**Department of Mathematics**

 **MATH 2155F Course Outline**

**1. Course Information**

**Course Information**

MATH 2155F, Mathematical Structures, Fall 2025

**Antirequisites**

[Mathematics 2151A/B](https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_024477_1&SelectedCalendar=Live&ArchiveID=).

**Prerequisites**

1.0 course from: [Mathematics 1120A/B,](https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_017786_1&SelectedCalendar=Live&ArchiveID=) [Mathematics 1600A/B,](https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_023092_1&SelectedCalendar=Live&ArchiveID=) [Mathematics 1700A/B,](https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_031207_1&SelectedCalendar=Live&ArchiveID=) [Numerical and Mathematical Methods 1412A/B,](https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_029475_1&SelectedCalendar=Live&ArchiveID=) [Numerical and Mathematical Methods 1414A/B,](https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_029476_1&SelectedCalendar=Live&ArchiveID=) [Calculus 1000A/B,](https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_013890_1&SelectedCalendar=Live&ArchiveID=) [Calculus 1500A/B,](https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_023735_1&SelectedCalendar=Live&ArchiveID=) [Calculus 1301A/B,](https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_013892_1&SelectedCalendar=Live&ArchiveID=) [Calculus 1501A/B,](https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_013891_1&SelectedCalendar=Live&ArchiveID=) the former Applied Mathematics 1412A/B, the former Applied Mathematics 1414A/B, the former Applied Mathematics 1413, in each case with a minimum mark of 60%; or permission of the department. [Integrated Science 1001X](https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_027319_1&SelectedCalendar=Live&ArchiveID=) with a minimum mark of 60% can be used in place of [Calculus 1301A/B](https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_013892_1&SelectedCalendar=Live&ArchiveID=).

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this course or written special permission from the Department of Mathematics to enroll in it, you may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on your academic record.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** |
| C. Hall | chall69@uwo.ca | MC 269 | TBA |

Students must use their Western (@uwo.ca) email addresses when contacting the instructor. Mathematical questions sent by email are unlikely to receive a response. They should be posed in office hours or posted in the course forums on owl Brightspace.

Office hours will be in person. Times and locations will be announced.

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

This course introduces logical reasoning and proofs. Topics include sets, mathematical induction, relations and functions, partial order relations, equivalence relations, and binary operations.

**Learning Outcomes**

A successful student in the course should be able to do the following:

* provide examples of deductive reasoning
* identify logical connectives (∧, ∨, ¬,→,↔)
* express logical statements in symbolic form
* assess logical equivalence of statements using truth tables
* perform basic set operations and comparisons (∩,∪,\,⊆,=)
* translate between logical and set-theoretic statements
* state standard laws of sentential logic
* assess statements with logical quantifiers (∀,∃,∃!)
* categorize variables in a quantified logical statement (free or dependent)
* identify components of a theorem (hypotheses, variables, conclusion)
* prove statements involving logical connectives and/or quantifiers
* assess a logical argument and determine its validity
* use a counterexample to disprove a false claim
* define a relation between two sets
* identify components of a relation (domain, codomain, range, inverse)
* perform basic operations with relations (invert, compose)
* characterize relations on a set (reflexive, symmetric, transitive, equivalence)
* define equivalence classes of an equivalence relation
* characterize ordering relations on a set (partial, total)
* define a function from one set to another
* identity components of a function (domain, codomain, range, inverse)
* perform basic operations with functions (invert, compose)
* characterize functions (one-to-one and onto)
* define unary and binary operations on a set
* identify common proof strategies (contrapositive, contradiction, induction)

**Key Dates**

Classes begin: September 4, 2025; January 5, 2026

Fall Reading Week: November 3 – 9, 2025

Classes end: December 9, 2025

Exam period: December 11 – 22, 2025

**4. Course Materials**

The textbook for the course is How to Prove It, third edition, by Daniel J. Velleman, Cambridge University Press. It is required that you have access to this edition of the book. The bookstore sells it for $65.85 at this [URL](https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2025A&courses%5B0%5D=001_UW/MAT2155F).

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.

**5. Methods of Evaluation**

**Grading Scheme and Assessment Dates**

The overall course grade will be calculated as listed below:

Assignments 15%

Quizzes 15%

Midterm Test 30%

Final Exam 40%

**Assignments**

There will be ten written homework assignments. Starting Wednesday, September 10 assignments will be posted to Brightspace most Wednesdays and due seven days later.

**Quizzes**

There will be four in-class quizzes on the following dates:

Friday September 26;

Friday October 24;

Monday November 17;

Monday December 1.

**Midterm Test**

The midterm is tentatively scheduled for Friday, October 10. It will take place during usual class time but will be in a *different* room. Details will be posted to Brightspace.

A makeup midterm is tentatively scheduled for Friday, October 17. The time and room will be posted to Brightspace.

**Final Exam**The final exam will cover all the course material. It will be a three-hour long exam and will take place in-person during the final exam period: December 11 – 22, 2025. It will be scheduled by the Registrar’s office.

**Use of Generative AI Tools**

The use of generative AI tools (e.g., ChatGPT, Copilot, Gemini) to complete assessments is strictly **prohibited**. Students who submit an answer they did not generate may be charged with an academic offense.

**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** (Defined by policy)

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**

**Assignments**

**It will not be necessary to request Academic Consideration for assignments.** The lowest two scores will be dropped. Do not request Academic Consideration for missed assignments and do not inform your professor about missed assignments, as these adjustments will be done automatically

See also the **Coursework with Assessment Flexibility section** below for the 48 hour No-Late-Penalty Period for assignments, which allows you to hand in any assignment up to 48 hours late.

**Midterm**

If you miss the midterm due to any circumstance, you must provide an academic consideration covering the date of the test. A makeup midterm will be available to those who are granted an academic consideration in the week following the midterm exam.
In cases where a student misses the midterm exam and the makeup midterm exam and can provide an academic consideration for both absences, the weight of the midterm will be transferred to the final exam.

**Final Exam**

When a student misses the Final Exam, they are expected to contact the Academic Counselling office of their Faculty of Registration as soon as they can do so. The Academic Counselling office will assess the eligibility of the student to be granted an Academic Consideration. If an Academic Consideration has been granted, the student will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam).

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 4 quizzes, and the 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 missed quiz. Academic consideration requests will be denied for the first missed quiz. Academic Consideration requests may be granted when students miss more than 1 quizzes, and these additional (2nd ,3rd…) 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 later, a late penalty of 50% per day will be applied.

**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.

Unless explicitly stated otherwise in advance by the instructor, the presence of any such device at your desk, on your person, or within reach during an assessment will be treated as a *scholastic offence*, even if the device is not in use.

Only devices expressly permitted by the instructor (e.g., non-programmable calculators) may be brought into the assessment room. 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.

**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.