

COURSE INFORMATION FOR MATH2211 (SPRING 2022) HONORS LINEAR ALGEBRA

Instructor: Yongyi Chen

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Lectures: MWF 12:00 pm–12:50 pm in Campion Hall 9

Homework: Weekly, due on Wednesdays at 11:59 pm.

Office: Maloney 532

Office hours: (tentative) Mondays 2-3 pm in Maloney 532, Tuesdays 4-6 pm over Zoom

1. COURSE INFORMATION

Course website. On Canvas. There you will find homework assignments, homework solutions, and supplemental course materials.

Course format. In person. 1 office hour is provided in person in my office and 2 office hours will be over Zoom.

Textbooks. There is no official textbook for the course. We will follow the notes written by Prof. Keane for the Spring 2019 version of the course. The notes can be found on Canvas. For a few topics we will follow *Linear Algebra Done Right* by Sheldon Axler, available on SpringerLink.

In addition to these course notes, you may find the following textbooks useful:

- *Linear Algebra Done Wrong* by Sergei Treil. Available free online.
- An experimental linear algebra zyBook (more information on Canvas).

Homework. There will be weekly homework, due on Wednesdays at 11:59 pm. Because homework solutions will be posted on Canvas, late homework will not be accepted. To submit your homework, upload a single PDF file to Gradescope (accessible from within the Canvas assignment page as well).

You are encouraged to collaborate on homework with your classmates, but the work that you turn in must be your own and must be written in your own words. Working together is good; copying somebody else's work is plagiarism.

One of the primary differences between this course and its non-honors variant is the emphasis on careful mathematical reasoning and proof. As such, writing style counts as much as having the right answer (often you will be told the answer and asked to justify it). Homework solutions must be written in complete sentences, and must be clear, concise, and readable. A correct but poorly expressed solution will not receive full credit.

Typesetting your homework using LaTeX is strongly encouraged, but not required.

Exams and grading. There will be two in-class exams (50 minutes each) and a final (120 minutes). Final grades will be determined by a weighted average of homework and exam scores. Homework counts for 20%, each in-class exam counts for 20%, and the final counts for 40%.

All exams will be given in class.

Academic integrity. Cheating of any kind will result in a failing grade for the course and referral to the Dean's office for disciplinary action. For more information on academic integrity see <https://www.bc.edu/integrity>.

2. LIST OF TOPICS

- (1) Warm-up
 - Sets, fields, functions, induction, complex numbers
- (2) Vector spaces
 - Subspaces, span, and linear independence
 - Bases and dimension
- (3) Linear transformations
 - Linear transformations and matrices
 - Kernels, images, and invertibility
 - Products, quotients, and duals
- (4) Gaussian elimination
 - Systems of linear equations
 - Row reduction and elementary matrices
 - Computing inverses
- (5) Determinants
 - Determinants and invertibility
 - Expansion by minors
 - Cramer's rule
- (6) Spectral theory
 - Polynomials
 - Eigenvectors and eigenvalues

- The characteristic polynomial
 - Diagonalizing matrices
- (7) Other topics, as time permits:
- Inner product spaces
 - The Cayley-Hamilton theorem and Jordan normal form