Policies

Attendance: While this is a fully-online course with no required in-person meetings, your engagement and participation in class activities is crucial to your success. Any synchronous online activities will be scheduled in consultation with you to ensure your availability.

Basic Needs: Any student who faces challenges securing food, housing, or other basic needs and believes this may affect their performance in this course is urged to contact Ms. Denine Rocco, Dean of Students (508-531-1276 drocco@bridgew.edu). Please also notify your instructor if you are comfortable doing so.

Collaboration: Working collaboratively with your classmates is highly encouraged. However, the work you hand in on individual assignments must be your own. Collaboration on assignments which do not permit collaboration will constitute a violation of the BSU Policy on Academic Integrity.

Disability Resources: In compliance with BSU policy and equal access law, your instructor is available to discuss appropriate accommodations you may require as a student with a disability. Requests for academic accommodation must be made during the add/drop period. Students are encouraged to register with the Disability Resources Office (Academic Achievement Center, Maxwell Library) for verification and determination of reasonable academic accommodations.

Tutoring: Math Services in the Academic Achievement Center supports this course during academic semesters. This summer, regular tutoring support will not be available for this course. Please use your classmates and instructor for additional help.

Learning Goals, Standards, & Dates

Dates listed subject to change.

Goal One: Describe the solution space of a linear system. **[A] Ch1**

1.A Solve systems of linear equations, written in equation form or augmented-matrix form, using row operations and Gaussian elimination.
1.B Characterize the solution set of a system of linear equations using appropriate notation and vocabulary, distinguishing consistent from inconsistent.
1.C Identify the pivots in a system of linear equations and discuss their effects on the nature of the system's solution set.
1.X Understand precise mathematical definitions in order to determine whether a given object satisfies them or not.

Portfolio 1 Due to Blackboard: Monday, June 4th

Goal Two: Use linear systems to infer properties of transformations. **[A] Ch2**

2.A Perform algebraic operations on vectors (addition and scalar multiplication).
2.B Perform algebraic operations with matrices, including addition, subtraction, scalar multiplication, matrix multiplication, transposition.
2.C Determine the inverse of a matrix using Gaussian elimination and use the inverse to solve a linear system.
2.D Determine if a given vector is a linear combination of a given set of vectors.
2.E Find a basis for the row space, column space, and null space of a matrix.
2.W Model phenomena using vectors and matrices and solve applied problems.
2.X Determine whether a subset of a vector space is a *vector subspace* (or not).
2.Y Determine whether (or not) a set of vectors is *linearly independent*, a *spanning set* for a given vector subspace, and a *basis* for that subspace.
2.Z Demonstrate theoretical connections related to matrix algebra, especially those related to invertibility of a matrix, its rank, and its nullity.

Portfolio 2 Due to Blackboard: Friday, June 22nd

Goal Three: Use transformations to define and change coordinates. **[A] Ch3**

3.A Determine the coordinate expression of a given vector with respect to a given basis.
3.B Construct and use invertible matrices that effect *changes of coordinates*.
3.C Given its effect on basis vectors, *determine a matrix representing a linear transformation*.
3.D Calculate the determinant of a square matrix using row-reduction, LU factorization, and/or cofactor expansion strategies.
3.X Demonstrate theoretical connections relating determinants of square matrices with the properties of those matrices.

Portfolio 3 Due to Blackboard: Monday, July 16th

Goal Four: Classify geometry of transformations using eigenvectors. **[A] Ch4**

4.A Determine the eigenvalues of a square matrix and their multiplicities, by finding and solving its characteristic polynomial equation.
4.B Determine eigenvectors of a matrix associated to a given eigenvalue and (where appropriate) a basis for the associated eigenspace.
4.C Classify the geometric effects of a given matrix using its eigenvalues and eigenvectors, and use *diagonalization to "DIY" a matrix* with desired effects.
4.X Demonstrate theoretical connections between eigenvalues/eigenspaces and other important properties of square matrices.

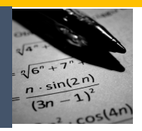
Portfolio 4 Due to Blackboard: Friday, August 3rd
Portfolio 5 (Final Exam) Due: Friday, August 10th

Linear Algebra

BRIDGEWATER STATE UNIVERSITY

MATH 202–W01 **Summer 2018** **Web-Only Course**

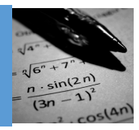
What You'll Learn



- Determine the solution sets of $A\mathbf{x} = \mathbf{b}$ and apply them to draw conclusions about vector spaces & linear transformations.
- Compute determinants and eigenvectors for square matrices and discuss their geometric interpretations.
- Discover and communicate mathematical proofs with clarity and precision.

4

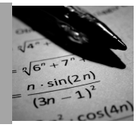
How You'll Learn It



Linear algebra is a broad subject that takes time to master. Our *standards-based grading* gives you several opportunities to show how your understanding of each topic is improving over time, letting you focus most on what you're still learning and less on what you've already mastered.

2-3

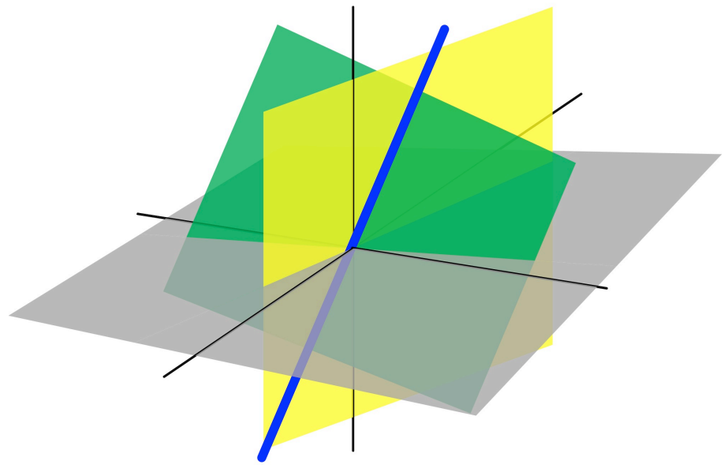
You Should Know



Find course learning standards, policies, important dates for the semester, and information on tutoring here.

4

Dr. Matt Salomone
msalomone@bridgew.edu
DMF Science, Room 433
Office Hours: Online, TBA
Twitter: @matthematician #MATH202



Transform Your Thinking.

It's one thing to say you can solve an equation.
It's another to know what your solution *says*.

Linear algebra is a bridge from concrete ways of thinking about mathematics to more abstract forms of reasoning. We'll begin with familiar strategies for solving equations, but as we develop our senses we'll soon be able to see those strategies as special cases of a far more general theme — vectors and linear transformations — that unites a wide variety of both theories and applications of mathematics. That is what lends linear algebra its power and its versatility for all who practice math in their field.

Single-Variable Calculus II (MATH 162) and Transition to Advanced Math (MATH 180) are prerequisites for this course. Either or both may be taken concurrently.

Course information continued on Page 2

Progress, Not Points: Our Grading Specifications

Here are the learning activities of our course, and the specifications to which each is assessed.

Making the Grade: Your Progress Chart

Check off your progress in each learning area *from left to right* on this chart.

Mastering mathematics requires a significant investment of time and struggle. Our grading system gives many opportunities to show what you know. It's most important that *you learn, not* when *you learn!*

Does the work demonstrate understanding of the concept & meet expectations?

YES — Full Mark ☑ Is it complete & well communicated?

NO — No Mark Yet ☐ Is there evidence of partial understanding?

YES **Exemplary**	NO **Meets Standard**	YES **Re-Assess**	NO **Not Assessed**
Computational Standards: The skills involving simplifying expressions, solving equations, and computing key properties of linear transformations.	Most solutions are CORRECT, COMPLETE, CLEAR, CONCISE, includes explanations, **and** are typeset. Solutions others could learn from.	Solution shows sufficient understanding that no additional instruction or review is needed. May include minor errors or small gaps in reasoning.	**Review & Reassess.** Significant gaps in approach, reasoning, or communication are present, requiring additional instruction.	Solution shows little understanding: an inconsequential attempt at solving the problem, *or* too many individual errors to revise each one.
Conceptual Standards: The skills to make connections among precise mathematical definitions and write effective proofs.	≥5 typeset proofs presented with airtight logic, effective writing, careful notation.	≥3 typeset proofs presented that apply sound logic but may have minor errors or gaps.		
Course Engagement: The sum total of your regular participation in reading annotations, discussions, video boards, hangouts.		Participated in 75% or more of available activities during a portfolio period.		Did not participate in 75% or more available activities during a portfolio period.
Pecha-Kucha Projects: Two projects to produce videos illustrating a key definition and an authentic application of linear algebra.	Meets all M criteria, *and* presents at least one connection or application beyond the scope of our course.	Video adequately addresses the assignment, is in Pecha-Kucha format, and contains no significant errors.	Video may be missing some information, contain factual errors, or is not in Pecha-Kucha format.	Video is not relevant to the assignment, or is not submitted on time.
WeBWorK Total Score: Your online homework and practice environment.		Problem scored as correct prior to its due date.		Problem not scored as correct when due date passes.

Learning Progress, Attainment, & Engagement: "The Bundle"

To complete a bundle, check *every* box in its column.

No partial credit is awarded. No box may be checked unless all boxes to its left are checked.

Insufficient F	**Beginner D**	**Intermediate C**	**Advanced B**	**Master A**
	☐☐☐☐☐	☐☐☐☐	☐☐☐	☐☐☐
	☐	☐☐	☐☐	☐☐
	☐	☐	☐	☐
			☐	☐
	☐ **≥60**	☐ **≥90**	☐ **≥120**	☐ **≥150**

Plus/Minus

C– needed for prereq/transfer

A maximum seven (7) **E** marks may be received: one (1) per portfolio, and one per project.

Check here from top to bottom for each **E** received. The plus or minus shown will attach to your final grade.

(none) –
☐ –
☐
☐
☐ +
☐ +
☐ +

***Computation Standards:** 1.A☐ B☐ C☐ 2.A☐ B☐ C☐ D☐ E☐ 3.A☐ B☐ C☐ D☐ 4.A☐ B☐ C☐

***Conceptual Standards:** 1.X☐ 2.W☐ X☐ Y☐ Z☐ 3.X☐ 4.X☐

Course Resources

This course makes use of Open Educational Resources and software.

Course Website: **matthematics.com/ola**

Your Preceptor: **Meryl Ohrenberger** (mohrenberger@student.bridgew.edu) will be facilitating online discussions of the Conceptual Standards of the course.

Required Text: [A] Austin, D. *Understanding Linear Algebra.* Open Educational Resource (CC-BY licensed), linked through the course website.

Optional Text: [L] Lay, D. *Linear Algebra and its Applications.* 4th Edition. Addison-Wesley. ISBN 0-321-38517-9. *Recommended for students planning advanced study.*

Calculators: Calculators of any kind are permitted for use on quizzes and exams at all times, unless specified otherwise.

Online Accounts: Several free online tools will be used in this course; see the course website for details.