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

General:

Instructor: Joshua Ruark Office: Wagoner 150

Day/ Time: MTWF Noon Office Hours: MWF 1:30-3:30PM, R 8:30AM-12:30PM

Phone Number: 765-285-7410 Email: jjruark@bsu.edu

Required materials:

1. Linear Algebra with Applications, 5th 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 132) or MATH 4123/4 (BSU—MATH165) 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 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.

Unexcused Absence

It is the policy of the Indiana Academy that any absence from class is unexcused, except for illness, death in the family, college or school-related activities, and extenuating circumstances. When a student is absent from a class, the instructor reports the student absence to the Faculty Attendance Coordinator in the Office of Academic Affairs. Unless the absence is excused by a school official, it is considered unexcused. The decision as to whether an absence is excused is not determined by the instructor.

Any unsubmitted assignment that is due on the day of an unexcused absence is subject to receiving a grade of “0” with no possibility of changing the grade. The only exception is an exam, which will still be recorded as a “0” but may be replaced with a higher percentage attained on the final exam minus ten percent.

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 is due. Even when absent, you can place the assignment in my mailbox before I leave school for the day and it is still considered on-time. If the absence is excused, it is due the day you return to class. If you know you will be absent the day of a quiz/exam, please let me know ahead of time so we can schedule a time outside of class for you to take the quiz/exam. If the excused absence is unexpected and a retake is not possible, the next exam will cover the quiz grade, and the exam grade will not be entered until the final exam percentage replaces the blank.

Personal Responsibility

Learning, by definition, is an individual experience. No one can learn for you, just as no one can eat, sleep, or breathe for you. If you are having difficulties in this course (or any course for that matter), it is your responsibility to seek help. Your first avenue should be to come to office hours, then seek outside tutoring. When seeking assistance, it is not recommended that you say, “I don’t understand this.” This conveys a lack of effort to learn the material and an attitude of giving up. Saying, “Can you help me understand this?” conveys a willingness to learn and put forth the requisite amount of effort to master the material. I am more than willing to help anyone who is willing to put in the time and energy required to learn to the best of their ability.

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 here.

Schedule

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Week of | M | T | W | F |
| 14-Aug | Syllabus | Sec. 1.1 | Sec 1.2 | Sec. 1.2-Q |
| 21-Aug | Sec. 1.3 | Sec. 2.1 | Sec. 2.2 | Sec. 2.2-Q |
| 28-Aug | Sec. 2.3 | Sec. 2.3 | Sec. 2.4 | Sec. 2.4-Q |
| 4-Sep | No class | No class | Exam Review | Exam 1 |
| 11-Sep | Sec. 3.1 | Sec. 3.1 | Sec. 3.2 | Sec. 3.2-Q |
| 18-Sep | Sec. 3.3 | Sec. 3.3 | Sec. 3.4 | Sec. 3.4-Q |
| 25-Sep | Sec. 4.1 | Sec. 4.1 | Sec. 4.2 | Sec. 4.2-Q |
| 2-Oct | Sec. 4.3 | Sec. 4.3 | Exam review | Exam 2 |
| 9-Oct | No class | Sec. 5.1-Thurs | No class | Sec. 5.1 |
| 16-Oct | Sec. 5.2 | Sec. 5.2 | Sec. 5.2 | Sec. 5.3-Q |
| 23-Oct | Sec. 5.3 | Sec. 5.3 | Sec. 5.4 | Sec. 5.4-Q |
| 30-Oct | Sec. 5.5 | Sec. 5.5 | Sec. 6.1 | Sec. 6.1-Q |
| 6-Nov | Sec. 6.2 | Sec. 6.2 | Sec. 6.3 | Sec. 6.3-Q |
| 13-Nov | Review | Exam 3 | Sec. 7.1 | Sec. 7.2 |
| 27-Nov | Sec. 7.2-Q | Sec. 7.3 | Sec. 7.3 | Sec. 7.5 |
| 4-Dec | Sec. 7.5-Q | Sec. 8.1 | Review | Exam 4 |

 |  |  |  |  |
|

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 11-Dec | Final Review | Final Review | Final Review |  |

 |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |