information`. Please familiarise yourself with these policies.

Updated August 22, 2024.