

MATH 225, Winter 2025: Course Outline

Section	Instructor	Lecture times	Lecture location
Q1	Jin-Cheng Guu	MWF, 09:00–09:50	ED 2-115
R1	Paul Buckingham	TuTh, 09:30–10:50	CCIS L1-140

Instructors' office locations and email addresses

Jin-Cheng Guu: CAB 495, guu@ualberta.ca

Paul Buckingham: CAB 617, p.r.buckingham@ualberta.ca

Office hours

Please see your instructor's tab on eClass for information about office hours.

Times

All times stated in this course outline, on eClass, on assessments, and in communications from the instructors are in Mountain Time and in the 24-hour clock.

Topics

The following topics will be covered: vector spaces and subspaces; linearly independent sets and spanning sets; bases, dimension, and change of basis; linear transformations; diagonalization; inner product spaces; and orthogonal diagonalization of real symmetric matrices. We will also cover some applications of the theory, such as constrained optimization and quadratic forms.

Textbook

There is no required textbook. However, if you would like further practice beyond the practice questions on eClass, you may wish to consult David Poole's *Linear Algebra: A Modern Introduction*, 4th edition. Most of the topics covered in this course can be found there as well.

Prerequisites

Both a 100-level linear algebra course and a 100-level calculus course are required for this course. You will need to be able to perform basic differentiation and integration. Credit can be obtained in at most one of MATH 225 or MATH 227.

Grades

The overall grade for the course will be calculated using the following weights:

- **Assignments:** 20%
- **Midterm:** 30%
- **Final exam:** 50%

Grade determination

A student who achieves at least 50% in the course overall and, in addition, at least 50% on the final exam will be guaranteed a passing grade of D or higher. Otherwise, if the overall score is less than 50% or the score on the final exam is less than 50%, a failing grade of F may result.

A student who achieves at least 90% in the course overall and, in addition, at least 90% on the final exam will be guaranteed a grade of A or higher.

Grades are unofficial until approved by the department and faculty offering the course.

Assignments

There will be 11 assignments, all worth the same amount. Late submissions will not be accepted, and under no circumstances will an individual student be granted an extension to an assignment deadline. There will be no exceptions to these rules. In the very unlikely situation that the instructors deem an extension to an assignment deadline necessary because of a circumstance affecting the whole class, the extension will be granted to all students uniformly. It is not anticipated that such a need will occur.

Please see the section **Missed assignments** below to see what happens in the event of a missed assignment.

Assignments must be submitted via Assign2. Instructions for using Assign2 may be found here:

<https://support.eclass.ualberta.ca/index.php?/Knowledgebase/Article/View/439/1/submitting-assignments-using-assign2-for-students>

Penalty for incorrectly placed images in Assign2

All images uploaded to Assign2 must be uploaded to the specific areas designated to the corresponding questions. That is, the solution to Question 1 on an assignment must be uploaded to the area designated to Question 1, and so on. If the solution to any question is uploaded to the area for a different question, the score for that assignment will be multiplied by 0.9. This penalty will be applied independently of the one described below for incorrectly oriented images. That is, if both infractions occur on a given assignment, the assignment score will be multiplied by $0.9 \times 0.9 = 0.81$.

Penalty for incorrectly oriented images in Assign2

All images uploaded to Assign2 must be the right way up. If any image is upside down or on its side, the score for that assignment will be multiplied by 0.9. This penalty will be applied independently of the one described above for incorrectly

placed images. That is, if both infractions occur on a given assignment, the assignment score will be multiplied by $0.9 \times 0.9 = 0.81$.

Midterm exam

There will be one midterm, lasting 50 minutes, each section (Q1 and R1) having its own exam. It will be held in the same room where your lectures take place, unless your instructor notifies you to the contrary. The date and time, by section, are as follows:

Section	Date of midterm	Time
Q1	Monday 24th February	09:00–09:50
R1	Tuesday 25th February	09:30–10:20

Final exam

The final exam will be 2 hours long. The date, time, and location will be announced on Bear Tracks. To see the tentative date for the final exam, please visit the university's consolidated-exam schedule:

<https://www.ualberta.ca/en/registrar/examinations/exam-schedules/fall-winter-consolidated-exam-schedule.html>

Note that the tentative date and time may change, and only the final date and time announced on Bear Tracks should be considered definite.

Use of materials in exams

Students are not permitted to use notes, books, formula sheets, or calculators in the exams.

Missed midterm

If incapacitating illness, severe domestic affliction, or some other compelling reason, such as a requirement to self-isolate, prevents you from writing the midterm exam, then you may apply for an excused absence. To apply for an excused absence, you must contact your instructor within two working days of the midterm, or as soon as possible thereafter. The instructor may request adequate documentation to substantiate the reason for the absence.

If an excused absence is granted, the weight of the midterm will be transferred to the final exam.

An excused absence is a privilege and not a right. There is no guarantee that an absence will be excused. Misrepresentation of facts to gain an excused absence is a serious breach of the Student Academic Integrity Policy¹.

¹<https://policiesonline.ualberta.ca/PoliciesProcedures/Pages/DispPol.aspx?PID=193&s=https://policiesonline.ualberta.ca/PoliciesProcedures/Pages/A---Z-Listing.aspx>

Deadline to apply for an alternative midterm date

If there is a possibility that you will be prevented from writing the midterm on the specified date because of an official university activity, such as a University of Alberta exam in a different course or a University of Alberta sporting commitment, then you must inform your instructor of such a potential conflict so that arrangements can be made for you to write the midterm in this course on a different date if necessary. The deadline to apply is 23:59 on Friday 24th January. If you miss the midterm because of such a conflict but you failed to apply for a different date or you applied after the deadline, then the weight of your midterm will be transferred to the final exam.

Missed assignments

You may transfer the weights of up to two missed assignments to the final exam. For each of the first two missed assignments, its weight (approximately 1.818%) will be transferred automatically; you do not need to request this to happen. The weights of subsequent missed assignments will not be transferred: there will be no opportunity to transfer the weights of any missed assignments after the second missed assignment. Note also that you may not transfer the weight of any assignment that has been submitted.

Example scenarios of missed term work

- E.g. 1. If you write the midterm but miss two assignments, then your nine submitted assignments will be worth, in total, 16.36% of your overall grade, your midterm will be worth 30%, and your final exam will be worth 53.64%.
- E.g. 2. If you write the midterm but miss three assignments, then two of the missed assignments will have their weights transferred and one will not. Therefore, your eight submitted assignments will be worth, in total, 14.55% of your overall grade, the missed assignment whose weight is not transferred will be worth 1.82% but, having been missed, will contribute zero towards that portion, your midterm will be worth 30%, and your final exam will be worth 53.64%.
- E.g. 3. If you miss the midterm and one assignment (and if your application to transfer the weight of the midterm is successful), then your ten submitted assignments will be worth, in total, 18.18% of your overall grade, and your final exam will be worth 81.82%.

(Continued)

Applications for accommodations for term work or the final exam on non-medical grounds (e.g., religious beliefs)

When a term assessment or final exam presents a conflict based on non-medical protected grounds, students must apply to the Academic Success Centre for accommodations via the Register for Accommodations website:

<https://www.ualberta.ca/current-students/academic-success-centre/accessibility-resources/register/index.html>

Students can review their eligibility and choose the application process specific for *Accommodations Based on Non-medical Protected Grounds*. Non-medical protected grounds are described here:

<https://www.ualberta.ca/current-students/academic-success-centre/accessibility-resources/register/eligibility.html>

It is imperative that students review the dates of all course assessments upon receipt of the course outline, and apply as soon as possible to ensure the timely application of the accommodation. Students who apply later in the term may experience unavoidable delays in the processing of the application, which can impact the accommodation.

Deferred final exam

If incapacitating illness, severe domestic affliction, or some other compelling reason, such as a requirement to self-isolate, prevents you from writing the final exam, then you may apply for a deferred final exam. Such an application must be made to your Faculty Office within two working days of the missed exam and must be supported by appropriate documentation or a statutory declaration². Deferred exams are a privilege and not a right; there is no guarantee that a deferred exam will be granted. The faculty may deny a deferral request if less than 50% of the term work, by weight, has been completed. Misrepresentation of facts to gain a deferred exam is a serious breach of the Student Academic Integrity Policy.

The deferred final exam will take place on Saturday 10th May. Students granted a deferred final exam will receive an email informing them of the time and location. Please keep the entire day available, because the deferred final exam could be in the morning or the afternoon.

Re-examination

A student who writes the final exam and fails the course may apply to the Faculty of Science for a re-examination. Re-examinations are rarely granted in the

²<https://calendar.ualberta.ca/content.php?catoid=44&navoid=13550#attendance>

Faculty of Science. Re-examinations are governed by university-wide Academic Regulations³ and Faculty of Science Academic Regulations⁴. Misrepresentation of facts to gain a re-examination is a serious breach of the Student Academic Integrity Policy.

Policy on regrades of term work

For the midterm and each assignment, you will have the opportunity to request a regrade of a question or questions on that assessment. The regrade request must be made via the form that will appear on eClass after the graded assessment has been returned to students. The period of availability of the regrade request form will be stated in the communication announcing the return of the graded assessment. A regrade may result in a lower score, a higher score, or no change to the score.

Recording of teaching environments and distribution of course content

Audio or video recording of lectures, labs, seminars, or any other teaching environment is allowed only with the prior written consent of the instructors or as part of an approved accommodation plan. The content of this course is solely for students enrolled in the course. Student or instructor content, digital or otherwise, created or used within the context of the course is to be used for personal study only, and is not to be used or distributed for any other purpose without the prior written consent of the content authors.

Academic integrity

The University of Alberta is committed to the highest standards of academic integrity and honesty, as well as maintaining a learning environment that fosters the safety, security, and inherent dignity of each member of the community, ensuring students conduct themselves accordingly. Students are expected to be familiar with the standards of academic honesty and appropriate student conduct, and to uphold the policies of the University in this respect.

Students are particularly urged to familiarize themselves with the provisions of the Student Academic Integrity Policy⁵ and the Student Conduct Policy⁶, and avoid any behaviour that could potentially result in suspicions of academic

³<https://calendar.ualberta.ca/content.php?catoid=44&navoid=13550#examinations-exams>

⁴<https://calendar.ualberta.ca/content.php?catoid=44&navoid=13550#academic-standing>

⁵<https://policiesonline.ualberta.ca/PoliciesProcedures/Pages/DispPol.aspx?PID=193&s=https://policiesonline.ualberta.ca/PoliciesProcedures/Pages/A---Z-Listing.aspx>

⁶<https://policiesonline.ualberta.ca/PoliciesProcedures/Pages/DispPol.aspx?PID=190&s=https://policiesonline.ualberta.ca/PoliciesProcedures/Pages/Academic.aspx>

misconduct (e.g., cheating, plagiarism, misrepresentation of facts, participation in an offence) and non-academic misconduct (e.g., discrimination, harassment, physical assault). Academic and non-academic misconduct are taken very seriously and can result in suspension or expulsion from the University.

All students are expected to consult the Academic Integrity website⁷ for clarification on the various academic offences. All forms of academic dishonesty are unacceptable at the University. Unfamiliarity with the rules, procrastination, or personal pressures are not acceptable excuses for committing an offence. Listen to your instructor, be a good person, ask for help when you need it, and do your own work – this will lead you toward a path to success. Any academic integrity concern in this course will be reported to the College of Natural and Applied Sciences. Suspected cases of non-academic misconduct will be reported to the Dean of Students. The College, the Faculty, and the Dean of Students are committed to student rights and responsibilities, and adhere to due process and administrative fairness, as outlined in the Student Academic Integrity Policy and the Student Conduct Policy. Please refer to the policy websites for details on inappropriate behaviours and possible sanctions.

The College of Natural and Applied Sciences (CNAS) has created an Academic Integrity for CNAS Students eClass site⁸. Students can self-enrol and review the various resources provided, including the importance of academic integrity, examples of academic misconduct and possible sanctions, and the academic misconduct and appeal process. They can also complete assessments to test their knowledge and earn a completion certificate.

Discussion, research, and help in connection with assignments

All assignments must be completed individually, i.e., there will be no group assignments. While discussion of assignments with other people is permitted, as is research on the Internet concerning the topic at hand, what you submit for grading must still be your own work, representing your own thoughts and efforts. Any work you submit that could reasonably be judged to have been obtained or copied from another student, or from any other source, including the Internet, may result in a misconduct case (see the section **Academic integrity** above). Also, if another student obtains or copies your work, then you as well could be subject to a misconduct case. Further guidance can be found on eClass.

Use of AI (Artificial Intelligence)

AI may not be used for any assessment in this course, and its use, if detected,

⁷<https://www.ualberta.ca/en/campus-life/academic-success/academic-integrity/index.html>

⁸<https://eclass.srv.ualberta.ca/enrol/index.php?id=88399>

may result in a misconduct case (see the section **Academic integrity** above).

Technology for learning

To successfully participate in this course, you should have access to a computer with an Internet connection that can support the tools and technologies the university uses to deliver content, engage with instructors, TAs, and fellow students, and facilitate assessment and examinations. If you encounter difficulty meeting the technology requirements, please email the Office of the Dean of Students (dosdean@ualberta.ca) to explore options and support.

Exam conduct

- Your student ID is required at exams so that your identity can be verified.
- You may not begin an exam after it has been in progress for 30 minutes.
- You may not leave an exam until 30 minutes have elapsed since it started.
- At the end of the exam, you must remain in your seat until the invigilator indicates otherwise.

Accessibility-related accommodations

Students granted accessibility-related accommodations must schedule their accommodations in accordance with the deadlines and procedures of the Academic Success Centre. Please visit the following link for more information:

<https://www.ualberta.ca/current-students/academic-success-centre/accessibility-resources/index.html>

Office of the Dean of Students

The Office of the Dean of Students provides support services to students, such as health-and-wellness support, academic support, career development, and experiential learning. More information is available at the office's website:

<https://www.ualberta.ca/dean-of-students/index.html>

Representative evaluative material

For each exam (the midterm and the final exam), a sample paper will appear on eClass at least a week before the date of the exam.

Revisions of the course outline

If any changes to the course outline are necessary, a new version will be posted on eClass and an announcement made. The most recent version of the course outline will supersede all previous versions.