

# Course Syllabus for Linear Algebra MAT4832 (MATH217—BSU Dual Credit)

## General:

Instructor: Joshua Ruark                      Office: Wagoner 150  
Day/ Time: MWRF 11AM, Noon              Office Hours: MWF 1-4 PM; R 10-11AM; 2-3PM  
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## Required materials:

1. Linear Algebra with Applications, 5<sup>th</sup> Edition, Otto Bretscher, 2013
2. Texas Instruments TI-89 or TI-nSpire graphing calculator; Mathematica Software

## Pre-requisite:

C- or better in MATH 4005 (BSU--MATH 162) or MATH 4123/4 (BSU—165) or permission of the department chairperson.

## Course Description:

Theory and application of systems of linear equations, vector equations, linear transformations, vector spaces, and inner product spaces. Includes the use of computer software.

## Course Objectives:

Students will learn to solve basic computational problems involving systems of equations, matrices, vector spaces and linear transformations. Students will master fundamental concepts and will learn to use precise language related to the theory of vector spaces and linear transformations. Students will become acquainted with technology (e.g. calculators and/or computer software) that is helpful in solving computational problems in linear algebra.

## Course Rationale:

Linear algebra is a fundamental topic in mathematics that finds wide application in computer science, engineering, physics, and other fields. It is fundamental in solving certain types of systems of equations (namely, linear equations). Further, since many systems can be approximated by linear systems, the techniques of linear algebra provide powerful tools in solving applied problems. Finally, many geometric transformations (e.g. rotations and reflections of the plane) are linear transformations, and because of this, linear algebra has important connections to geometry.

## Course Content:

Linear equations and vector equations; Gaussian elimination. Matrix algebra and linear transformations. Determinants. Vector spaces and subspaces: linear independence and spanning; dimension, coordinates, and change of basis. Null space, column space, and rank of a matrix. Eigenvalues and eigenvectors of a linear transformation. Inner products, orthogonality, and projections. Diagonalization of symmetric matrices. Applications and advanced topics at the discretion of the instructor.

## Grading:

Grades for the course and assignments are assigned by the following percentages:

	100-93 — A	92-90 — A-
89-88 — B+	87-83 — B	82-80 — B-
79-78 — C+	77-73 — C	72-70 — C-
<70 — D*		

The final grade in the course will be determined by the following factors:

Homework:	10%
Quizzes:	10%
Midterm exams:	60%
Final Exam:	20%

### Assignments:

For nearly every section, there will be a homework assignment. Homework will be collected on a regular basis and checked for both completeness and accuracy. Expect quizzes on a near weekly basis that will cover material discussed the previous two weeks in class. Depending on the number of quizzes, I will drop up to the lowest three scores from consideration for the overall quiz grade. At the end of each chapter or couple of chapters, there will be a midterm exam covering that material. Finally, at the end of the course, you will have a final exam that will encompass all the material presented during the semester. As the final exam is cumulative, its score will replace any lower midterm exam scores throughout the semester.

### Academic Integrity:

As a firm believer that grades should reflect learning, academic integrity is paramount to the academic experience. Please review the Academy's Academic Integrity policy as it will be strictly adhered to in my class.

Examples of behavior subject to review under the Academic Integrity policy include, but are not limited to:

- 1, Copying someone's work and turning it in as one's own
- 2, Use of aids and/or other materials on quizzes and exams without expressed permission.
- 3, Use of calculators when explicitly forbidden to do so.
- 4, Copying another person's work or answers on a quiz or exam.

I encourage you to work in groups when doing the homework assignments as much can be learned from your peers that you may not always pick up in class. However, each individual is required to turn in work in their own handwriting accompanied by the requisite work shown to receive full credit.

### Technology:

We will use technology extensively in this course to visualize the problems we will be solving. It is strongly recommended that you familiarize yourself with the models of calculator listed above. We will also be using Mathematica Software (see Canvas for access information) in conjunction the TI-nSpire (or TI-89) calculator to solve problems and model concepts discussed in class. This includes solving matrices and finding eigenvalues and vectors.

### Attendance:

Attendance will be taken at the beginning of the hour. You are responsible to be on time for each class period. Arrival within the first 10 minutes of class will constitute a tardy, otherwise you will be marked absent. Failure to attend class will result in disciplinary action as set forth by Academy policy regarding absences and tardies.

### Late Work/ Make-up policy:

It is my policy not to accept late work/ allow make-up work unless there is an excused absence the day an assignment was due. If you can't be in class the day an assignment is due, please bring it by my office. If you miss a quiz or exam due to an excused absence, it is up to you to schedule a time with me (office hours or other) during which you can take the exam or quiz. You must contact me within a week of the missed assignment and complete the assignment within two weeks of missing it.

### Office Hours:

My office hours are posted at the top of the syllabus, but if my door is open, feel free to stop by, even if you don't have any specific questions. However, there may be times I have work that must get done, so please don't be offended if I ask you to leave if it is not an official office hour time.

### Institutional Diversity:

Ball State University aspires to be a university that attracts and retains a diverse faculty, staff, and student body. We are committed to ensuring that all members of the community are welcome, through valuing the various experiences and worldviews represented at Ball State and among those we serve. We promote a culture of respect and civil discourse as expressed in our Beneficence Pledge and through university resources found at <http://cms.bsu.edu/campuslife/multiculturalcenter>.

### Mask Policy:

The Indiana Academy will follow [Ball State University's mask policy](#) (see Section IV). Based on current CDC guidance recommending the wearing of face masks for all people—regardless of vaccination status—in public indoor settings in communities where the rate of coronavirus transmission is high or substantial, all employees, students, and campus visitors are required to wear a mask while inside any University building. This requirement is effective on August 9, 2021. Fully vaccinated people are not required to wear masks outdoors.

Individuals who are not fully vaccinated for COVID-19 are required to wear face masks while inside campus buildings and outside when physical distancing cannot be maintained.

If a student declines to wear a face mask as required, the student will be referred to the Director of Academic Affairs or the Director of Residential Affairs. If the situation occurs in a classroom or other academic setting, it is considered a classroom management issue, and the teacher will remind the student of the requirement and give the student a chance to comply with it prior to referring the matter to the Director of Academic Affairs or the Director of Residential Affairs. Wearing masks is crucial to preventing the spread of COVID-19 to others.

## Schedule

Week of	M	W	R	F
16-Aug	Syllabus/ Sec. 1-1	Sec. 1.1	Sec 1.2	Sec. 1.2-Q
23-Aug	Sec. 1.3	Sec. 1.3	Sec. 2.1	Sec. 2.1
30-Aug	Sec. 2.2	Sec. 2.2-Q	Sec. 2.3	Sec. 2.3
6-Sep	No class	Sec. 2.4-Q	Exam Review	Exam 1
13-Sep	Sec. 3.1	Sec. 3.1	Sec. 3.2	Sec. 3.2-Q
20-Sep	Sec. 3.3	Sec. 3.3	Sec. 3.4	Sec. 3.4-Q
27-Sep	Sec. 4.1	Sec. 4.1	Sec. 4.2	Sec. 4.2-Q
4-Oct	Sec. 4.3	Sec. 4.3	Exam review	Exam 2
11-Oct	No class	No class	No class	Sec. 5.1
18-Oct	Sec. 5.1	Sec. 5.2	Sec. 5.2	Sec. 5.2-Q
25-Oct	Sec. 5.3	Sec. 5.3	Sec. 5.3	Sec. 5.4
1-Nov	Sec. 5.4	Sec. 5.4-Q	Sec. 6.1	Sec. 6.1
8-Nov	Sec. 6.2	Sec. 6.2-Q	Review	Exam 3
15-Nov	Sec. 7.1	Sec. 7.1	Sec. 7.2	Sec. 7.2-Q
29-Nov	Sec. 7.3	Sec. 7.3	Sec. 7.5	Sec. 7.5-Q
6-Dec	Review	Exam 4	Final Review	Final Review