

MAT344 Fall 2021

Introduction to Combinatorics

University of Toronto

Course overview

course code	MAT344H1-F
webpage	https://www.math.toronto.edu/mayrand/mat344-fall-2021/
description	Basic counting principles, generating functions, permutations with restrictions. Fundamentals of graph theory with algorithms; applications (including network flows). Combinatorial structures including block designs and finite geometries.
prerequisites	MAT223H1/MATA23H3/MAT223H5/MAT240H1/MAT240H5 (i.e. Linear Algebra I or Algebra I)
textbook	We will use the free and online textbook <i>Applied Combinatorics</i> , by Mitchel T. Keller and William T. Trotter available at https://appliedcombinatorics.org/book/app-comb.html
course content	The plan is to cover the following sections of the textbook: 1, 2, 3, 4.1, 5.1–5.6, 7, 8, 9, 13
organization	Lectures and tutorials are in person. There are three hours of lectures and one hour of tutorial per week. Students are permitted to attend lectures and tutorials online for the first two weeks (September 13–23, 2021). During this time, lectures will be recorded on Zoom and students will receive a link from their official University of Toronto email address to watch remotely. The University of Toronto requires us to write: <i>Please note that due to the ongoing COVID-19 pandemic, the course delivery method may change after term has started and this may alter the course organization. Students are expected to check the course site for updates as the contents of this syllabus may change.</i>

technical requirement

In order to participate in this course, students will be required to have:

- Reliable internet access. It is recommended that students have a high speed broadband connection (LAN, Cable, or DSL) with a minimum download speed of 5 Mbps.
- A computer satisfying the minimum technical requirements:
<https://www.viceprovoststudents.utoronto.ca/covid-19/tech-requirements-online-learning/>

Other recommended items include headphones, microphone, webcam, and a tablet or printer.

If you are facing financial hardship, you are encouraged to contact your college or divisional registrar (<https://future.utoronto.ca/current-students/registrars/>) to apply for an emergency bursary.

Instructors

name	email	section	office hour (online on Zoom)
Shubhangi Saraf	shubhangi.saraf@utoronto.ca	LEC0101	Wednesday 15:30–16:30
Maxence Mayrand	mayrand@math.toronto.edu	LEC0201	Thursday 11:00–12:00

Email is the preferred method of communication.

Students will receive Zoom links for the office hours from their UofT email address.

Lectures

LEC0101 – Shubhangi Saraf

time	Monday 9:00–11:00 Wednesday 9:00–10:00
first lecture	Monday, September 13, 2021
last lecture	Thursday, December 9, 2021 (make-up day)
room	MP 102

LEC0201 – Maxence Mayrand

time	Monday 16:00–18:00 Tuesday 17:00–18:00
first lecture	Monday, September 13, 2021
last lecture	Thursday, December 9, 2021 (make-up day)
room	GB 221

Teaching assistants

name	email	tutorials	office hour
Lemonte Alie-Lamarche	lemonte@math.utoronto.ca	TUT5301	Wed 13:00–13:30
Christopher Kaumeyer	chris.kaumeyer@mail.utoronto.ca	TUT0101	Thu 12:30–13:00
Feodor Kogan	feodor.kogan@mail.utoronto.ca	TUT5201	Fri 13:00–13:30
Theodore Lindgreen	theodore.lindgreen@mail.utoronto.ca	TUT0201 TUT5302	Wed 15:00–15:30
Charlie Wu	charliec.wu@mail.utoronto.ca	TUT5101	Wed 13:30–14:00
Fengkai Ye	fengkai.ye@mail.utoronto.ca	TUT0301	Thu 14:00–14:30

Tutorials

sections	time	room	TA
TUT0101	Monday 13:00–14:00	BA 1220	Christopher Kaumeyer
TUT0201	Tuesday 13:00–14:00	SS 1086	Theodore Lindgreen
TUT0301	Tuesday 16:00–17:00	RW 142	Fengkai Ye
TUT5101	Monday 17:00–18:00	BA 2195	Charlie Wu
TUT5201	Monday 18:00–19:00	MP 134	Feodor Kogan
TUT5301	Tuesday 17:00–18:00	GB 220	Lemonte Alie-Lamarche
TUT5302	Tuesday 17:00–18:00	GB 120	Theodore Lindgreen

During the tutorials, TAs will explain solutions to some exercises, answer students questions, and review the relevant course material.

Tutorials start in the week Sep 20–Sep 24 and continue every week until the week Dec 6–Dec 10, except for the week of the Thanksgiving (Oct 11–Oct 17) and the reading week (Nov 08–Nov 14).

Tentative schedule

week	textbook section	evaluation	note
Sep 13–Sep 19	2		
Sep 20–Sep 26	2		first tutorial
Sep 27–Oct 03	3	PS1 due Sunday	
Oct 04–Oct 10	4.1, 5		
Oct 11–Oct 17	5	PS2 due Sunday	no lecture on Monday and no tutorial all week
Oct 18–Oct 24	5		
Oct 25–Oct 31	7	midterm on Monday	
Nov 01–Nov 07	8	PS3 due Sunday	
Nov 08–Nov 14			reading week: no lecture and no tutorial
Nov 15–Nov 21	9	PS4 due Sunday	
Nov 22–Nov 28	9		
Nov 29–Dec 05	13	PS5 due Sunday	
Dec 06–Dec 09	13		last tutorial; make-up class on Thursday
		final exam	final assessment period (Dec 10–Dec 21)

Marking scheme

problem sets	40% (best 4 out of 5 problem sets)
midterm exam	25%
final exam	35%

Problem sets

weight	40%
quantity	5
marking scheme	Your problem set with the lowest grade will be dropped, so only your best 4 will count. Each will have an equal weight of 10% in your final grade.
due dates	Problem sets are due on Sundays at 11:59PM (one minute before midnight) and are released one week before. The due dates are: PS1 due on Sunday October 3 at 11:59PM PS2 due on Sunday October 17 at 11:59PM PS3 due on Sunday November 7 at 11:59PM PS4 due on Sunday November 21 at 11:59PM PS5 due on Sunday December 5 at 11:59PM
late problem sets	will be marked 0%.
submission	The problem sets will be sent to you via Crowdmark . You will be asked to submit your solutions electronically on Crowdmark. No paper copy will be accepted. The easiest way to upload your problem set is to use a scanner, but if you don't have access to one, you can also use a scanner app on your phone. Make sure that your work is legible before submitting it; otherwise, it will not be accepted.
solutions	Written solutions are not provided, but some of them will be discussed in tutorials. You are encouraged to consult with TAs, your fellow students, and the instructors to identify shortcomings in your grasp of the material.
plagiarism	Your submissions must be your own work, written independently, in your own words. Otherwise, it will be considered an offence under the University of Toronto's Code of Behaviour on Academic Matters (see section B.I.) and serious sanctions will be applied.

Midterm exam

weight	25%
format	1 hour and 50 minutes, in person, during class time
date	Monday, October 25
rooms	TBA
missed midterm	There will be no make-up midterm exam. For students who missed the midterm exam because of illness or any other approved legitimate reason, its weight will be transferred to the final exam.

Final exam

weight	35%
format	3 hours, in person
date	TBA. The final exam will be held during the final assessment period in December 2021 and will be scheduled by the registrar.
content	All material from the first lecture to the last lecture.

Discussion forum

We will use [Piazza](#), which is a discussion forum where you can ask as many questions as you like, and will receive answers from other students, the TAs, or the instructors.

To join the forum, go to [piazza.com](#) and search for MAT344. You will also get an email invitation at the beginning of the course. Alternatively, you can sign up at this link:

<https://piazza.com/utoronto.ca/fall2021/mat344>

Course Policies

Policy on Missed Term Work

As flexibility for missed or late course assignments have been built into the marking scheme, late and missed assignments will not be accepted for any reason.

Please note that Verification of Illness forms (also known as a “doctor’s note”) are temporarily not required. Students who are absent from class for any reason (e.g., COVID, cold, flu and other illness or injury, family situation) and who require consideration for missed academic work should report their absence through the online absence declaration. The declaration is available on ACORN under the Profile and Settings menu.

If you miss a term test or the final assessment, then you must inform your course Instructor within 72 hours of the test. No exceptions. If your request is approved, you may receive an accommodation in the form of an oral exam, written make-up test, or a re-weighting of your assessments.

Turnitin

Turnitin may be used for detecting plagiarism in some of the written work submitted in this course. Normally, students will be required to submit written work to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University’s use of the Turnitin.com service are described on the Turnitin.com web site.

Email Policy

Should you have a question that is not answered on the course site (please check there first!) please note that all communications with the Course Instructor or TA's must be sent from your official utoronto email address, with the course number included in the subject line. If these instructions are not followed, your email may not be responded to.

Mathematics Department Policy on Wearing Masks in Class

Masks are an inexpensive and effective measure that limits the spread of COVID and will facilitate the return to normal life as quickly as possible. Failure to wear a mask properly entails unnecessary risks to public health and may disrupt learning by creating unwelcome distractions. It is the policy of the Math Department that in-person instruction cannot take place unless all students are wearing a mask that covers both mouth and nose, with exceptions only for students who have received documented exemptions.

As with other accommodations, any student who has an official exemption from wearing a mask is expected inform the instructor BEFORE classes begin by providing documentation.

This policy is in line with the University's mask requirement: https://www.provost.utoronto.ca/planning-policy/joint-provostial-and-human-resources-guideline-on-facemasks-at-the-university-of-toronto/#section_0

Institutional Policies and Support

Academic Integrity

All suspected cases of academic dishonesty will be investigated following procedures outlined in the [Code of Behaviour on Academic Matters](#). If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, please reach out to your Course Instructor. Note that you are expected to seek out additional information on academic integrity from me or from other institutional resources (for example, the University of Toronto website on [Academic Integrity](#)).

Copyright

This course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session.

Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation and are protected by copyright. Do not download, copy, or share any course or student materials or videos without the explicit permission of the instructor.

For questions about the recording and use of videos in which you appear, please contact your instructor.

Accessibility

The University provides academic accommodations for students with disabilities in accordance with the terms of the Ontario Human Rights Code. This occurs through a collaborative process that acknowledges a collective obligation to develop an accessible learning environment that both meets the needs of students and preserves the essential academic requirements of the University's courses and programs. Students with diverse learning styles and needs are welcome in this course. If you have a disability that may require accommodations, please feel free to approach your Course Instructor and/or the Accessibility Services office as soon as possible. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

Link to Accessibility Services website: <https://studentlife.utoronto.ca/departments/accessibility-services/>

Equity, Diversity and Inclusion The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.

Important Academic Dates & Deadlines

The academic dates include enrolment dates, drop deadlines, exam periods, petition deadlines and more.
<https://www.artsci.utoronto.ca/current/dates-deadlines/academic-dates>

Other Academic and Personal Supports

- Writing Centre <https://writing.utoronto.ca/writing-centres/arts-and-science/>
- U of T Libraries <https://onesearch.library.utoronto.ca/>
- Feeling Distressed? <https://studentlife.utoronto.ca/task/support-when-you-feel-distressed/>
- Academic Success Centre <https://studentlife.utoronto.ca/department/academic-success/>
- College/Faculty Registrars <https://future.utoronto.ca/current-students/registrars/>