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

General:

Instructor: Joshua Ruark Office: Wagoner 150

Day/ Time: MTWF 8 AM Office Hours: MWF 11:30AM-12:30 PM; MW 3-4:30 PM

T 11AM-1PM; R 10-Noon

Phone Number: 765-285-7410 Email: [jjruark@bsu.edu](mailto: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.

IA Wireless Device Policy:

Pursuant to Indiana Code 20-26-5-40.7, The Indiana Academy for Science, Mathematics and Humanities prohibits student use of wireless communication devices for non-instructional purposes in the classroom. As such, any and all portable wireless devices, that have the capability to provide voice, messaging, or other data communication between two or more parties, must only be used for academic purposes directly tied to the classroom activity or related educational task. Exceptions to this wireless device policy are eligible through academic accommodations, individualized education programs, or with instructor approval permitting the use of a wireless device for justification related to health, safety, and/or well-being. The improper use of a wireless device in an active classroom setting is subject to disciplinary action including but not limited to; a verbal warning, temporary seizure of said device by a school official, an unexcused absence for the class in question, written communication to parent/guardian, among other elevated consequences for repeated improper use.

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.

Math Mindset:

No matter your opinion on math and your aptitude for it, you can be successful in this class. Everyone doesn’t learn at the same pace, and realizing this, not only do I drop the three lowest quizzes (for when you have a bad day or take a little longer to learn something), I allow the percentage on the cumulative final exam to replace any of the mid-semester exams grades. My philosophy of grades is that if you can demonstrate mastery of the material at the end of the course, you should be rewarded no matter the path taken to get there.

However, the responsibility to learn is yours and yours alone. No one can learn for you, just as no one can breathe, eat, or sleep for you. You may need to work harder for this course than you have in the past, and that is not always easy to do. If you do experience challenges throughout the semester, I recommend one or more of the following strategies to improve your performance:

a—Start your homework as soon as it is assigned. This allows you to find out what help you need, and you can make the most out of the time in class used to answer homework questions.

b—Use whatever resources at your disposal to get the homework turned in complete and correct. This may mean using internet resources or studying with a partner.

c—Reading the lecture notes I post in Canvas, noting the high points that can easily be turned into multiple choice conceptual questions.

d—Retain your tests and quizzes to use as study material for both the mid-term exams and the final exam.

e—Use unassigned homework problems and chapter review problems to simulate possible quiz or exam questions.

f—Seek help early. Take advantage of office hours or inquire about the possibility of an Academy tutor.

g—If there is more than one section of a class, review the board notes from the other section as different lecture examples and homework questions are likely to be there.

h—Have an attitude that expresses a desire to put in the necessary effort to be successful. Plopping down in a chair in my office saying, “I don’t understand this stuff,” shows an attitude unwilling to put forth the effort, while saying, “Can you help me with these specific problem?” does demonstrate that attitude.

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. As a reflection of Ball State’s commitment to respect, civil discourse, and the Beneficence Pledge, Inclusive Excellence at the Indiana Academy emerges as one of the priorities of our living and learning community. We strive to exist together respectfully and compassionately, creating an environment where every member can thrive. Unfortunately, there might be occasions when something occurs that disrupts our progress toward meeting these objectives. In this case, we encourage any member of the Academy community to file a Campus Climate Report (CCR) <https://bsu.qualtrics.com/jfe/form/SV_6mbRbL5acAntUTI>.  All reports will be taken seriously, and appropriate responses will be carried out by Academy administration.

Schedule

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | Week of | M | T | W | F | | 12-Aug | Syllabus | Sec. 1.1 | Sec 1.2 | Sec. 1.2-Q | | 19-Aug | Sec. 1.3 | Sec. 2.1 | Sec. 2.2 | Sec. 2.2-Q | | 26-Aug | Sec. 2.3 | Sec. 2.3 | Sec. 2.4 | Sec. 2.4-Q | | 2-Sep | No class | No class | Exam Review | Exam 1 | | 9-Sep | Sec. 3.1 | Sec. 3.1 | Sec. 3.2 | Sec. 3.2-Q | | 16-Sep | Sec. 3.3 | Sec. 3.3 | Sec. 3.4 | Sec. 3.4-Q | | 23-Sep | Sec. 4.1 | Sec. 4.1 | Sec. 4.2 | Sec. 4.2-Q | | 30-Sep | Sec. 4.3 | Sec. 4.3 | Exam review | Exam 2 | | 7-Oct | No class | Sec. 5.1-Thurs | No class | Sec. 5.1 | | 14-Oct | Sec. 5.2 | Sec. 5.2 | Sec. 5.2 | Sec. 5.3-Q | | 21-Oct | Sec. 5.3 | Sec. 5.3 | Sec. 5.4 | Sec. 5.4-Q | | 28-Oct | Sec. 5.5 | Sec. 5.5 | Sec. 6.1 | Sec. 6.1-Q | | 4-Nov | Sec. 6.2 | Sec. 6.2 | Sec. 6.3 | Sec. 6.3-Q | | 11-Nov | Review | Exam 3 | Sec. 7.1 | Sec. 7.2 | | 18-Nov | Sec. 7.2-Q | Sec. 7.3 | Sec. 7.3 | Sec. 7.5 | | 2-Dec | Sec. 7.5 | Sec. 8.1 | Sec. 8.1-Q | Review | |  |  |  |  |
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