MATH 418 Probability / MATH 544 Probability I **2020W Term 1, Sep-Dec, 2020**

Credit value: 3

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

Office hours: Indicated on Canvas.

Course webpage: Course materials will be found on Canvas `https://canvas.ubc.ca/courses/55327`

Lectures on Zoom: Lectures will be given on Zoom (click on the Zoom link in Canvas) at the scheduled hours MWF 10:00-10:50. You are strongly encouraged to attend class at those times, and to take notes as you would do in a blackboard lecture. The lectures will be recorded and available in Canvas.

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.

Prerequisites: For MATH 418: A score 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, expectation, modes of convergence, independence, laws of large numbers, Borel–Cantelli lemma, Kolmogorov 0-1 law.
2. Characteristic functions, weak convergence, Central Limit Theorem.
3. Random walks.

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 11	September 18
September 18	September 25
September 25	October 2
October 2	October 9
October 16	October 23
October 23	October 30
October 30	November 6
November 6	November 20
November 20	November 27

Test: There will be one 50-minute test held during the regularly scheduled class hour on:

Friday, October 16.

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: 40% (best eight assignments)
Test: 25%
Final exam: 35%

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. If you find a solution on the internet, a book, or elsewhere, cite your source.

The tests and exam will be invigilated via Zoom and it is essential that every student have a webcam. Without a webcam, it will not be possible to complete the course.

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`.

University policies: UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available on the UBC Senate website `https://senate.ubc.ca/policies-resources-support-student-success`.

Updated September 3, 2020.