CMPT 210 - D100 Probability and Computing

Instructor(s): Andrei Bulatov

Calendar Objective/Description:
Probability and Computing

Instructor's Objectives:
The course introduces the foundational concepts in probability as required by many modern applications in computing. It will give the students in Computing Science experience in (1) understanding the combinatorial nature of computational problems, and (2) working knowledge of probability theory, with applications to computing (algorithms, data science, etc).

Prerequisites:
see go.sfu.ca

Topics:
- Combinatorics: Permutations, Binomial coefficients, Inclusion-Exclusion
- Basic probability theory: Random variables, Expectation, Linearity of Expectation, Variance
- Discrete distributions: Binomial and Geometric
- Joint distributions, Independence, Conditional probability, Bayes' Theorem
- Markov’s Inequality, Chebyshev’s Inequality, Chernoff Bound
- Normal Distribution, Central Limit Theorem (introduction)
- Applications: Verifying matrix multiplication, Approximating pi, Testing primality
  - Applications: Karger’s min-cut algorithm / Hashing
  - Applications: Markov Chains / PageRank

Grading:
There will be multiple assignments, midterms, and a final exam. The details will be discussed in the first week of classes.
Students must attain an overall passing grade on the weighted average of exams in the course in order to obtain a clear pass (C- or better).

Reference Books:
Introduction to Probability and Statistics for Engineers and Scientists, Sixth Edition, Sheldon M. Ross, 978-0128243466

Academic Honesty Statement:
Academic honesty plays a key role in our efforts to maintain a high standard of academic excellence and integrity. Students are advised that ALL acts of intellectual dishonesty will be handled in accordance with the SFU Academic Honesty and Student Conduct Policies (http://www.sfu.ca/policies/gazette/student.html).