Western Science

Department of Mathematics

Math 2151A Course Outline

1. Course Information

Math 2151A, Discrete Structures for Engineers, Fall 2024
Lectures: Monday 12:30pm-1:30pm, Tuesday 8:30am-9:30am, and Wednesday 12:30pm-1:30pm at NCB-113.
Office hours: Office hours: Monday 4:30pm-5:30pm, Tuesday: 2pm-3pm, Wednesday: 2:30pm-3:30pm.. My office is Middlesex College 134. Also by appointment.

List of Prerequisites:
Computer Science 1026A/B or Engineering Science 1036A/B, in each case with at least 60%, and 1.0 courses with at least 60% in each from: Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B, Numerical and Mathematical Methods 1412A/B or the former Applied Mathematics 1412A/B, Numerical and Mathematical Methods 1414A/B or the former Applied Mathematics 1414A/B, or the former Applied Mathematics 1413.

Antirequisite(s): Computer Science 2214A/B, Mathematics 2155F/G.

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Advisors) to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

2. Instructor Information

Name: Diego Manco (he/him)
Contact info: dmanco@uwo.ca
In person office hours: Office hours: Monday 4:30pm-5:30pm, Tuesday: 2pm-3pm, Wednesday: 2:30pm-3:30pm. My office is Middlesex College 134. If you cannot attend this office hours we could meet through zoom, but we would have to arrange it by email.

Students must use their Western (@uwo.ca) email addresses when contacting their instructors.

3. Course Syllabus, Schedule, Delivery Mode

Logic, sets and functions, algorithms, mathematical reasoning, counting, relations, graphs, trees, Boolean Algebra, computation, modeling.

Tentative outline of the course:
Counting (2 weeks)
Logic and proofs (2 weeks)
Sets and relations (2 weeks)
Functions (1 week)
Induction and recursion (1.5 weeks)
Modular arithmetic (1.5 weeks)
Algorithms and complexity (1 week)
Graphs (1 week)

Main objective of the course:
The objective of the course is to introduce the student to the main types of objects in mathematics (numbers, sets, relations,functions, graphs, trees, etc.) in a formal way. We start by counting techniques since they will be applied during the rest of the course. Then, we move on to Logic and Proofs with the purpose of familiarizing the student with the formalism of mathematics and preparing her to understand mathematical proofs about the objects we will introduce in the rest of the course. We are then prepared to rigorously introduce the main objects of study of the course in the next sections.

At the end of the course a successful student will be able to:

- Use different counting tools such as combinations, permutations and the bars and stars method to solve counting problems.
- Analyze the validity of logical statements and logical arguments via truth tables.
- Compute the conjunctive and disjunctive normal form of a logical statement.
- Establish the validity of a mathematical argument as well as producing simple mathematical proofs, including proofs that use mathematical induction.
- Understand sets and their operations.
- Understand relations among the elements of a set, including equivalence and order relations.
- Understand functions, how to compose and find their inverses as well as how to use them to show that two sets have the same number of elements.
- Use modular arithmetic, express the g.c.d. of two numbers as a linear combination of both and solve diophantine equations.
- Understand graphs and establish basic properties such as planarity, and existence of Euler circuits and Hamiltonian paths, and cycles.

Key dates:
Classes begin: September 5, 2024
Fall Reading Week: October 12 – 20
Classes end: December 6

Exam period: December 9 – 22, 2024
First Midterm: Wednesday, October 9th, 7pm-8:30pm. Location TBA.
Second Midterm: Thursday, November 14th, 7pm-8:30pm. Location TBA.

4. Course Materials

Required:
I will be mostly following the book *Discrete Mathematics with Graph Theory*, 3 ed, by Edgar Goodaire and Michael Parmenter. Most of the exercises for the weekly worksheets would be taken from this book.

Suggested:
Another book that I like is *Discrete and Combinatorial Mathematics*, 5th ed, by Ralph Grimaldi. I will assign some exercises from this book as well. However, this book is NOT REQUIRED. The relevant pages from the book will be posted as PDF files in the OWL course as we go.

All course material will be posted to OWL: https://westernu.brightspace.com/

Students are responsible for checking the course OWL site (https://westernu.brightspace.com/) regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the OWL Brightspace Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

5. Methods of Evaluation

Grading Scheme and Assessment Dates

The overall course grade will be calculated as listed below:

Quizzes and Assignments (One every Wednesday except 1st and Midterms weeks)	20%
Midterm Tests (2)	20% (each)
Final Exam	45%

I will post a sheet with suggested exercises every Monday on OWL. Quizzes will be based on the exercise sheet posted the previous week. Goodaire and Parmenter's book has solutions for most exercises. I will post solutions to some selected exercises that are not in Goodaire and Parmenter on Mondays. Quizzes will be posted on Fridays on OWL.

There will be two written assignments (these will be harder and longer than the quizzes). Information about the written assignments will be posted on OWL.

Exam Timeline:

First Midterm: Wednesday, October 9th, 7pm-8:30pm. Location TBA.
Second Midterm: Thursday, November 14th, 7pm-8:30pm. Location TBA.
Final Exam: Date and location TBA.

General information about missed coursework
Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult Accessible Education.

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:
https://registrar.uwo.ca/academics/academic_considerations/
All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Final exam.
- Second midterm exam.
- Remember that if you have a supported excuse you can make up any of the exams.

When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

Evaluation Scheme for Missed Assessments
To offset any missed quizzes the two worst quiz grades will be dropped. If you miss a third quiz and you want to retake it you have to provide supporting documentation.

When a student misses the Final Exam and their Academic Consideration has been granted, they will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under Special Examinations), especially for those who miss multiple final exams within one examination period.

Coursework with Assessment Flexibility
By policy, instructors may deny Academic Consideration requests for the following assessments with built-in flexibility:

Flexible Completion
Quizzes. This course has n quizzes, and the n-2 quizzes with the highest marks are counted towards your final grade. That is, the lowest 2 quizzes will be dropped. Should extenuating circumstances arise, students do not need to request Academic Consideration for the first 2 missed quizzes. Academic consideration requests will be denied for the first 2 missed quizzes. Academic Consideration requests may be granted when students miss more than 2 quizzes, and these additional (3^{rd}, 4^{th}…) missed quizzes will be reweighted to the final exam.

6. Additional Statements

Religious Accommodation
When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays:

https://www.edi.uwo.ca.

Accommodation Policies
Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf.

Academic Policies
The website for Registrar Services is https://www.registrar.uwo.ca/.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

Calculator policy:

You can use a calculator as long as it is only a calculator. No smartphones or calculators with access to the internet are allowed!

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Support Services

Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic-related matters: https://www.uwo.ca/sci/counselling/.

Students who are in emotional/mental distress should refer to Mental Health@Western (https://uwo.ca/health/) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.

Additional student-run support services are offered by the USC, https://westernusc.ca/services/.