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 website

https://news.uoguelph.ca/2019-novel-coronavirus-information/

Illness: The University will not normally require verification of illness (doctor's notes) for fall 2020 or winter 2021 semester courses. However, requests for Academic Consideration may still require medical documentation as appropriate.

Math 2000: Fall 2020

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 2020
Class Schedule and Location: Synchronous Lectures through Courselink at 3:30-4:20 MWF

Instructor Information

Instructor Name: Daniel Ashlock
Instructor Email:dashlock@uoguelph.ca
Office location and office hours: Online
Office hours can be found on the instructor's web page.

GTA Information Connor Gregor, cgregor@uoguelph.ca; Thimas Kielstra, ikielstr@uoguelph.ca; NingPing Cao, ncao@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 and sets of numbers, functions and relations. They will learn the mathematical logic needed to handle mathematical statements
- Students will be introduced to and demonstrate proficiency in mathematical proofs, such as: Proofs with sets; Direct proofs; Proofs by Contrapositive; Proofs by Contradiction; Nonconditional statement proofs; Proofs by Induction; Disproof.
- This course is unique in that it focuses on teaching the skills of mathematical logic and proofs, rather than focusing onheavy new mathematical content

Lecture Content:

Week	Content
1	Review of polynomials, series, and numbers; simple counting. Ch1
2	Boolean logic and truth values. Ch2
3	Rules of inference and mathematical proofs, Ch3, Ch4
4	More on proofs, disproof and counter examples. Ch4
5	Intuitive set theory, Venn diagrams, set operations. Ch5
6	Mathematical induction, well ordering, and proof by induction. Ch6
7	Functions and permutations. Ch7
8	The integers, prime numbers, prime factorization. The fundamental theorem of arithmetic. Ch8
9	Counting things. Ch9
10	Relations, equivalence and order, the integers ($mod\ n$). Ch 10
11	Applications of Proof to linear algebra. Handout.
12	Review and reflection. Questions about the take-home exam.

All references to chapters are for the book *An introduction to proofs with set theory.*

Labs:
A 15 minute quiz is given during the weekly lab.

Course Assignments and Final Exam:
Assignments consists of ten problem sets due each Friday except the final week of the course. If Friday of a given week is a holiday the homework is due during the next non-holiday weekday. There are eleven weekly quizzes administered in lab. The class will have a take-home final examination due the date of the final exam in the undergraduate calendar.

Course Resources

Required Text: 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
Recommended Texts: None
Other Resources: Handout on proof applied to linear algebra.

Course Policies

Grading Policies
Performance on the homework assignments is worth 60% of the grade, the score on quizzes is worth 20% of the grade.
The final examination is worth 20% of the course grade.
Late assignments not accompanied by a reasonable medical or personal excuse are docked 5% per class day late to a maximum penalty of 50%. Late assignments may be turned in at any time up to and including the last day of classes. Makeup quizzes must be arranged with the instructor and will be oral.
Course Policy on Group Work:
Students are encouraged to work on homework problems together but must each write up individually the material they turn in. Work on the final exam may be done in consultation with other students but the final exam must be completely written by the student.
Course Policy regarding use of electronic devices and recording of lectures
Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

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/

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