



COURSE OUTLINE

1. **Course:** MATH 273, Numbers and Proofs - Fall 2020

Lecture 01: MWF 09:00 - 09:50 - Online

Instructor	Email	Phone	Office	Hours
Dr Jerrod Smith	jerrod.smith@ucalgary.ca		MS 442	Via Zoom: Wednesday 9:00 - 9:50 AM; or by appointment.

Office Hours

Wednesday 9:00 - 9:50 AM via Zoom. A "Waiting Room" will be enabled to facilitate one-on-one discussions. Access Zoom Office Hours via D2L > Communication > Zoom

See **D2L > Course Information** for **additional details** and **important information**.

Live Synchronous Meetings

Monday and **Friday** 9:00 - 9:50 AM via Zoom.

- Access Zoom meetings via D2L > Communication > Zoom.
- **An initial meeting will be held on Wednesday, September 9 at 9:00 - 9:50 AM via Zoom.**
- **Monday meetings:** overview and group discussion of the week's topics; discussions of mathematical writing.
- **Friday meetings:** student led **problem solving sessions** and **Worksheet** discussions; *participation is required for credit*: Students will be required to lead the discussion during 1/3 (i.e., 15 minutes) of one Friday meeting during the term (a schedule will be determined during Week 1: September 8-11). Students are also required to participate in at least **10 out of 12** Friday meetings. Students may miss only two (2) Friday meetings; there will be no opportunity for make-up meetings.

Zoom meetings will NOT be recorded.

Online Delivery Details:

Some aspects of this course are being offered in real-time via scheduled meeting times. For those aspects you are required to be online at the same time.

Content Delivery

All course materials will be delivered via D2L. The course will primarily be delivered via short **instructional videos** posted to D2L, which students will watch **at their own pace** during each week following the **Course Schedule**.

You should **pause** the videos and **take notes** as you would during an in-person class. **Fill-in-the-blank** style **lecture notes** will be provided for students to complete as they watch the associated videos.

Weekly **worksheets** will be provided to give students an opportunity to practice **problem solving** and **mathematical communication skills**. Students will be expected to attempt worksheet problems **before** the Friday meetings during which **students will lead** discussions of these problems. See Section 3 for more information.

Readings will also be assigned to supplement the **videos** and **lecture notes**.

See the **Course Schedule** on D2L for a detailed **schedule of topics**

Course Site:

D2L: MATH 273 L01-(Fall 2020)-Numbers and Proofs

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

Email Policy:

- All **content** and **course-related** questions should be posted to the **D2L Discussion Boards**. Questions will normally be answered within 36 hours (except on weekends and holidays). Do not expect a response if you email your instructor with a content or course-related question.
- All questions of a personal nature (e.g. accommodations, missed assessments) should be directed to your instructor (jerrod.smith@ucalgary.ca). You can usually expect a response within 24 hours (except on weekends and holidays).

Outline of a Typical Week

See the Course Schedule for more details regarding **Deadlines** for **Assignments, Quizzes** and **Discussion Posts**.

Monday

- **9:00 - 9:50 AM Zoom Meeting: Introduction/Discussion of the Week's Topics**
- Work through course content and practice problems at your own pace.
- **Weeks 4, 6, 9, and 13: Upload completed Assignment by 11:59 PM**

Tuesday

- Work through course content and practice problems at your own pace.

Wednesday

- **9:00 - 9:50 AM Waiting-Room Zoom Office Hours**
 - ~10 minute one-on-one meetings; first-come first-served; uses Zoom Waiting Room
- Work through course content and practice problems at your own pace.
- **Weeks 3, 7, and 11: Complete a Quiz due at 11:59 PM**

Thursday

- Work through course content and practice problems at your own pace.
- **Even # Weeks: 11:59 PM Deadline: Complete Discussion Post on D2L**

Friday

- **9:00 - 9:50 AM Zoom Meeting: Student-Led Problem Solving Session**
 - Discussion of weekly practice problems (you should work on these ahead of time!)
 - Participation in Problem-Solving Sessions is For Credit
 - Each student must lead at least 1/2 of one Problem Solving Session during the semester.
- Work through course content and practice problems at your own pace.
- **Even # Weeks: 11:59 PM Deadline: Responses to Peer's Discussion Posts due.**

Expect to spend 7-10+ hours per week working on this course.

At a minimum, you should check D2L for updates on Mondays and Fridays.

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
Reading & Writing (6 Discussion Posts and Replies)*	18 % (equal weight)	Sept 17; Oct 1; Oct 15; Oct 29; Nov 19; Dec 3
Quizzes (3)**	36 % (unequal weight)	Sept 23; Oct 21; Nov 25
Assignments (4)***	18 % (equal weight)	Sept 28; Oct 13; Nov 2; Dec 7
Live Group Discussion Participation (10 out of 12 meetings + lead 1/3 of one meeting)****	5 % + 3 %	Fridays 9:00 - 9:50 AM
Final Examination*****	20 %	To be scheduled by the Registrar

Note: all times are local times in Calgary, Alberta, Canada (Mountain Time)

*** Reading & Writing (6 Discussion Posts and Replies)**

Students will be placed into randomized groups via D2L for each Reading and Writing discussion activity.

- Posts due Thursdays at 11:59 PM
 - Assessed as “acceptable (2 pts.)”, “needs improvement (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.
 - At a minimum “needs improvement” posts will be submitted by the deadline, within the indicated word counts AND/OR include attachments if required, and address the discussion prompt.
- Replies to each group member (usually 2-3 replies) due Friday following original post at 11:59 PM
 - Assessed as “complete (1 pt.)” or “incomplete”. Completeness also includes using a rubric if instructed to do so.

**** Quizzes (3)**

- Quiz #1 worth 10%, Quizzes #2 and #3 worth 13% each.
- Designed as 50 minute Quiz; due at 11:59 PM on the due date
- Available to be completed during a 24 hour period from 12:00 AM - 11:59 PM
- Submissions must be a **single PDF file** uploaded to the appropriate **D2L Dropbox**

***** Assignments (4)**

- Equally weighted at 4.5% each
- Due at 11:59 PM on the due date
- Students will have approximately one week to complete each Assignment.
- **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 > Mathematical Writing Resources** for **writing score** rubric information.
- Submissions must be a **single PDF file** uploaded to the appropriate **D2L Dropbox**
- Students may revise and resubmit **up to two (2)** Assignments throughout the semester to improve the **writing score only**. Resubmission (*of the graded problem only*) via D2L Dropbox must be **within 5 days** after initial feedback is received. Re-assessed writing scores may **increase, decrease, or stay the same**.

****** Live Group Discussion Participation**

- Students are required to **lead 1/3** (i.e., *15 minutes*) of one Friday group problem-solving discussion during the term; for instance students may present a **solution** or **partial solution** to a **Worksheet problem**.
 - Weight: 3% of the final grade
 - A schedule will be determined during Week 1 (September 8-11)
- Students are required to participate in 10 out of 12 Friday group problem-solving discussions
 - Weight: 5% of the final grade

******* Final Examination**

- *To be scheduled by the Registrar.*
- Students will have a 24 hour period to complete the **3 hour** examination.
- Submissions must be a **single PDF file** uploaded to the appropriate **D2L Dropbox**

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 has a registrar scheduled final exam.

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, then the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course.

5. Scheduled Out-of-Class Activities:

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

6. Course Materials:

Required Textbook(s):

Richard Hammack, *Book of Proof, 3rd edition*: Richard Hammack: PDF available online: <https://www.people.vcu.edu/~rhammack/BookOfProof/>.

Recommended Textbook(s):

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 app** 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:

Students must submit quizzes, assignments and examinations as **single PDF files**. This may be done by:

- Printing a copy of the exam, writing on the exam pages, and scanning your solutions (with a scanner or smartphone application).
- Using a tablet app to write your exam on a copy of the exam pages.
- Alternatively, if you are unable to print and do not have access to a tablet, then you may complete the assessment on 8.5" by 11" paper (**within indicated page limits**) and then scanning your solutions.
- Assignments **ONLY** may be submitted as a **single PDF** typeset with LaTeX

Reading & Writing (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 complete the 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*.

Quiz Expectations

- The Quizzes are intended to help you assess your understanding of fundamental concepts, definitions and theorems, as well as to assess your problem solving skills and mathematical writing.
- You should **complete quizzes on your own**, and **without help from your peers**
- **You may re-watch** the **topic videos** as you complete the quiz
- **You may** refer to the **notes you've taken** on the **fill-in-the-blank notes**
- **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 do NOT** refer to the **course text(s)** as you complete the quiz
- We **recommend** that **you do NOT** use: (online) computer algebra systems like *Wolfram Alpha*, *Mathematica*, etc.

Final Examination Expectations

- The Final Exam is intended to assess your understanding of fundamental concepts, definitions and theorems, as well as to assess your problem solving skills and mathematical writing.
- You must **complete the final exam on your own**, and **without help from your peers**
- **You may** refer to the **notes you've taken** on the **fill-in-the-blank notes**
- **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 do NOT** watch the **topic videos** as you complete the exam
- We **recommend** that **you do NOT** refer to the **course text(s)** as you complete the exam
- We **recommend** that **you do NOT** use: (online) computer algebra systems like *Wolfram Alpha*, *Mathematica*, etc.

On all assessments, **be wary** of using external internet resources (course notes, You Tube videos, etc.); you will be expected to use the **standard notation**, **definitions**, and **constructions** used in the **videos** and **fill-in-the-blank notes**. Outside resources may use **different conventions** for notation, definitions, and standard constructions.

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.

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

10. **Human Studies Statement:**

Students will not participate as subjects or researchers in human studies.

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.

***** Assignments**

Students may revise and resubmit **up to two (2)** Assignments throughout the semester to improve the **writing score only**. Resubmission (*of the graded problem only*) via D2L Dropbox must be **within 5 days** after initial feedback is received. Re-assessed writing scores may **increase, decrease, or stay the same**.

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 Center:** 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 (syva@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/policies/files/policies/sexual-violence-policy.pdf>)
- d. **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/ fabrication of experimental values in a report. **These are only examples.**

- e. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](#).

Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head of the Department of Mathematics & Statistics, Mark Bauer by email bauerm@ucalgary.ca or phone 403-220-4189. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See [Section E.4](#) of the University Calendar.

- 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](tel:403-220-3911) Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: [403-220-3913](tel: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.

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).

Electronically Approved - Sep 03 2020 17:38

Department Approval