**Department of Mathematics**

 **Math 2151A Course Outline**

**1. Course Information**

**Course Information**

Math 2151A, Discrete Structures for Engineers, Fall 2025

**List of Prerequisites:**

Prerequisite(s): 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.

Unless you have either the prerequisites for this course or written special permission from the Department of Mathematics to enroll in it, you may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on your academic record. This decision may not be appealed.

**2. Instructor Information**

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| --- | --- | --- | --- |
| **Instructors** | **Email** | **Office** | **Office Hours** |
| Dr. Diego Manco | dmanco@uwo.ca |  |  |

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

You can also get help at Help Center. See:

<https://www.math.uwo.ca/undergraduate/current_students/Help%20Centre.html>

**3. Course Syllabus, Schedule, Delivery Mode**

 **Course description:** 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) (Optional)

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.), as well as the formal way in which mathematicians and computer scientists think and write about them. 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. Sets, relations and functions form the building blocks of the language we use to talk about mathematics. Induction and recursion are the mathematic techniques most used by software engineering, we will use them to reason about integer numbers and will introduce other important ideas about them like the Fundamental Theorem of Arithmetic and Modular arithmetic. Another objects that will be introduced are Algorithms, Graphs, and Trees.

**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 4, 2025

Fall Reading Week: November 3 – 9, 2025

Classes end: December 9, 2025

Exam period: December 11 – 22, 2025

First Midterm: Thursday, October 9th, 7pm-8:30pm. Location TBA. Second Midterm: Thursday, November 13th, 7pm-8:30pm. Location TBA.

**4. Course Materials**

**Costs of Textbooks on the Course Syllabus:**

**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. It seems you can get access to the ebook for six months by 67.99 at:

 <https://www.pearson.com/en-us/subject-catalog/p/discrete-mathematics-with-graph-theory-classic-version/P200000006193/9780138094645>

**Strongly 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.

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](https://brightspacehelp.uwo.ca/) page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

**Technical Requirements:**

Gradescope (<https://www.gradescope.ca/>) will be used as a grading platform for written work in the course. A free account will be created on your behalf, although you will be required to verify the account and change the password during the first week of class. Details regarding the set-up of your account and the submission requirements for your written work will be posted on OWL. It is the responsibility of the student to ensure their homework assignments are submitted in the correct format (PDF or PNG.) Submitting work in an improper format may result in your work not being graded, and this cannot form the basis of a regrade request. Additionally, the term test may be scanned by the course staff and uploaded to Gradescope for grading and viewing.

**Additionally, students will need:**

* a laptop or computer;
* a stable internet connection;
* a working microphone and webcam;
* to have installed recent versions of Chrome AND Firefox browsers, a pdf reader, and Zoom on their computer;
* a device for scanning documents to upload to Gradescope (either a scanner or an app that can be used in conjunction with your device’s camera).

**5. Methods of Evaluation**

**Grading Scheme and Assessment Dates**

The overall course grade will be calculated as listed below:

Assignments (2) 10%

Quizzes (Roughly 1 every week except 1st week, Midterm, and Assignment weeks) 15%

Midterm Test (2) 20% each

Final Exam 35%

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 from Grimaldi’s book. Quizzes will be posted on Wednesdays on OWL and due on Sundays. The two assignments will be published on OWL. Tentatively they will be due the week before the midterms. They will consist of exercises that are harder than the ones in Quizzes or Exams.

First Midterm: Tentatively for Thursday, October 9th, 7pm-8:30pm. Location TBA.

Second Midterm: Tentatively for Thursday, November 13th, 7pm-8:30pm. Location TBA.

Final Exam: 2 hours. Time and date TBA. Location TBA.

**Use of Generative AI Tools**

I discourage the use of generative AI tools. Part of what you should learn in this course is how to distinguish a valid mathematical argument from an invalid one but until you have that skill you can be prone to believe false statements made by AI. You’ll only learn by working out exercises, getting stuck and then asking for help (Office hours, and the Library’s Math Help Desk are encouraged). You can also ask Generative AI for help but with the caveat that not everything they generate is truth and that you are not allowed to use AI in the solution of the 2 Assignments and the Quizzes.

**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](http://academicsupport.uwo.ca/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 (Scheduled by the Office of Registrar)
* Second midterm exam (Tentatively for Thursday, October 9th, 7pm-8:30pm. )

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**

In the case of a missed midterm, a common makeup test will be arranged. If a student misses the midterm and the corresponding makeup midterm and has appropriate permission for both, then the final exam will be re-weighted to include the weight of the missed term test.

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](https://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=5&SelectedCalendar=Live&ArchiveID=#SubHeading_70)), 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-3 quizzes with the highest marks are counted towards your final grade. Should extenuating circumstances arise, students do not need to request Academic Consideration for the first 3 missed quizzes. Academic consideration requests will be denied for the first 3 missed quizzes. Academic Consideration requests may be granted when students miss more than 2 quizzes, and these additional (3rd, 4th…) missed quizzes will be reweighted to the final exam.

**Deadline with a No-Late-Penalty Period**

**Assignments.** Students are expected to submit each of the assignments by the deadline listed. Should extenuating circumstances arise, students do not need to request Academic Consideration and they are permitted to submit their assignment up to 48 hours past the deadline without a late penalty. Should students submit their assessment beyond 48 hours past the deadline, a late penalty of 30% per day will be applied. Although assignments submitted more than 96 hours past the deadline will not be accepted. Academic Consideration requests may be granted only for extenuating circumstances that started before the deadline and lasted longer than the No-Late-Penalty Period (48 hours).

**6. Additional Statements**

**6.1 Religious Accommodation**

When conflicts arise 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 of 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>

**6.2 Academic 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](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf).

**6.3 General Academic Policies**

The website for Registrar Services is <https://www.registrar.uwo.ca/>.

**Use of @uwo.ca email:** 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 email address. It is the responsibility of the account holder to ensure that emails received from the University at their official university address are attended to in a timely manner.

**Requests for Relief** (formally known as “appeals”)

Policy on Request for Relief from Academic Decision:

<https://uwo.ca/univsec//pdf/academic_policies/appeals/requests_for_relief_from_academic_decisions.pdf>

Procedures on Request for Relief from Academic Decision (Undergraduate):

<https://uwo.ca/univsec//pdf/academic_policies/appeals/undergrad_requests_for_relief_procedure.pdf>

Procedures on Request for Relief from Academic Decision (Graduate):

<https://uwo.ca/univsec//pdf/academic_policies/appeals/graduate_requests_for_relief_procedure.pdf>

**6.4 Scholastic Offences**

Policy on Scholastic Offences: <https://uwo.ca/univsec//pdf/academic_policies/appeals/scholastic_offences.pdf>

Procedures on Scholastic Offences:

<https://uwo.ca/univsec//pdf/academic_policies/appeals/undergrad_scholastic_offence_procedure.pdf>

**Use of Electronic Devices During Assessments**

In courses offered by the Faculty of Science, the possession of unauthorized electronic devices during any in-person assessment (such as tests, midterms, and final examinations) is strictly prohibited. This includes, but is not limited to: mobile phones, smart watches, smart glasses, and wireless earbuds or headphones. Non-programable Scientific calculators such as the Casio fx-300ES PLUS are allowed. Nothing with connection to the internet is allowed. It is your responsibility to review and comply with these expectations.

**Use of Generative AI Tools**

Unless otherwise stated, the use of generative AI tools (e.g., ChatGPT, Microsoft Copilot, Google Gemini, or similar platforms) is **not permitted** in the completion of any course assessments, including but not limited to: assignments, lab reports, presentations, tests, and final examinations.

Using such tools for content generation, code writing, problem solving, translation, or summarization—when not explicitly allowed—will be treated as a **scholastic offence**.

If the use of generative AI is permitted for a particular assessment, the conditions of use will be specified by the instructor in advance. If no such permission is granted, students must assume that use is prohibited. It is your responsibility to seek clarification before using any AI tools in academic work.

Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

**6.5 Support Services**

Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, requests for relief, 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. If you have any questions regarding accommodations, you may also wish to contact Accessible Education at

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

Learning-skills counsellors at Learning Development and Success ([https://learning.uwo.ca](https://learning.uwo.ca/)) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

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