Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings and academic schedules. Any such changes will be announced via CourseLink and/or class email. All University-wide decisions will be posted on the COVID-19 information website

This is a face-to-face teaching and learning course. Students coming to campus are obligated to follow the procedures / recommendations posted on the COVID-19 Info for Students website.

Illness: The University will not normally require verification of illness (doctor's notes) for Fall 2021 or Winter 2022 semester courses. However, requests for Academic Consideration may still require medical documentation as appropriate.

Math 2000: Fall 2021

Department of Mathematics and Statistics

General Information

Course Title: Proofs, Sets, and Numbers

Course Description:

This course exposes the student to formal mathematical proof, and introduces the theory of sets and number systems. Topics include relations and functions, number systems including formal properties of the natural numbers, integers, and the real and complex numbers. Equivalence relations and partial and total orders are introduced. The geometry and topology of the real number line and Cartesian plane are introduced. Techniques of formal proof are introduced including well-ordering, mathematical induction, proof by contradiction, and proof by construction. These techniques will be applied to fundamental theorems from linear algebra.

Prerequisite(s): One of IPS 1500, Math 1080, Math 1160, or Math 1200.

Credit Weight: 0.5
Academic Department (or campus): Mathematics & Statistics
Campus: University of Guelph
Semester Offering: Fall 2021
Class Schedule and Location:
Richards 2520 3:30-4:20 MWF
Rozhanski 103 1:30-2:30 M

Lectures are presently being conducted in a face-to-face format. Should the University cease such practices, then the remainder of the course will be done with pre-recorded lectures that cover the remainder of the course's content.

Instructor Information

Instructor Name: Connor Gregor
Instructor Email: cgregor@uoguelph.ca
Office location and office hours: MACN 541; TBD

GTA Information

Matthew Kreitzer, mkreitze@uoguelph.ca;
Michael Dube, mdube04@uoguelph.ca;
Moksh Trivedi, moksh@uoguelph.ca

Course Content

Specific Learning Outcomes:

This course will teach techniques of proofs, mathematical rigorous proof methods and some new knowledge in sets, numbers, and relations. The course will cover problem solving as it arises in mathematics.

- Students will be introduced to the theory of sets, functions and relations. They will learn the mathematical logic needed and about the axioms that mathematics is built on.
- Students will learn mathematical proofs, such as: Proofs with sets; Direct proofs; Proofs by Contrapositive; Proofs by Contradiction; Nonconditional statement proofs; Proofs by Induction; Disproof.
- Students will also learn about number systems and be given an introduction to the different types of infinity that exist in mathematics.

Lecture Content:

Week	Content
1	Chapter 2; Boolean Logic and Truth Values
2	Chapter 3; Quantified Predicates, Inference, and Arguements
3	Chapter 4; Mathematical Proofs
4	Chapter 6; Mathematical Induction & Test #1
5	Chapter 5; Intuitive Set Theory
6	Chapter 7 & 10; Functions & Relations
7	Chapter 8; Number Systems
8	Chapter 9; Counting Things & Test #2
9	Chapter 11; Number Bases, Number Systems, and Operations
10	Chapter 12 & 13; Many Infinities: Cardinal and Ordinal Numbers
11	Chapter 14; Paradoxes & Test #3
12	Chapter –; A Glimpse at Topology and Complexity

All references to chapters are for the book *an Introduction to Proofs with Set Theory*; this text is available for free online through the website of the university library. Since the course is being handled by a new instructor, the presented timeline may prove to be inaccurate during the semester. Relevant updates to course content will be given with at least one week of notice.

Labs:
Labs are intended to supplement lecture content with additional examples and may also serve as additional lectures should the main topics of the course be proceeding too slowly. Labs are to be handled by TA's who will take turns throughout the semester.

Course Assignments, Tests, and Final Exam:
Three will be three assignments during the semester. Due dates and weightings are written as follows:

- Assignment #1: Friday September 24th, 11:59pm. **(8%)**
- Assignment #2: Friday October 22nd, 11:59pm. **(8%)**
- Assignment #3: Friday November 19th, 11:59pm. **(9%)**

Assignments are to be submitted through the courselink system. There will also be three in-class tests. An exam will also be conducted at the end of the semester. They will be conducted during the regularly scheduled lecture on the following dates:

- Test #1: 3:30-4:20 Wednesday October 6th **(15%)**
- Test #2: 3:30-4:20 Wednesday November 3rd **(15%)**
- Test #3: 3:30-4:20 Wednesday November 24th **(15%)**
- Final Exam: 8:30-10:30 Monday December 13th **(30%)**

Should the university cease its face-to-face operations, all tests will be replaced with assignments. These assignments will be made available the same day that they are due.

Course Resources

Recommended Texts: An Introduction to Proofs with Set Theory, Colin Lee and Daniel Ashlock, Pub. by Morgan and Claypool, available as an e-text from the library. Elements of Advanced Mathematics, Steven G. Krantz, Pub. by CRC Press.

Course Policies

Grading Policies

Performance on the assignments is worth 25% of the grade. Tests are worth 45% of the course grade. The final examination is worth 30% of the course grade. Late assignments not accompanied by a reasonable medical or personal excuse are docked 10% per class day late down to a minimum grade of 0%. Missed tests that are not accompanied with a reasonable medical or personal excuse will be given a grade of 0. Should one be able to present a reasonable excuse for their test absence, then the grade of that test is ignored and the percentage of the student's grade that would normally be attributed to the test is instead allocated to the final exam.

Course Policy on Group Work:

Students are permitted to work on assignments together but must each individually write up the material they turn in. Though this option is permitted, identically submitted (literally copied and pasted) assignments will be viewed as academic misconduct and treated as such.

Course Policy regarding use of electronic devices and recording of lectures

Presentations that are made in relation to course work - including lectures- cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or a guest lecturer.

Policy Appendix

University Policies

Academic Accommodation of Religious Obligations

If you are unable to complete a course requirement due to religious obligations, please let the instructor know within the first two weeks of class. See the academic calendar for more information:
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml

Academic Consideration

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id, and e-mail contact. See the academic calendar for information on regulations and procedures for Academic Consideration:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor. The Academic Misconduct Policy is detailed in the Undergraduate
Calendar: https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c03/index.shtml

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibility Services (SAS) as soon as possible.
For more information, contact SAS at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.uoguelph.ca/csd/

Mental Health Services:
One out of every five students in Canada experiences some sort of mental health issue at some point in their academic career. If you find yourself facing a mental health crisis, or just need to talk to someone, please consider taking advantage of one of the following resources available to University of Guelph students:
Counselling Services:
Visit the Counselling Services website (https://wellness.uoguelph.ca/counselling) to get information on resources available to you, both online and in-person. You can also visit them at Health Services (J.T. Powell Building, ext 53244) where they offer individual and group counselling sessions by appointment or walk-in.
Illness:
Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).
For information on current safety protocols, follow these links: https://news.uoguelph.ca/return-to-campuses/how-u-of-g-is-preparing-for-your-safe-return/
https://news.uoguelph.ca/return-to-campuses/spaces/#ClassroomSpaces
Student Support Network:
is located in the Wellness & Education Promotion Centre in the J.T. Powell Building and offers confidential, peer-based, drop-in support.
Good2Talk: (1-866-925-5454) is a free, 24/7 student hotline that provides professional counselling and referrals for mental health, addictions and well-being.
Here 24/7: (1-844-437-3247) specializes in assessment, referral and appointment booking and is available 24/7 for crisis support. You are not alone and you will not be judged for asking for help.
Drop date
The last day to drop the class is the last day of classes.

Inappropriate online behaviour will not be tolerated.
Examples of inappropriate online behaviour include:

- Posting inflammatory messages about your instructor or fellow students
- Using obscene or offensive language online
- Copying or presenting someone else's work as your own
- Adapting information from the Internet without using proper citations or references
- Buying or selling term papers or assignments
- Posting or selling course materials to course notes websites
- Having someone else complete your quiz or completing a quiz for/with another student
- Making false claims about lost quiz answers or other assignment submissions
- Threatening or harassing a student or instructor online
- Discriminating against fellow students, instructors or TAs
- Using the course website to promote profit-driven products or services
- Attempting to compromise the security or functionality of the learning management system
- Sharing your user name and password
- Recording lectures without the permission of the instructor