MATH 239: Introduction to Combinatorics

Spring 2012 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 (MWF)	Tutorials	Instructor	Office (Phone)	Email
1	9:30-10:20 MC2054	W 2:30-3:20 MC4020	M. Pei	MC5039 (35598)	mpei
2	12:30-1:20 MC1085	W 3:30-4:20 MC4020	J. Koenemann	MC5174 (32144)	jochen
3	1:30-2:20 MC1085	W 4:30-5:20 MC4020	M. Pei	MC5039 (35598)	mpei
4	10:30-11:20 DC1350	M 8:30-9:20 DC1351	B. Guenin	MC6056 (33641)	bguenin

For lectures on May 28 and 30 only, the location will be changed for sections 1-3 as follows:

Sec 1: DC 1350. Sec 2: M3 1006. Sec 3: AL 116.

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

Week	Dates	Topics	Assignments
1	May 2, 4	1.1-1.3 Combinatorial proofs	
2	May 7, 9, 11	1.3-1.6 Generating series, sum and product lemmas	A1 due May 11
3	May 14, 16, 18	2.1 Compositions, recurrences	A2 due May 18
4	May 22, 23, 25	2.3-2.7 Binary strings	A3 due May 25
5	May 28, 30, June 1	2.8, 3.1-3.3 Recursion of strings, solving recurrences	A4 due June 1
6	June 4, 6, 8	3.4, 4.1-4.3 Asymptotics, graphs, isomorphisms, degrees	A5 due June 8
7	June 11, 13, 15	4.4, 4.6, 4.8 Bipartite graphs, paths, cycles, connectedness	A6 due June 15
8	June 18, 20, 22	4.9, 5.1 Bridges, Eulerian circuits, trees	A7 due June 22
9	June 25, 27, 29	5.2-5.3 Bipartite characterization, minimum spanning trees	Midterm June 26
10	July 4, 6	7.1-7.2 Planarity, Euler's formula	A8 due July 6
11	July 9, 11, 13	7.4-7.7 Platonic solids, Kuratowski's theorem, colouring	A9 due July 13
12	July 16, 18, 20	8.1-8.3 Matchings, König's theorem	A10 due July 20
13	July 23, 25	8.4-8.6 Hall's theorem	

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 35%, final exam 55%

Assignments. There will be ten graded homework assignments in all. They will be posted online and are due on Fridays at 9:29AM in the dropboxes outside MC4066. No late assignments will be accepted. Assignments handed into the wrong dropboxes will receive no credit. The lowest assignment mark will not be counted in your overall grade. The instructors will not grant any extension to the due date on an individual basis regardless of circumstances.

Exams. A midterm will be held on Tuesday June 26th, 4:30-6:30PM. 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.

Teaching assistants.

Section 1: Fidel Barrera-Cruz fbarrera@uwaterloo.ca
Section 2: David Qian dkqian@uwaterloo.ca
Section 3: Menghong Sun m34sun@uwaterloo.ca
Section 4: Brandon Weir bweir@uwaterloo.ca

Tutorials. Graduate student TAs will be responsible for the tutorials. They will present examples, answer student questions, and return marked assignments (except section 4, which will be returned in class). 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.

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.

Question and answer forum. Students are encouraged to help each other understand assignment questions and course materials using the forum at piazza.com. Guidelines for usage and details about access will be provided early in the term.

INC policy. You need to be in reasonable standing before an instructor can grant a grade of INC. To be in reasonable standing means handing in at least 8 assignments, and passing the midterm.

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.