

MATH 4310

General Information

Course Title: Combinatorics and Graph Theory

Course Description:

This course is an introduction to combinatorics with a focus that includes graph theory. Specific topics covered are enumerative combinatorics up to inclusion-exclusion, the theory of simple graphs, Latin squares and orthogonal Latin squares, and introductory coding theory. Instructors may continue to one or more of the Polya theory of counting, graph coloring and embedding, combinatorial design theory, Ramsey theory, or advanced topics in enumerative combinatorics.

Prerequisite(s): Math 2000 and 10 credits.

Credit Weight: 0.5

Academic Department: Mathematics & Statistics

Semester Offering: Winter 2023

Class Schedule and Location: Tuesdays and Thursdays 11:30-12:50, Macdonald Stewart Hall Room 129

Instructor Information

Instructor Name: Rajesh Pereira

Instructor Email: pereirar@uoguelph.ca

Office location and office hours: MacN 519, Office Hrs TBA

Course Resources

Required Text: Combinatorics: an upper-level introductory course in enumeration, graph theory, and design theory by Joy Morris. This is a free textbook available from the following website: <https://collection.bccampus.ca/textbooks/combinatorics/>

Grading Policies

Performance on the homework assignments is worth 80% of the grade, the score on the final project is worth 20% of the grade.

There will be 8 assignments due every week on Thursday in the Dropbox except for the first two weeks of classes and the Midterm break. The due dates are approximate and may change. Late assignments or projects not accompanied by a reasonable medical or personal excuse are docked 5% per day late and are not accepted more than a week late. The final project is due April 20, 2023.

Specific Learning Outcomes

- (1) Students in this course will learn the basic ideas, tools and techniques of combinatorics and graph theory.
- (2) Students will be introduced to the theory of enumeration, counting objects with specific properties. This will include basic material such as binomial and multinomial coefficients, recurrence relations, inclusion-exclusion, and generating functions.
- (3) Students will be introduced to and demonstrate proficiency with graph theory for simple graphs and digraphs including concepts such as Euler and Hamilton cycles, various constructions of graphs, and a variety of graph invariants.
- (4) Students will be introduced to and demonstrate proficiency with Latin squares, mutually orthogonal Latin squares, and combinatorial designs including the origin of these objects and their application as a foundation of experimental design.
- (5) Time permitting, students will be introduced to the theory and application of error correcting codes.

Email Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the Undergraduate Calendar for information on regulations and procedures for [Academic Consideration](#).

Drop Date

Courses that are one semester long must be dropped by the end of the last day of classes; two-semester courses must be dropped by the last day of classes in the second semester. The regulations and procedures for [Dropping Courses](#) are available in the Undergraduate Calendar.

Copies of Out-Of-Class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

More information: www.uoguelph.ca/sas

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it.

Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The [Academic Misconduct Policy](#) is outlined in the Undergraduate Calendar.

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The [Academic Calendars](#) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via Courselink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

COVID-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campus/how-u-of-g-is-preparing-for-your-safe-return/>
- <https://news.uoguelph.ca/return-to-campus/spaces/#ClassroomSpaces>

Please note, that these guidelines may be updated as required in response to evolving University, Public Health or government directives.