Carleton University
School of Mathematics and Statistics
Discrete Structures and Applications
Math3825A/Math3855A/Comp3805A, Fall 2020

Instructor: Dr. Steven Wang
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Day and time of course: Tuesday, Thursday 13:05 - 14:25.
Office hours: 14:30 -15:30, Tuesday, Thursday

Textbook: *"Discrete Mathematics"* by Norman L. Biggs (Oxford Science Publications, 2nd edition).
Prerequisites: One of MATH2108 or MATH3101.

Course Objective: The purpose of this course is to introduce students to the methods and techniques of discrete mathematics and applications. We will study 4 major topics: Enumeration (elementary methods, inclusion and exclusion, and etc); Generating functions and applications (recurrence relations, partitions of positive integers, etc); Graph theory and algorithms (connectivity, planarity, Hamiltonian cycle and Eulerian walk, etc); Error-correcting codes.

Evaluation: Tests (30%), Tutorials (5%), Assignments (30%), and Final Examination (35%).

Tutorials: Tuesday 11:35-12:25. All tutorials in the school begin on Friday Sep 18. Tutorials are a very important part of this course. In each tutorial you will be given several questions to work on. You are grouped in a team of four or five students. You may have discussions with the TA and/or your study partners about the tutorial questions. At the end, each team submits one set of answer to the TA. Each member will have the same mark. TA's name and office hour will be announced later.

Tests: There will be three 50 minutes tests held on tutorials. Each test

contributes 10 marks. TESTS DATE: Oct. 6, Nov. 3, and Nov. 24.

Assignments: Two assignments (15 marks each). Due dates: Oct. 13 and Nov. 24.

Final Examination: This is a three hour closed-book online exam scheduled by the University and will take place sometime during the examination period.

Academic Accommodation Academic accommodation refers to educational practices, systems and support mechanisms designed to accommodate diversity and difference. The purpose of accommodation is to enable students to perform the essential requirements of their academic programs. At no time does academic accommodation undermine or compromise the learning objectives that are established by the academic authorities of the University.

Carleton is committed to providing academic accessibility for all individuals. Please review the processes for academic accommodation requests. Special arrangements include pregnancy obligation, religious obligation, students with disabilities, survivors of sexual violence, and accomodation for student activities. See https://students.carleton.ca/course-outline for more detail.

Academic accommodation related to COVID-19: Students should complete the self-declaration form available on the Registrars Office website to request academic accommodation for missed course work including exams and assignments.

Tentative lecture schedule

Week	Dates	Sections	Topics
1	Sep. 9-11	6.2; 6.4; 10.1-10.2	Introduction; pigeonhole and addition principle; counting sets of pairs;
2	Sep. 14-18	10.3 -10.6	Euler's function; functions, words and selections; ordered selections without repetitions; permutations
3	Sep. 21-25	11.1-11.4	binomial numbers; unordered selections with repetitions; binomial theorem;
4	Sep. 28 - Oct. 2	11.5-11.7; 12.1 - 12.2	sieve principal; designs and t-designs; partitions of sets;
5	Oct. 5-9	12.3- 12. 4; 25.1	Multinomial numbers; partitions of a positive integer; **Test #1 (Oct. 6)**
6	Oct. 12-16	25.1 - 25.3	Power series and properties; partial fractions; binomial theorem for negative exponents **Assign # 1 due on Oct. 13**
7	Oct. 19-23	25.4 - 25.6	Generating functions; homogenous and non-homogenous linear recurrences;
8	Oct. 26-30		Reading week, no class
9	Nov. 2-6	26.1-26.2 26.3-26.4;	Partitions and diagrams; conjugate partitions; partitions and generating functions; restricted partitions **Test # 2 (Nov. 3)**
10	Nov. 9-13	15.1-15.6	Graphs; isomorphism; valency; paths and cycles; trees; vertex colouring;
11	Nov. 16-20	Course notes;	Planar graphs; Euler's theorem;
12	Nov 23-27	24.1 -24.2	Words, codes and errors; linear codes **Test # 3 (Nov. 24)** **Assign # 2 due on Nov. 24**
13	Nov. 30- Dec. 4	24.3 - 24.4	Construction and error correction;
14	Dec. 7-11	27.1-6	Symmetry and counting; course review