

MTH 309 - Intro to Linear Algebra

Course Syllabus

Course information

Course number: MTH 309

Course name: Introduction to Linear Algebra

Course credits: 4

Catalog description: Linear equations, matrices, determinants, vector spaces, linear mappings, inner products, eigenvalues, eigenvectors. *Section number:* 21368

Section format: Lecture

Class times: MWF 1:50 - 2:40 PM

Class location: Norton 218

Textbook: "Matrix Theory and Linear Algebra" open source text book

<https://www.mathstat.dal.ca/~selinger/linear-algebra/>

Instructor information

Instructor: Richard Hollister Ph.D. (He, Him, His)

Email: rahollis@buffalo.edu

Office location: Math Building 326

Office hours: MW 3:00 - 4:00 PM

About me: I recently graduated with my PhD in Mathematics from Western Michigan University. My research interests include Linear Algebra, Matrix Theory, and Numerical Analysis. This is my second year as a visiting Assistant Professor here at UB, and I am teaching MTH 309 and MTH 337. Outside of academics, I enjoy teaching snowboarding at all skill levels and coaching track and field.

Lecture information

Grades

Grades will be distributed as follows:

Homework	Quizzes	Exam 1	Exam 2	Exam 3	Final Exam
20%	10%	15%	15%	15%	25%

Grades will be available to view at this online spreadsheet. Grades will be listed by the alias you have given in the course survey.

Homework

Throughout the semester we will have homework assignments using UBx, <http://learning.buffalo.edu>. You must create an account using your UB email address and when prompted, select our course to enroll. Homework assignments will consist of several small modules that could have one or multiple questions. There are only two deadlines to remember when it comes to

homework: Oct 10 at 11:59PM, and Dec 12 at 11:59PM. See the List of Assessments at the end of the syllabus for pacing.

Quizzes

Each Monday (except for exam weeks) we will have a quiz over the material from the previous week. The quiz will typically consist of two questions that you will have 15 minutes to answer. Due to Labor Day recess, our first quiz will be on Sep 8th.

The lowest two quiz grades will be dropped at the end of the semester.

Exams

There will be three exams during the semester. Exam dates can be found in the List of Assessments at the end of this syllabus. Each exam will consist of about 5 questions relating to material covered in lecture.

Final exam

We will have a cumulative final exam during finals week. This final exam will be two hours long and will cover all material from the course. The final exam is on Friday 12/17 from 11:45 AM to 1:45 PM.

Recitation information

21369

Instructor: Lingqi Meng, email lingqime@buffalo.edu

Meeting time: W 4:10 - 5:00 PM

Meeting location: Talbrt 106

Office hours: TR 2:00 - 3:00 PM in Math 130

21370

Instructor: Lingqi Meng, email lingqime@buffalo.edu

Meeting time: F 4:10 - 5:00 PM

Meeting location: Clemen 102

Office hours: TR 2:00 - 3:00 PM in Math 130

Additional information

Important dates

- Aug. 30: first day of classes
- Sep. 6: Labor Day recess
- Sep. 7: last day to drop/add

- Nov. 12: last day to resign
- Nov. 24 - 27: Fall recess
- Dec. 10: last day of classes

Academic integrity

Academic integrity is critical to the learning process. It is your responsibility as a student to complete your work in an honest fashion, upholding the expectations your individual instructors have for you in this regard. The ultimate goal is to ensure that you learn the content in your courses in accordance with UB's academic integrity principles, regardless of whether instruction is in-person or remote. Thank you for upholding your own personal integrity and ensuring UB's tradition of academic excellence. The academic integrity policy is available at <https://www.buffalo.edu/academic-integrity.html>.

Collaboration is encouraged on homework assignments, but **each student must write up the solutions to each problem on their own**. This means you can discuss the homework problems with each other, but you must solve the problems yourself. Exams must be completed on your own with no help from notes, books, friends, technology (calculator or computer), or the internet. Any student found to be in violation of academic integrity will receive a zero on the assignment or exam in question.

Accessibility resources

If you have any disability which requires reasonable accommodations to enable you to participate in this course, please contact the Office of Accessibility Resources in 60 Capen Hall, 716-645-2608 and also the instructor of this course during the first week of class. The office will provide you with information and review appropriate arrangements for reasonable accommodations, which can be found on the web at: <http://www.buffalo.edu/studentlife/who-we-are/departments/accessibility.html>.

Sexual violence

UB is committed to providing a safe learning environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic and dating violence and stalking. If you have experienced gender-based violence (intimate partner violence, attempted or completed sexual assault, harassment, coercion, stalking, etc.), UB has resources to help. This includes academic accommodations, health and counseling services, housing accommodations, helping with legal protective orders, and assistance with reporting the incident to police or other UB officials if you so choose. Please contact UB's Title IX Coordinator at 716-645-2266 for more information. For confidential assistance, you may also contact a Crisis Services Campus Advocate at 716-796-4399.

Mental health

As a student you may experience a range of issues that can cause barriers to learning or reduce your ability to participate in daily activities. These might include strained relationships, anxiety, high levels of stress, alcohol/drug problems, feeling down, health concerns, or unwanted sexual experiences. Counseling, Health Services, and Health Promotion are here to help with these or

other issues you may experience. You can learn more about these programs and services by contacting:

Counseling Services:

- 120 Richmond Quad (North Campus), 716-645-2720
- 202 Michael Hall (South Campus), 716-829-5800

Health Services:

- Michael Hall (South Campus), 716-829-3316

Health Promotion:

- 114 Student Union (North Campus), 716-645-2837

UB portfolio

If you are completing this course as part of your UB Curriculum requirements, please select an ‘artifact’ from this course that is representative of your learning and save it in a safe location with a clear title. Your final UB Curriculum requirement, UBC 399: UB Curriculum Capstone, will require you to submit these ‘artifacts’ as you process and reflect on your achievement and growth through the UB Curriculum. Artifacts include homework assignments, exams, research papers, projects, lab reports, presentations, and other coursework. For more information, see the UB Curriculum Capstone website: <https://www.buffalo.edu/ubcurriculum/capstone.html>.

List of assessments

Week	Assessment	Completion Date
1	Course Survey	9/3
2	Quiz 1 HW Part 1	9/8 9/12
3	Quiz 2 HW Part 2	9/13 9/19
4	Quiz 3 HW Part 3	9/20 9/26
5	Exam 1	9/27
6	Quiz 4 HW Part 4	10/4 10/10
7	Quiz 5 HW Part 5	10/11 10/17
8	Quiz 6 HW Part 6	10/18 10/24
9	Exam 2	10/25
10	Quiz 7 HW Part 7	11/1 11/7
11	Quiz 8 HW Part 8	11/8 11/14
12	Quiz 9 HW Part 9	11/15 11/21
13	Exam 3	11/22
15	Quiz 10 HW Part 10	12/6 12/12
	Final Exam	12/17

Topics by week

Week	Dates	Topics to be covered
1	8/30 - 9/3	Systems of linear equations, the matrix equation, Gaussian elimination, echelon forms.
2	9/6 - 9/10	Applications of systems of linear equations.
3	9/13 - 9/17	More with matrix equations.
4	9/20 - 9/24	Vector spaces, subspaces, span, linear independence.
5	9/27 - 10/1	Exam 1, linear transformations, matrix representations.
6	10/4 - 10/8	linear transformations in \mathbb{R}^2 , one-to-one, onto.
7	10/11 - 10/15	Basis, dimension, coordinates, rank, nullity, change of basis.
8	10/18 - 10/22	Matrix algebra, multiplication, inverse, composition of transformations.
9	10/25 - 10/29	Exam 2, transformations of \mathbb{R}^2 and area, determinants.
10	11/1 - 11/5	Calculating determinants, determinants and inverses, determinants and basis.
11	11/8 - 11/12	Norms, inner products, orthogonality, Gram-Schmidt orthogonalization.
12	11/15 - 11/19	Projections, least squares, pseudo-inverse, SVD.
13	11/22 - 11/26	Exam 3, Fall recess.
14	11/29 - 12/3	Characteristic polynomial, eigenvalues, eigenvectors, diagonalization, systems of differential equations.
15	12/6 - 12/10	Floating point numbers, errors in computation, conditioning of a system, condition number, review for final exam.