Linear Algebra

Math 244

Instructor Info ——

👤 Reginald L. McGee II, Ph.D.

👤 Pronouns: He/Him/His

🕐 Student Hrs: W 2-3:30pm, F 11:30am-12:30pm or by appointment

📍 Swords 326

☎ x2635

ℹ https://mathcs.holycross.edu/~rmcgee/

@ rmcgee@holycross.edu

Course Info ———

📅 Monday & Wednesday & Friday

🕐 10:00-10:50am

📍 Swords 330

Equity and Inclusion

⚡ You are all welcome and belong here. I will always work to make our classroom a safe place for everyone to contribute, learn, and grow no matter your identity, background, or circumstances. Please do not hesitate to reach out if I can do anything to improve the classroom climate. In addition, I expect our classroom to be a place where we respect one another and support each other's learning.

Overview

MATH 244 is a one semester course that presents the theory of "objects" known as *vector spaces* and *linear transformations* (functions between between vector spaces). The course is often viewed as a new way of thinking and problem solving. Despite the new concepts and vocabulary, we will see the course content arise in previously seen (and future) areas of mathematics and in other disciplines such as economics, chemistry, and population dynamics.

Learning Objectives

- Recognition and application of key results from linear algebra
- Demonstrate proficiency of algebraic manipulations and computations
- Improve written communication skills and exercise verbal communication skills
- Develop an ability to identify major proof techniques
- Develop both independent and collaborative problem solving skills
- Gain familiarity with computational software to accomplish course tasks

Material

Main Texts
Axler, S. (2010). *Linear Algebra Done Right.* Springer.
https://link.springer.com/content/pdf/10.1007/978-3-319-11080-6.pdf

Byth, T.S., & Robertson, E. F. (1998). *Basic Linear Algebra.* Springer.
https://link.springer.com/content/pdf/10.1007/978-1-4471-3496-1.pdf

Other Suggested Texts
Damiano, D. B., & Little, J. B. (2011). *A course in linear algebra.* Courier Corporation.

Other resources
We will be using the *free* online homework package WebWork. Online assignments can be accessed from the Canvas course page.

Topics

- Vector spaces and subspaces (A Sections 1A–C; DL Sections 1.1 and 1.2)
- Matrices, Matrix Arithmetic, Matrix Algebra (BR Chapter 1-4)
- Span, Linear Independence, and Bases (A Sections 2A–C; DL Sections 1.3-1.6)
- Linear Transformations (A Sections 3A–D; DL Chapter 2)
- Determinants (BR Chapter 8; DL Chapter 3)
- Eigenvectors, eigenvalues, and the Spectral Theorem (BR Chapter 9; DL Chapter 4; A Chapter 5)

Grading scheme overview
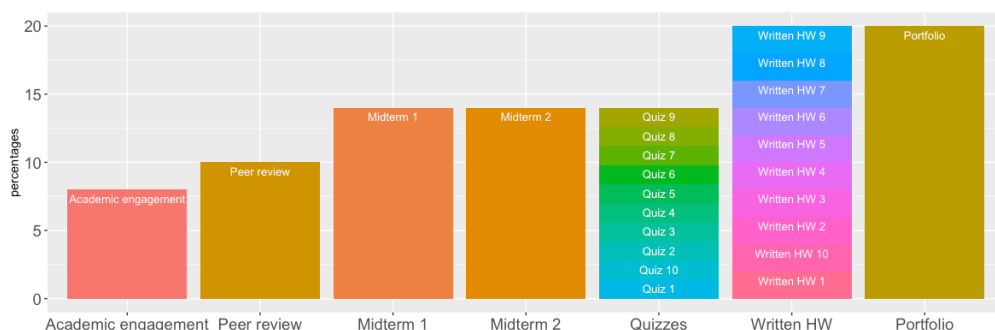
At the end of the semester, total course percentages will be used to determine final grades. I do not use an absolute scale to determine letter grades.

Accommodations for Students with Disabilities

Any student who feels the need for accommodation based on the impact of a disability should contact the Office of Accessibility Services (https://www.holycross.edu/health-wellness-and-access/office-accessibility-services) to discuss support services available. Once the office receives documentation supporting the request for accommodation, the student would meet privately with Accessibility Services to discuss reasonable and appropriate accommodations. The office can be reached by calling 508-793-3693 or by visiting Hogan Campus Center, room 505.

Grading and assignment notes

"The test of a good teacher is not how many questions he can ask his pupils that they will readily answer, but how many questions he inspires them to ask him which he finds it hard to answer." -Alice Wellington Rollins

Your pre-final course percentage will be computed as follows:

Academic Engagement	8 %
Peer review assignment and reflection	10%
Midterm 1	14 %
Midterm 2	14 %
Quizzes	14 %
Written and online Homework	20 %
Final Portfolio	20 %
————————————	———
Total	100 %

  (i) Academic engagement includes effort observed throughout the course, contributing to a positive learning environment by asking questions and collaborating during in-class problem solving/coding, attending student hours, participating in Canvas discussions, proper mask wearing in student hours, answering questions, submitting Creativity in Progress Reflections after in-class problem solving/coding, attending class, etc. You should aim to be doing many of these activities "most of the time" or "all of the time" as opposed to "some of the time" or "none of the time."

 (iia) The online homework is implemented through WebWork and are assigned to promote proficiency with routine linear algebra computations.

 (iib) There will be at most 10 written homework will usually be due on Thursdays by 5pm, it should be uploaded to Canvas. The lowest written homework will be dropped at the end of the semester.

 (iii) There will be at most 10 quizzes. Quizzes cover material since the preceding quiz or hour exam. The lowest quiz grade will be dropped at the end of the semester for a total of 9 quizzes that count for credit.

 (iv) Midterm exams will be 60 minutes and held in Smith Labs 155. The first midterm covers material starting with the beginning of the course and will be more computationally focused. The second midterm covers material starting with material covered since the first midterm exam and be focused on proofs.

   Midterm 1   Wed. March 1st   evening 6:30pm

   Midterm 2   Wed. April 5th   evening 6:30pm

  (v) Written assignments are to be submitted via Canvas. Assignments should be Portable Document Format (PDF) and the filename for the PDF document should be:

   LASTNAME-FIRSTNAME-2023-MATH244-ASSIGNMENTNAME

   These filename guidelines are in part to build good submission habits for when you need to send documents for jobs, interviews, internships, etc. In the case that Canvas is down, you may submit electronically via email from your "g.holycross.edu" address.

 (vi) Instead of a final exam, the course will culminate with a proof portfolio consisting of revised proofs from written homework assignments, midterm 2, and some new proofs. Previous homework proofs will be selected by the student to reflect specified proof techniques.

NOTE: I will follow universal design principles and allow every student time and a half on quizzes and midterms.

NOTE: Any end of semester travel arrangements must be made for after the final exam period.

NOTE: While you are allowed and encouraged to work on homework problems with your classmates, the solutions you turn in to be graded should be your own. Take care to write up solutions in your own words. Plagiarism will not be tolerated and will be treated as a violation of both the departmental policy on academic integrity and the college's policy on academic honesty.

NOTE: LATE homework will NOT be accepted unless arranged ahead of time.

When life happens

Life happens to all of us and it is important to recognize each other's humanity. Moreover, it is important to emphasize that your health and wellbeing are the most important outcomes of the course. The dropped assignment and assessment are built into the course for exactly when life happens. If you need to miss an exam, please let me know as soon as you become aware of the conflict. The more advance notice helps the amount of options that can be considered. If there is an ongoing situation in your life, please let me and your Class Dean know as soon as possible so that we can try to accommodate.

Covid-19

- If you feel sick, do not come to class. If you have an active cough, please wear a mask for class.
- For the safety of everyone, masks are required over your nose and mouth during student hours. You will be asked to leave if you are noncompliant.

Calculators

Graphing calculators have become the de facto norm for high school and college mathematics and science courses. The use of calculators is allowed during in-class activities and homework, but are prohibited on quizzes. Quizzes will be written so that calculators are not required. Keep in mind that while it is useful to be fluent in the use of calculators, calculator fluency alone is not a substitute for understanding.

How to do well in this course

- Attend class, participate, and ask questions. Having questions means that you are processing the material, never hesitate to ask questions.
- Go over your lecture notes as soon after class as possible. Google Ebbinghaus forgetting curve for more on why.
- Start working on homework as soon as it is assigned.
- Visit office hours, even if you don't have questions it's good to simply discuss material.
- Read and work through the textbook and previous notes in preparation for class.
- Study topics iteratively and work towards developing a growth mindset.

Academic Integrity

The Department of Mathematics and Computer Science has drafted a policy on academic integrity to precisely state our expectations of both students and faculty with regards to cheating, plagiarism, academic honesty, etc. You are required to read this policy and sign a pledge agreeing to uphold it. A violation of the Departmental Policy on Academic Integrity will result in a 0 for that assignment (or exam) and a letter describing the occurrence of academic dishonesty will be sent to your Class Dean.

The College's Academic Integrity Policy can be found: `https://catalog.holycross.edu/node/1381#AHP`

NOTE: There will be a ritual before every exam where we all turn off our phones and places them inside our bags. If you have a potential emergency where you need to have your phone on discuss with me before the exam.

Attendance and excused absences

Students are expected to attend class regularly and to fulfill all obligations of the course as outlined on this syllabus and discussed during class. Students should also read and abide by the College's Class Attendance Policy: https://www.holycross.edu/sites/default/files/files/registrar/excused_absence_policy.pdf.

Disclaimer

Topics covered on a given day may change slightly depending on the pace set for the course. The following may be changed, but only in the event of an emergency such as school closure: due dates for homework, dates for exams, and topics covered on each exam. If this occurs, it will be announced as soon as possible electronically and in class. I reserve the right to correct typographical errors on this syllabus without comment. If you're having an issue with me or the course and do not feel comfortable bringing it up to me, you can reach out to the department chair (Prof. Soares, esoares@holycross.edu), your class dean, or a faculty member you feel comfortable with.