



COURSE OUTLINE

1. **Course:** MATH 273, Numbers and Proofs - Fall 2021

Lecture 01: MWF 09:00 - 09:50 in MS 319

Instructor	Email	Phone	Office	Hours
Dr Jerrod Smith	jerrod.smith@ucalgary.ca	403 220-6766	VIA ZOOM	M 12:00 - 13:00 and W 10:15 - 11:15 AM, or by appointment (Online via Zoom).

In Person Delivery Details:

Classes and Labs are in-person.

A selection of classes will consist of "flipped lessons": students will be asked to watch a selection of short instructional videos prior to attending class in order to be adequately prepared for in-class activities. Video content, and the schedule of flipped classes, will be communicated to students via D2L in advance.

Additional short instructional videos will be provided via D2L to supplement in-class material.

Re-Entry Protocol for Labs and Classrooms:

To limit the spread of COVID-19 on campus, the University of Calgary has implemented safety measures to ensure the campus is a safe and welcoming space for students, faculty and staff. The most current safety information for campus can be found [here](#).

Course Site:

D2L: MATH 273 L01-(Fall 2021)-Numbers and Proofs

Note: Students must use their U of C account for all course correspondence.

Course Outcomes:

- Be able to list the different proof methods, including direct proofs, inductive proofs, proof by contrapositive and proof by contradiction.
- Be able to explain the difference between different proof methods, including direct proofs, inductive proofs, proof by contrapositive and proof by contradiction.
- Be able to read and recreate proofs of mathematical statements about the topics covered in this course, such as sets, functions and the number systems (natural, integer, rational, real and complex numbers).
- Be able to construct mathematical proofs using a variety of methods, including direct proofs, inductive proofs, proof by contrapositive and proof by contradiction.
- Restate all of the technical definitions and named theorems covered in the course.
- Be able to verify that an abstract mathematical object satisfies a given definition, or is a counterexample.
- Be able to apply standard problem-solving techniques (such as proof by induction, the Chinese remainder theorem, the Euclidean algorithm, and other formulaic theorems) to particular problems or situations
- Be able to generate original solutions to a variety of mathematical problems related to the topics covered in this course, such as sets, functions and the number systems (natural, integer, rational, real and complex numbers).

2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

Prerequisite(s):

A grade of 90 per cent or higher in both Mathematics 30-1 and 31 or consent of the Department.

3. **Grading:**

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar.

In determining the overall grade in the course the following weights will be used:

Component(s)	Weighting %	Date
Discussion Posts & Replies (6 original posts + replies to each group member)*	18 % (equal weight)	Sept 15, Sept 29, Oct 13, Oct 27, Nov 17, Dec 1
Lab Tasks (6 of 8) **	12 % (equal weight)	Sept 24, Oct 1, Oct 15, Oct 22, Oct 29, Nov 19, Nov 26, Dec 3
Assignments (3) ***	12 % (equal weight)	Sept 27, Oct 25, Nov 29
Two-Stage Midterm Exams (2; in-class and lab)	28 % (equal weight)	Friday Oct 8 and Friday Nov 5
Final Examination	30 %	Scheduled by the Registrar

* **Discussion Posts & Replies:** All discussion posts will be on the D2L Discussion boards. Original discussion posts are due on Wednesdays at 11:59 PM MT and replies to each group member are due 48-hours later on Fridays at 11:59 PM MT. For each Discussion assignment students will be placed in randomized groups of four or five.

- Original posts assessed as “acceptable (1 pt.)” or “unacceptable (0 pts.)” based on the following:

At a minimum: “acceptable” posts will be submitted by the deadline, within the indicated word counts AND/OR include attachments if required, and address the discussion prompt. Writing will be of good quality, with correct spelling and grammar.

- Replies to each group member will be assessed as "acceptable (2 pts.)", "needs improvement (1 pt.)" or "unacceptable (0 pts)".

At a minimum: "acceptable" posts will be submitted to each participating group member by the deadline, within the indicated word counts, address the discussion prompt, as well as include a rubric-based assessment if applicable. At a minimum "needs improvement" posts will be submitted to each participating group member by the deadline.

** **Lab Tasks:** during each MATH 273 lab on Friday (starting Sept 24, and except during labs with a Midterm Exam) there will be a for-credit task to be completed and submitted. These activities will have a different format each week, some will be individual tasks and others will involve group work.

- The best six (6) of eight (8) tasks will be counted for credit; therefore, students may miss up to two lab tasks throughout the semester without penalty.
- Lab Tasks will be evaluated for completion, mathematical correctness, and clarity of communication (written or spoken).

*** **Assignments:** Students will typically have one week to complete written assignments. Assignments will be submitted electronically via D2L Dropbox by 11:59 PM MT on the due date.

- One question (chosen at random) on each assignment will be assessed out of 15 points: 10 for mathematical correctness; 5 points for the quality of mathematical writing.

See **D2L > Content > Mathematical Writing Resources** for writing score rubric information.

- Submissions must be a single PDF file uploaded to the appropriate D2L Dropbox

Two-Stage Midterm Exam Information

Midterm Exams will be written during registrar scheduled lecture and lab time on Friday, October 8 and Friday, November 5.

Each midterm exam will have two stages: Stage 1 - Individual and Stage 2 - Group

Stage 1 - Individual

- 50 minutes during lecture time (9:00 - 9:50 AM)
- Weight: 85% of the exam.
 - The group stage **cannot** lower your exam grade. If your individual score exceeds the group score, then your midterm exam grade will be determined by your individual score only.
- Individual written examination.
- No aids allowed.

Stage 2 - Group

- 50 minutes during lab time (10:00 - 10:50 AM)
- Weight: 15% of the exam.
- Instructor determined teams of four (4) students.
- No aids allowed.
- Questions will consist of a subset of the Stage 1 questions and at least one new question.

Important: Students with SAS-approved accommodations for exams will discuss making alternate arrangements for the two-stage midterm exams with the instructor.

Final Examination Information

The final examination will be an individual, cumulative written examination.

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Minimum % Required	95 %	90 %	85 %	80%	76%	72 %	68 %	64%	60%	55 %	50 %

This course will have a final exam that will be scheduled by the Registrar. [The Final Examination Schedule](#) will be published by the Registrar's Office approximately one month after the start of the term. The final exam for this course will be designed to be completed within 2 hours.

The University of Calgary offers a [flexible grade option](#), Credit Granted (CG) to support student's breadth of learning and student wellness. Faculty units may have additional requirements or restrictions for the use of the CG grade at the faculty, degree or program level. To see the full list of Faculty of Science courses where CG is not eligible, please visit the following website: <https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade>

4. Missed Components Of Term Work:

The university has suspended the requirement for students to provide evidence for absences. Please do not attend medical clinics for medical notes or Commissioners for Oaths for statutory declarations.

In the event that a student legitimately fails to submit any online assessment on time (e.g. due to illness etc...), please contact the course coordinator, or the course instructor if this course does not have a coordinator to arrange for a re-adjustment of a submission date. Absences not reported within 48 hours will not be accommodated. If an excused absence is approved, one possible arrangement is that the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course. This option is at the discretion of the coordinator and may not be a viable option based on the design of this course.

5. Scheduled Out-of-Class Activities:

There are no scheduled out of class activities for this course.

6. Course Materials:

Recommended Textbook(s):

Richard Hammack, *Book of Proof, 3rd edition*: Richard Hammack.
John D'Angelo and Douglas West, *Mathematical Thinking: Problem-Solving and Proofs, 2nd edition*: Pearson.
Daniel J. Velleman, *How to Prove It: A Structured Approach*: Cambridge University Press.
John Meier and Derek Smith, *Exploring Mathematics: An Engaging Introduction to Proof*: Cambridge University Press.

Technology Requirements

Students **must** be able to **scan/photograph** written work and convert the images to **PDF files**.

- For iPhone / iPad try the **free** Adobe Scan Digital PDF Scanner <https://tinyurl.com/tlhhkj3>
- On Google Play try the **free** Adobe Scan Digital PDF Scanner <https://tinyurl.com/v7csw88>

Alternative to scanning; students may create PDF files of written work by:

- writing with tablet application and saving to a PDF file
- typing work with a **LaTeX distribution** (<https://www.latex-project.org/get/>) or online LaTeX editor (such as Overleaf <https://www.overleaf.com>) and saving to a PDF file. See D2L for more information about writing mathematics with LaTeX.

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam/Camera (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Stable internet connection.

For more information please refer to the UofC [ELearning](#) online website.

7. Examination Policy:

Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity. Research integrity, ethics, and principles of conduct are key to academic integrity. Members of our campus community are required to abide by our institutional code of conduct and promote academic integrity in upholding the University of Calgary's reputation of excellence.

No aids are allowed on tests or examinations unless otherwise indicated in the examination instructions.

Students must submit assignments as single PDF files. This may be done by:

- Completing the assessment on 8.5" by 11" paper and then scanning your solutions.
- Using a tablet app to write your assignment and saving it as a PDF file.
- Typeset with the assignment with LaTeX.

Discussion Post Expectations

- Discussion posts are intended to help you practice problem solving and mathematical writing.
- You should use your notes, the topic videos, and the course text(s) to help you complete the posts.
- You should complete the initial posts on your own to ensure that you receive maximum benefit from reading your peer's posts and receiving feedback on your posts from your peers.
- **You may NOT use:** homework answer services, like Chegg.com, Slader, etc.
- **You may NOT use:** mathematics question & answer forums like Mathematics Stack Exchange

Assignment Expectations

- Assignments are intended to help you practice problem solving and mathematical writing.
- You should use your notes, the topic videos, and the course text(s) to help you assignments.
- You may discuss assignment problems with your peers (on the D2L discussion boards); however, **you must write your assignment solutions on your own** (i.e., independently).
 - Please see the topic description of the Assignment Discussion Board for detailed instructions for how to discuss Assignments while maintaining Academic Integrity.
- **You may NOT use:** homework answer services, like Chegg.com, Slader, etc.
- **You may NOT use:** mathematics question & answer forums like Mathematics Stack Exchange
- We recommend that you only use (online) computer algebra systems like Wolfram Alpha, Mathematica, etc. to verify any necessary calculations that you have performed by hand.

Lab Task Expectations

- Lab Tasks will vary week-to-week.
- In general, there will be no aids allowed unless otherwise indicated in the activity instructions.

Students should also read the Calendar, [Section G](#), on Examinations.

8. Approved Mandatory And Optional Course Supplemental Fees:

There are no mandatory or optional course supplemental fees for this course.

9. Writing Across The Curriculum Statement:

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section [E.2](#) of the University Calendar.

10. Human Studies Statement:

If you agree, your course work may be used for research purposes. Your responses will remain anonymous and confidential. Grouped data (no individual responses) may be used in academic presentations and publications. Participation in such research is voluntary and will not influence grades in this course. Students' signed consent forms will be withheld from instructors until after final grades are submitted. More information will be provided at the time student participation is requested.

See also [Section E.5](#) of the University Calendar.

11. Reappraisal Of Grades:

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See [Section I.3](#) of the University Calendar.

- a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **ten business days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall submit the Reappraisal of Graded Term work form to the department in which the course is offered within 2 business days of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections [I.1](#) and [I.2](#) of the University Calendar
- b. **Final Exam:**The student shall submit the request to Enrolment Services. See [Section I.3](#) of the University Calendar.

12. Other Important Information For Students:

- a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, [Mental Health Services Website](#)) and the Campus Mental Health Strategy website ([Mental Health](#)).
- b. **SU Wellness Services:** For more information, see www.ucalgary.ca/wellnesscentre or call [403-210-9355](tel:403-210-9355).
- c. **Sexual Violence:** The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at [403-220-2208](tel:403-220-2208). The complete University of Calgary policy on sexual violence can be viewed at (<https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Sexual-and-Gender-Based-Violence-Policy.pdf>)
- d. **Misconduct:** Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity. Research integrity, ethics, and principles of conduct are key to academic integrity. Members of our campus community are required to abide by our institutional [Code of Conduct](#) and promote academic integrity in upholding the University of Calgary's reputation of excellence. Some examples of academic misconduct include but are not limited to: posting course material to online platforms or file sharing without the course instructor's consent; submitting or presenting work as if it were the student's own work; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. Please read the following to inform yourself more on academic integrity:

[Student Handbook on Academic Integrity](#)
[Student Academic Misconduct Policy](#) and [Procedure](#)
[Research Integrity Policy](#)

Additional information is available on the [Student Success Centre Academic Integrity page](#)

e. Academic Accommodation Policy:

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf>

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf>.

Students needing an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, by filling out the [Request for Academic Accommodation Form](#) and sending it to Mark Bauer by email bauerm@ucalgary.ca preferably 10 business days before the due date of an assessment or scheduled absence.

- f. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see [Legal Services](#) website.
- g. **Student Union Information:** [VP Academic](#), Phone: [403-220-3911](#) Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: [403-220-3913](#) Email: sciencerep@su.ucalgary.ca. [Student Ombudsman](#), Email: ombuds@ucalgary.ca.
- h. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction ([USRI](#)) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.
- i. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or [non-academic misconduct](#), in addition to any other remedies available at law.

Electronically Approved - Sep 08 2021 16:29

Department Approval

Electronically Approved - Sep 08 2021 17:27

Associate Dean's Approval