**MAT 344S Introduction to Combinatorics**

**Instructor:** Pramath Sastry (BA6204; pramath@math.toronto.edu)

**Textbook:** Alan Tucker, *Applied Combinatorics*, John Wiley and Sons, Sixth Edition.

**Office Hours:** Fridays 14:00–16:00.

**TAs:**
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**TA Office hours:** TBA

**Tutorials** will start from Jan 18.

**Marking Scheme:** There will be one midterm exam, in class on **Tuesday February 27**. It will be of two hours duration. The midterm will count as 40 percent of the course mark. There will be five quizzes based on suggested lists of homework problems. Each quiz grade will contribute 4 percent of the course mark (so the total for all five quizzes will be counted as 20 percent of the course mark). Each quiz will consist of of 1–3 homework problems from the corresponding homework assignment. Bear in mind that you are expected to solve homework problems at home. You will be given enough time to write down solutions of homework problems that you already know, but not enough time solve these problems in class. The final exam will count as 40 percent of the final mark.
ALL QUZZES, THE MIDTERM AND THE FINAL WILL BE "NO AIDS ALLOWED".

**Dates of quizzes:** All quizzes will be written during tutorials. The first quiz will take place on February 8, and the second on Febrruary 15. The dates of the remaining quizzes will be announced later.

**Syllabus:** Approximately half this course will be devoted to graph theory, and another half to combinatorics. I plan to cover material that can be found in the first eight chapters of the textbook.
The covered topics will include: Basic definitions of graph theory, isomorphisms of graphs, planar graphs, Euler cycles, Hamilton circuits, graph colouring, colouring theorems, trees and their properties, network flows, Max flow-Min cut theorem, matchings, Hall's marriage theorem, general

counting methods for arrangements and selections, generating functions, recurrent relations, inclusion-exclusion formula and applications.

**Homeworks:** All homework problems are from "Applied Combinatorics" by Alan Tucker, Sixth edition. Solutions to homework problems will not be graded. The first two homework assignments are given below. The remaining will be posted later.

**Homework 1:** Ch. 1, Section 1.1: 1, 2, 3, 4, 5(a), 6, 7, 22, 25, 26, 28. Section 1.2: 1, 2, 3(a), 5, 14. Section 1.3: 1, 2 (a), (b), (c), 3, 4, 6, 9, 11, 15.

**Homework 2:** Ch. 1 Section 1.4: 3 (a), (b), (d), (e), (g), (j), (l), 5(a), 8, 17, 18(a), 19. Ch. 2, Section 2.1: 1 (a), 2 (a), 4, 12. Section 2.2: 1, 2, 4 (a), (p). Section 2.3: 1 (b), (c), (e), 12, 13, 15. Section 2.4: 1, 2, 3, 4. Ch. 3, Section 3.1: 1, 2, 3, 4, 6, 14, 16.