MATH 239: Introduction to Combinatorics

Spring 2014 Course Outline

Overview. The first portion of the course is Combinatorial Analysis. We introduce generating series and apply them to enumerate compositions of an integer and $\{0,1\}$-strings. We then consider the solution to recurrence equations.

The second portion of the course is Graph Theory. We introduce graphs, isomorphisms, paths, cycles, trees, and connectivity, and continue with planarity, colouring, bipartite matching, and applications.

Classes, tutorials and instructors. To send an email, add @uwaterloo.ca.

Sec	Lectures	Tutorials	Instructor	Office	Phone	Email
1	MWF 11:30 MC 4045	Th 2:30 MC 2054	P. Nelson			
2	MWF 1:30 MC 4045	F 3:30 MC 2017	B. Richter	MC 5033A	x84625	brichter
3	MWF 11:30 MC 2054	Th 2:30 MC 2017	M. Pei	MC 6492	x35587	mpei
4	MWF 2:30 RCH 302	F 8:30 AL 113	P. Nelson			

Schedule. This is a tentative schedule with topics that we plan to cover.

Week	Dates	Topics	Assessments
1	May 5, 7, 9	1.1-1.3 Counting, bijections, combinatorial proofs	
2	May 12, 14, 16	1.4-1.5 Generating series, formal power series, recurrences	A0 due May 12
3	May 21, 23	1.6, 2.1 Sum and product lemmas, integer compositions	A1 due May 20
4	May 26, 28, 30	2.1, 2.3-2.7 Integer compositions, binary strings	A2 due May 26
5	June 2, 4, 6	2.8, 3.1-3.2 Recursion of strings, solving recurrences	A3 due June 2
6	June 9, 11, 13	3.3, 4.1-4.3 Nonhomogeneous recurrences, graphs	A4 due June 9
7	June 16, 18, 20	4.4, 4.6-4.8 Bipartite graphs, walks, paths, cycles, connectedness	A5 due June 16
8	June 23, 25, 27	4.9, 5.1 Eulerian circuits, bridges, trees	A6 due June 23
9	July 2, 4	5.2-5.3 Spanning trees, bipartite characterization	Midterm July 3
10	July 7, 9, 11	7.1-7.2 Minimum spanning trees, planarity, Euler's formula	A7 due July 7
11	July 14, 16, 18	7.4-7.7 Platonic solids, Kuratowski's theorem, colouring	A8 due July 14
12	July 21, 23, 25	7.8, 8.1-8.3 Dual graphs, matchings, König's theorem	A9 due July 21
13	July 28, 30	8.4-8.6 Hall's theorem	A10 due July 28

Online. No printed material will be distributed in class. Go to the University of Waterloo's LEARN website learn.uwaterloo.ca to find news, assignments, solutions and information about this course.

Textbook. *Introduction to Combinatorics: Course Notes for Math 239*, which is available online. Printed copies are also available from Campus Copy at MC2018.

Additional materials not covered in the course notes will also be published online.

Grades. Assignments 10%, midterm 30%, final exam 60%

Assignments. There will be 11 graded homework assignments in all, including a bonus assignment 0 due on the second week. The assignments will be posted online and are due on Mondays at 3:00PM in the dropboxes outside MC 4066. No late assignments will be accepted. Assignments handed into the wrong dropboxes will receive no credit. The instructors will not grant any extension to the due date on an individual basis regardless of circumstances.

You may ask your instructors or TAs for help during their office hours or tutorial centre hours. You may also discuss the assignments in small groups. However, **you must write up the solutions on your own**. This means that you may not write up your solutions while you are with a group, and you should not consult any notes you have taken during your group discussions while writing up your solutions.

Exams. A midterm will be held on Thursday July 3, 4:30-6:20PM. A final exam will be scheduled later. No calculators are allowed during exams. Missed exams will count as 0 unless suitable medical documentation is provided. There will not be any make-up exams.

Unclaimed materials. Assignments and midterms that are not claimed will be destroyed after the final exam.

Tutorials. Graduate student TAs will be responsible for the tutorials. They will present examples, answer student questions, and return marked assignments. They will *not* present solutions to assignment problems before the due date. However, they can do related examples, and can also answer some specific questions related to an assignment problem (without giving away the solution) provided the problem has been seriously attempted. Tutorial problems will be posted online ahead of time. The tutorials will begin on the second week.

Teaching assistants.

Section 1:
Section 2:
Section 3:
Section 4:

Tutorial centre. Graduate student TAs will be in the Tutorial Centre, MC4067. Schedule for this will be posted online.

Instructor office hours. Schedule for instructor office hours will be posted online.

INC policy. In case of serious illness during the final exam, you need to be in reasonable standing before an instructor can grant a grade of INC. To be in reasonable standing means having passing grades for both the assignments and the midterm exam.

Academic Integrity. In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. For more information, check
www.uwaterloo.ca/academicintegrity.

Grievance. A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4,
http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm.
When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline. A student is expected to know what constitutes academic integrity to avoid committing academic offenses and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the undergraduate associate dean. For information on categories of offenses and types of penalties, students should refer to Policy 71, Student Discipline,
http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm.
For typical penalties check Guidelines for the Assessment of Penalties,
http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm.

Appeals. A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals,
http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm.

Students with disabilities. The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.