McMaster University | SCIENCE Department of Mathematics & Statistics

We recognize and acknowledge that McMaster University meets and learns on the traditional territories of the Mississauga and Haudenosaunee nations, and within the lands protected by the "Dish With One Spoon" wampum, an agreement amongst all allied Nations to peaceably share and care for the resources around the Great Lakes.

MATH 1C03 – Introduction to Mathematical Reasoning
2022 Winter Term

Section	**C0 1**
Instructor	Dr. Greg Cousins
Contact Info	cousingd@math.mcmater.ca
Office Hours	TBD
Class Schedule	TuThFr 11:30 - 12:20
Location	In-person: JHE 264 (MAYBE??)

** See section on **Tentative Course Delivery** below. Further details will be announced on Avenue.

Tutorials

TA Name: Matthew How-Chun-Lun

TA Email: howchunm@mcmaster.ca

Section	**T01**	**T02**	**T03**
Instructor	Matthew	Matthew	Matthew
Schedule	Monday	Friday	Thursday
Time	14:30-15:20	12:30-13:20	10:30-11-20
Location*	JHE 326H	JHE A101	JHE A102

Course Website

The central course webpage will be on Avenue to Learn. Students are responsible for staying up-to-date with all deadlines, material, and announcements made on the Avenue course webpage.

Course Description

Inquiry into the ideas and methods of advanced mathematics. Material will include topics selected from algebra, calculus, discrete math, geometry, analysis, and number theory.

Prerequisite(s): Grade 12 Calculus and Vectors U or MATH 1F03; and credit or registration in MATH 1B03

Course and Learning Objectives

Upon completion of this course, the student will be able to:

- *Develop proof-writing skills and techniques:* For example, you should be able to organize what you are given in a problem and determine what you are assuming and what you are being asked to prove. You should also be able to complete a proof using methods such as proof by induction, proof by contradiction or by using the contrapositive. The proof-writing assignments will help facilitate this objective.
- *Acquire a foundation in basic logical reasoning:* For example, you should be able to negate a statement including quantifiers such as "for all" or "there exists," be able to state the contrapositive and converse of a statement and use truth tables to determine equivalences of statements. These tools are fundamental in proof-writing, so both the assignments, as well as the quizzes will help facilitate this objective.
- *Learn ways of approaching mathematical ideas and proofs through investigation and inquiry:* For example, you will become familiar with topics selected from areas such as algebra, geometry, number theory and/or cryptography, and be able to do both computational work as well as theoretical proofs. The assignments and quizzes will all help facilitate this objective.
- Learn to communicate mathematics effectively in speaking and writing. Working together in break-out rooms or in in-person groups will help to facilitate this objective.

Course Format

The instructor will present topics in class selected from a variety of mathematical areas.

Whether virtual or in person, we plan for lectures to be **interactive**, to provide students with opportunities to do individual and group work, and to allow for questions and discussion. For this reason, lecture attendance is important. We may incorporate lecture participation into the participation grade.

There will be **on-line weekly quizzes (submitted through Avenue)** and **written assignments** (to be submitted for grading on **Crowdmark)**.

The **midterm tests** are tentatively as indicated below. **Midterms and the final exam will be in person unless otherwise indicated by the university.** The **final examination** will be scheduled by the registrar.

Examples and problems will be discussed in the weekly tutorials where you will also be encouraged to work together to solve problems.

Tentative lecture schedule, midterm test dates and due dates for assignments.

Week of	Lecture Topics	Readings	Dates
Jan 10	Propositional Logic, Truth Tables	Chapter 1	
Jan 17	Quantifiers and Proofs Techniques	Chapter 1, 2	A1 due
Jan 24	Proof Techniques, Weak Induction	Chapter 2, 3	
Jan 31	Strong Induction, Sets	Chapter 3, 4	
Feb 7	Sets	Chapter 4	A2 due
Feb 14	Functions	Chapter 4,5	**Test 1 (W. Feb. 16)**
Feb 21	Spring Break		
Feb 28	Functions, cont'd	Chapter 5	A3 due
Mar 7	Introduction to Number Theory	Chapter 5, 6	
Mar 14	Number Theory cont'd	Chapter 6, 7	A4 due
Mar 21	Finite an Infinite Sets	Chapter 7, 8	**Test 2 (Th. March 24)**
Mar 28	Finite and Infinite Sets cont'd, Foundations of Analysis	Chapter 8	
April 4	Foundations of Analysis	Chapter 9	A5 due

Required Textbook:

- "The Tools of Mathematical Reasoning," Tamara J. Lakins, American Mathematical Society, The Sally Series, Pure and Applied Undergraduate Texts, volume 26.

Tentative Course Delivery

The course is planned to be in person (room information is above). However, some lectures, tutorials, or office hours may need to be online due to the circumstances. We will notify students with an announcement whenever a session is to be held online (Zoom information is above and on avenue). In absence of an announcement you should assume that sessions are in person at the planned location. (MAYBE??)

To follow and participate in virtual classes it is expected that you have reliable access to the following:

- A computer that meets performance requirements found here.
- An internet connection that is fast enough to stream video.
- Computer accessories that enable class participation, such as a microphone, speakers and webcam when needed.

If you think that you will not be able to meet these requirements, please contact uts@mcmaster.ca as soon as you can. Please visit the Technology Resources for Students page for detailed requirements. If you use assistive technology or believe that our platforms might be a barrier to participating, please contact Student Accessibility Services, sas@mcmaster.ca, for support.

Course Evaluation

Your grade will be calculated based on the following two grading schemes. You will automatically be assigned whichever grade is higher.

Each students' grade will be assigned based on whichever grading scheme indicated below automatically results in the better grade.

Grade Component	**Weight**
Mid Term Tests	40% (2 X 20%)
Marked Assignments	10% (drop worst one)
On-line Quizzes	10% (drop worst one)
Final Examination	40%
TOTAL	**100%**

The instructors and university reserve the right to modify elements of the course during the term, with timely notice provided to the class. It is the responsibility of the student to check their McMaster email and course websites regularly during the term and to note any changes.

Late Submission Policy

- In the absence of a MSAF, **all missing or late work will receive a grade of 0 with no exceptions**. It is your responsibility to submit work on time.
- Internet issues can sometimes interfere with online submission. For this reason, treat all submission deadlines as being 1 day earlier. Do not wait until the last minute to attempt to submit your work. The number of days provided for assignments and tests has already factored in time for you to sort out potential submission difficulties.
- If you are trying to submit your homework ahead of the deadline and encounter a persistent technical difficulty, please do not hesitate to inform us by email.

Email policy

Please read this policy in detail. This will help us to communicate more effectively.

- All emails pertaining to the course must include "MATH 1C03" in the subject.
- We may only reply to emails on weekdays between 9AM and 5PM (Eastern time), excluding holidays. Thus, we may not reply to your email immediately. You are responsible for planning accordingly (i.e., do not wait until the last minute before a deadline to ask a question).
- Check the course outline and Avenue Discussions before asking a question by email. We may not reply to emails asking questions which have already been answered in the course outline or the Avenue Discussions.
- Contrary to the McMaster website, please do not email us regarding your first MSAF. If you are given **special permission** by McMaster for a **second MSAF**, then **you must contact us**.
- All regrade requests must follow the instructions for regrade requests provided below.

Requests for Relief for Missed Academic Term Work

McMaster Student Absence Form (MSAF): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work".

Academic Accommodation of Students with Disabilities

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University's *Academic Accommodation of Students with Disabilities* policy.

Academic Accommodation for Religious, Indigenous Or Spiritual Observances (Riso)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office ***normally within 10 working days*** of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

Courses with An On-Line Element

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

Online Proctoring

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

Academic Integrity

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

It is your responsibility to understand what constitutes academic dishonesty.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the *Academic Integrity Policy*, located at https://secretariat.mcmaster.ca/university-policies-procedures- guidelines/

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

Authenticity / Plagiarism Detection

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. **All submitted work is subject to normal verification that standards of academic integrity have been upheld** (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to the McMaster Office of Academic Integrity's webpage.

Conduct Expectations

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all our living, learning and working communities. These expectations are described in the *Code of Student Rights & Responsibilities* (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online**.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

Copyright and Recording

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

Research Ethics -N/A

Extreme Circumstances

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.