

Math 2124A, Introduction to Mathematical Problems Fall 2023

1. Course Information

Course Information

Math 2124A, Introduction to Mathematical Problems, Fall 2023.

Lectures: Tuesday: 12:30- 2:30 PM, Thursday 1:30-2:30 PM.

Class location: NCB-295.

List of Prerequisites

A minimum mark of 60 in one of Calculus 1501A/B, Numerical and Mathematical Methods 1414A/B, the former Applied Mathematics 1414A/B, the former Applied Mathematics 1413, or a minimum mark of 85 in Calculus 1301A/B. Integrated Science 1001X with a minimum mark of 60 can be used in place of Calculus 1301A/B.

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Counselling) 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

Dr. Masoud Khalkhali, Professor of Mathematics, UWO

Email: masoud@uwo.ca

Office: MC 137, Phone: 661-2111 x 86524.

Office hours: Two hours per week in my office, or by appointment. All appointments in person. Times: TBA

Students must use their Western (@uwo.ca or @ivey.uwo.ca) email addresses when contacting their instructors. I won't answer to any other type of email addresses.

3. Course Syllabus, Schedule, and Delivery Mode

Course Content

Primarily for Mathematics students, but will interest other students with ability in and curiosity about mathematics in the modern world as well as in the past. Stresses development of students' abilities to solve problems and construct proofs. Topics will be selected from: counting, recurrence, induction; number theory; graph theory; parity, symmetry; geometry. Extra Information: 3 lecture hours per week.

Course Learning Outcomes

Understand the importance of **Generalization**, **Specialization**, **Analogy**, and **Discretization** in formation of new mathematical problems and mathematical theories. You will be able to correctly generalize/specialize/analyze a mathematical statement (without necessarily knowing its truth, or its proof.)

Learn general methods to solve mathematical problems including **Mathematical Induction**, **Mathematical Recursion**, and **Educated Guessing**. You will be able to apply mathematical induction and recursive reasoning to solve mathematical problems.

Understand the definition and properties of **Fibonacci Numbers**, **Catalan Numbers** and **Binomial Coefficients**. You will be able to effectively decide if a given sequence of numbers is Fibonacci/Catalan/Binomial even when they are given in a different form. Applications of the idea of **Symmetry** to solve problems in Geometry, Calculus and Algebra.

Key Sessional Dates

Classes begin:	September 7, 2023
Last day to add:	September 15, 2023
No classes:	September 29, 2023
Holiday:	October 9, 2023
Reading Week:	October 30 to November 5, 2023
Last day to drop:	November 13, 2023
Classes end:	December 8, 2023
Exam period:	December 10 to 22, 2023

Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all of the course to be delivered online, either synchronously or asynchronously, the course will adapt accordingly. The grading scheme will not change. Any assessments affected will be conducted online as determined by the course instructor.

Course Materials

Textbook: I will use my own notes. You will be provided with notes as we proceed. Students can benefit from the book *How to Solve It* by George Polya as a supplementary material. The assignments and exams are solely based on what I cover in class.

Course Website: The official website for the course is the course page on OWL. All information about this course including the course outline, assignments, exams, lectures, etc. will be posted only on OWL. Students are responsible to check the course OWL page regularly, that is daily!

Learning Management System (OWL)

If students need assistance with the course OWL site, they can seek support on the OWL Help 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

4. Methods of Evaluation

Course Grade

The final course grade will be determined as follows:

Final exam: 40%. The final exam is cumulative and covers the entire semester. It will be a 3 hours exam. It is a written test. (Time and place TBA)

Midterm: 30%. It is a written test. (Time and place TBA). There will be just one makeup midterm for those who qualify. Time and place of the makeup midterm will be announced in due time. See item 5 below for student absences.

Homework: 30%. Weekly homeworks. Your written answers are due in class (before lectures start) on Tuesdays. The first assignment will be due on Sept 19. We will have 10 short assignments and your assignment grade will be based on your best 9.

Details for each exam will be announced as the date approaches. All exams will be closed book: notes or class material are not permitted. Calculators or other electronic devices (cell phones, ipads, tablets, etc.) are not permitted either.

5. Student Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

Assessments Worth Less Than 10% of Course Grade: In this case the weight of the assessment will be added to your final exam's weight.

Assessments Worth At Least 10% of Course Grade: See policy on missed midterm above.

For work totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the [University's medical illness policy \(click here\)](#) and review the [Student Medical Certificate \(click here\)](#). In the event that the links do not work, type either

- https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration.pdf (for policy)
- https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf (for certificate)

into your browser.

Absences From Final Examinations

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the

name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (e.g., 3 or more exams in 23-hour period, 4 or more exams in a 47-hour period).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under Special Examinations).

Accommodation and Accessibility

Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult [the University’s list of recognized religious holidays \(click here\)](#), which is updated annually. Alternatively, you may wish to enter

- <https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>

directly into your browser.

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. Students can consult [the policy on Academic Accommodation for Students with Disabilities \(click here\)](#). Alternatively, type

- [www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation disabilities.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf)

into a browser.

6. Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca> ([click here](#)).

In accordance with [policy \(click here\)](#), the centrally administered e-mail account provided to students will be considered the individuals 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. The policy referenced above can also be accessed by typing

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

into your browser.

Scholastic offences are taken seriously and students are directed to read the appropriate [policy \(click here\)](#), specifically, the definition of what constitutes a Scholastic Offence. This policy can also be accessed by typing

- http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

into your browser.

In the event of a health lock-down, tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide personal information (including some biometric data) and the session will be recorded. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Westerns Remote Proctoring website at <https://remoteproctoring.uwo.ca> (click here).

7. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling 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/> (click here).

Students who are in emotional/mental distress should refer to Mental Health@Western by visiting their website <https://uwo.ca/health/> (click here) 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 information about support services for survivors, including emergency contacts [is available \(click here\)](#). If you cannot access the link you can type

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

into your browser. To connect with a case manager or set up an appointment, please email 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 \(click here\)](#) if you have any questions regarding accommodations. If the link provided does not work, type

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

into your browser.

Learning-skills counsellors at the [Student Development Centre \(click here\)](#) are ready to help you improve your learning skills (alternatively, type <https://learning.uwo.ca> into your browser). 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/> (click [here](#)).