



## COURSE OUTLINE

### 1. **Course:** MATH 311, Linear Methods II - Winter 2023

Lecture 01 : MWF 12:00 - 12:50 in KNB 126

Instructor	Email	Phone	Office	Hours
Dr Jerrod Smith	jerrod.smith@ucalgary.ca	403 220-6766	MS 442	Please see D2L.

To account for any necessary transition to remote learning for the current semester, courses with in-person lectures, labs, or tutorials may be shifted to remote delivery for a certain period of time. In addition, adjustments may be made to the modality and format of assessments and deadlines, as well as to other course components and/or requirements, so that all coursework tasks are in line with the necessary and evolving health precautions for all involved (students and staff).

#### **In Person Delivery Details:**

##### **Classes are in-person.**

- **This class will be partially "flipped"**. Students will complete pre-class activities online (watching content videos, answering questions) prior to attending class.
- During class, in addition to short lecture components, students will work in pairs/small groups on active learning activities (non-credit worksheets, group discussions, etc.) with the guidance of the instructor.

##### **Tutorials are in-person.**

- All quizzes are in-person during tutorials.
  - Quiz #7 ("Final Exam") will be scheduled by the Registrar.

If you are not feeling well, or you have any symptoms of respiratory illness, we do encourage you to stay home and watch the content videos, work on worksheets, etc. for the topics you miss in class. Once you are well, you can visit the Math Help Centre (MS 457), and talk to your instructor, for additional support.

**Note:** To succeed in this course, students must engage with the **weekly non-credit worksheets posted** on D2L (these are test-level questions). Worksheets will form the primary material discussed during tutorials and will also be discussed in-class. Solutions will be provided one week (typically) after the worksheet is posted to provide sufficient opportunity to engage with the problems.

#### **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 311 L01-(Winter 2023)-Linear Methods II

#### **Email policy**

All questions of a personal nature (e.g. accommodations, missed assessments) should be directed to your course instructor (jerrod.smith@ucalgary.ca). You can usually expect a response within 48 hours (except on weekends and holidays).

#### **Questions about math**

Questions about mathematics are best answered during Class, Office Hours, or at the Math Help Centre (MS 457).

- See D2L for Math Help Centre (MS 457) information and a schedule.

## Frequently Asked Questions (FAQ)

Questions about the course organization should be posted to the Frequently Asked Questions (FAQ) discussion board on D2L.

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

### Equity Diversity & Inclusion:

The University of Calgary is committed to creating an equitable, diverse and inclusive campus, and condemns harm and discrimination of any form. We value all persons regardless of their race, gender, ethnicity, age, LGBTQIA2S+ identity and expression, disability, religion, spirituality, and socioeconomic status. The Faculty of Science strives to extend these values in every aspect of our courses, research, and teachings to better promote academic excellence and foster belonging for all.

### Course Outcomes:

- Explore the relationship between key linear algebra concepts and their geometric representation.
- Seek to apply linear algebra techniques to a variety of practical problems.
- Read and create proofs of mathematical statements about topics covered in the course.
- State all of the technical definitions covered in the course (such as a vector space, span, independence, dimension, linear transformation, kernel, image, and other terms)
- State all of the relevant theorems covered in the course
- Use these definitions and theorems from memory to construct solutions to problems and/or proofs.
- Verify that an abstract mathematical object satisfies a given definition, or is a counterexample
- Analyze a finite dimensional vector space and its properties, including the basis structure of vector spaces
- Understand the concept of a linear transformation as a map from one vector space to another, and to be able to construct such maps given a basis of the domain
- Use the Gram-Schmidt process to produce an orthonormal basis

### 2. Requisites:

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

#### Prerequisite(s):

Mathematics 211 or 213.

#### Antirequisite(s):

Credit for Mathematics 311 and 313 will not be allowed.

### 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:

Course Component	Weight	Due Date (duration for exams)	Modality for exams	Location for exams
Writing Assignment (D2L Discussions; 6 equal weight) <sup>1</sup>	18%	Ongoing		
Quizzes (Best 5 of 6, equal weight) <sup>2</sup>	50%	Ongoing		
Online Homework (x 6) <sup>3</sup>	18%	Ongoing		
Registrar Scheduled Final Exam <sup>4</sup>	14%	Will be available when the final exam schedule is released by the Registrar	in person	Will be available when the final exam schedule is released by the Registrar

<sup>1</sup> Students will complete 6 group online discussion activities called: "Writing Assignments". Original posts are due on Wednesdays at 11:59 PM & Replies to each group member are due 48 hours after the original posts. Original post due dates: Jan 18, Feb 1, Feb 15, March 8, March 22, April 5.

<sup>2</sup> Quizzes take place during tutorial on January 24, Feb 7, Feb 28, March 14, March 28, and April 11.

<sup>3</sup> Online Homework is due on Tuesdays at 11:59 PM on the following dates: January 24, February 7, February 28, March 14, March 28, and April 11. Assignments will be available for late completion at reduced credit for one week after the original due date. No additional extensions will be granted.

<sup>4</sup> The Final Exam is "Quiz #7". Students will have the option to use the single dropped quiz grade from Quizzes 1 - 6 in place of Quiz #7, or will have the option to complete a project in place of Quiz #7. Details about the final assessments options will be provided on D2L.

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
<b>Minimum % Required</b>	95 %	90 %	85 %	80%	76%	72 %	68 %	64%	60%	55 %	50 %

This course will have a Registrar Scheduled Final exam that will be delivered in-person and on campus. [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 1.5 hours.

**See D2L > Course Information for a detailed schedule of topics and assessments deadlines.**

**\* Online Homework (WeBWork)**

- All assignments are equally weighted.
- Online homework assignments have a **computational focus**.

**\*\* Writing Assignments (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.

**\*\*\* Top Hat (non-credit)**

- **Top Hat questions will form part of the pre-class, in-class and post-class activities for each week.**

- Top Hat is an optional course component that focuses on understanding of key concepts and definitions.
- Top Hat questions follow the online content (fill-in-the-blank notes and videos) and are highly recommended for students working through asynchronous content while away from class.

#### \*\*\*\* Quizzes 1 - 6 (during the term)

- The lowest single quiz score from Quizzes 1 - 6 will be dropped from final grade calculations.
- During in-person instruction, Quizzes will be held during Tutorials
- No aids allowed (closed book, no electronic devices).

#### \*\*\*\*\* Final Assessment

- Students have three options for the final assessment. Additional details will be posted to D2L.
  - **Option 1:** Use the dropped quiz score from Quizzes 1 - 6.
  - **Option 2:** Quiz #7 ("Final Examination") to be completed during the final examination period.
  - **Option 3:** Project (written report, video, or podcast) on applications of linear algebra.
    - Will include a mandatory **project proposal** (due March 1, 2022) with an opportunity for feedback from the instructor.
    - Additional details will be posted to D2L.
- **Students will be required to indicate which option they wish to choose.**
  - Students wishing to complete **Option 3: Project** must submit the **Project Proposal** by **March 1, 2023**
    - Details about **Project Proposal requirements** will be posted to **D2L**.
  - Students wishing to use **Option 1:** use the single dropped quiz (Quizzes 1 - 6) in place of Quiz #7 must indicate their intention to the instructor by email **before 11:59 PM on Wednesday, April 12, 2023 (last day of classes)**. ("Final Exam" to be scheduled by the registrar).

The University of Calgary offers a [flexible grade option](https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade), 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.

#### If you miss a WeBWork Assignment deadline...

- Assignments will be available for one week after the deadline at reduced credit.
- No additional extensions will be granted.
- Do not leave your WeBWork to the last day -- complete it early!

#### If you miss a Writing Assignment (D2L Discussion Post + Replies)...

- No extensions will be granted barring exceptional circumstances (see below: (\*)).

#### If you miss one of Quizzes #1 - 6 ...

- The lowest single quiz score from Quizzes 1 - 6 will be dropped from final grade calculations; therefore **if a student misses one quiz (for any reason), then this is the quiz score that will be dropped.**
- If a student misses two or more quizzes due to exceptional circumstances (see below: (\*)), then they must contact the instructor within 48 hours.
  - If a student misses two or more quizzes, then they **must** complete Quiz #7 ("Final Exam").
  - If a student misses two or more quizzes, accommodation (e.g. increasing the weight of Quiz #7) will be made on a case-by-case basis.

#### If a student planning on completing Quiz #7 ("Final Exam") misses Quiz #7 ...

- The following applies in exceptional circumstances (see below: (\*)).
- Students must contact the course instructor within 48 hours.
- Students will have the option of retroactively using Final Assessment Option #1 (counting the single dropped quiz from Quizzes 1 - 6) **OR** applying for a Deferred Final Examination (see the University Calendar for details)

(\*) If exceptional circumstances (e.g., extended illness, emergency, etc.) arise: contact your coordinator by email within 48 hours of the assignment deadline. Accommodations in exceptional circumstances will be made on a case-by-case basis.

#### 5. **Scheduled Out-of-Class Activities:**

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

#### 6. **Course Materials:**

Recommended Textbook(s):

W. K. Nicholson, *Linear Algebra with Applications*. Open Texts:  
[https://lila1.lyryx.com/textbooks/OPEN\\_LAWA\\_1/base2021/Nicholson-OpenLAWA-2021A.pdf](https://lila1.lyryx.com/textbooks/OPEN_LAWA_1/base2021/Nicholson-OpenLAWA-2021A.pdf).  
 Richard Hammack, *Book of Proof, 3rd edition*: Richard Hammack. PDF available online:  
<https://www.people.vcu.edu/~rhammack/BookOfProof/>.

#### **Technology Requirements**

We will be using **Top Hat** for synchronous and asynchronous active learning exercises (**non-credit**). University of Calgary students may access Top Hat at **no cost**. **Students must use their @ucalgary email address for their Top Hat account.**

**Students must ensure that their UCID is entered in their Top Hat account information.**

Students will receive an direct invitation to the Top Hat course to their @ucalgary email account on/after the first day of classes.

You can access our Top Hat course MATH 311 Linear Methods II W23 via:

- A web browser on your computer\*\* at <http://app-tophat.com>,
- or The Top Hat smartphone/tablet app

**\*\* Recommended option:** Using a web browser on a computer is the best option for viewing mathematics.

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:

### 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 **MUST complete quizzes on your own**, and **without help from your peers**
- No aids allowed (closed book, no electronic devices).
- In-person Quizzes are held during tutorials.

### Writing Assignment ("Discussion") 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, Slader, etc.
- **You may NOT use:** mathematics question & answer forums like Mathematics Stack Exchange
- **You may NOT use:** artificial intelligence (AI) tools to generate discussion prompts.

### WeBWork Assignment Expectations

- WeBWork Assignments are intended to help you practice computational skills and problem solving, and to check your theoretical understanding.
- You should use your notes, the topic videos, and the course text(s) & lecture notes to help you complete the assignments.
- You may discuss assignment problems with your peers during the initial problem-solving stages; however, you should complete your assignments on your own (i.e., independently).
- **You may NOT use:** homework answer services, like Chegg, Slader, etc.
- **You may NOT use:** mathematics question & answer forums like Mathematics Stack Exchange

We recommend that you do NOT use (online) computer algebra systems like Wolfram Alpha, Mathematica, etc. **except to check any calculations that you have already completed by-hand.**

**IMPORTANT NOTE:** 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.

**On all assessments both mathematical correctness and quality of mathematical writing / communication will be assessed.**

## 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 their [website](#) or call [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](mailto:svsa@ucalgary.ca)) or phone at [403-220-2208](#). The complete University of Calgary policy on sexual violence can be viewed [here](#).
- d. **Student Ombuds Office:** A safe place for all students of the University of Calgary to discuss student related issues, interpersonal conflict, academic and non-academic concerns, and many other problems.
- e. **Student Union Information:** [SU contact](#), Email your SU Science Reps: [science1@su.ucalgary.ca](mailto:science1@su.ucalgary.ca), [science2@su.ucalgary.ca](mailto:science2@su.ucalgary.ca), [science3@su.ucalgary.ca](mailto:science3@su.ucalgary.ca),
- f. **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](mailto:bauerm@ucalgary.ca) preferably 10 business days before the due date of an assessment or scheduled absence.

- g. **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](#)  
[Faculty of Science Academic Misconduct Process](#)  
[Research Integrity Policy](#)

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

- h. **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.
- i. **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.
- j. **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.

Electronically Approved - Jan 04 2023 12:17

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**Department Approval**