MAT 442

Introduction to Linear Algebra

Course Designation

MAT 442. INTRODUCTION TO LINEAR ALGEBRA. Finite-dimensional vector spaces, matrices, linear transformations, solutions of systems of linear equations. Prerequisite or corequisite: MAT 206. 3.

Conceptual Framework: "The purposes of the Department of Mathematics are to prepare teachers of mathematics for the elementary and secondary schools, to provide a foundation for professional careers in mathematics, and to provide for the mathematical needs of the general student," (*2005-2006 Delta State Bulletin*). This view of education supports the College of Education's Conceptual Framework Delta Model, which is based on Performance, Professionalism, and Preparation of candidates to become the educators that are needed not only in the delta, but also throughout the state and nation.

The Conceptual Framework can be found at:
http://www.deltastate.edu/docs/math/ConceptualFramework.pdf

General Course Goals

Students will gain an understanding of the following:

1. The solution of systems of linear equations using matrix methods
2. Matrices and determinants
3. Vector spaces and subspaces of vector spaces
4. Linear independence and spanning
5. Linear transformations and applications of linear algebra

Subject Matter

Text: David C. Falvo, and Roland E. Larson. <u>Elementary Linear Algebra</u>, <u>6th Edition</u>. Boston: Houghton Mifflin Harcourt Publishing Company, 2009.

Content Topics

The course will cover the following topics:

1. Systems of linear equations
2. Matrices
3. Determinants
4. Vector spaces
5. Subspaces of vector spaces

6.   Linear transformations
7.   Applications of linear algebra

Technology

It is expected that each student will be able to use a graphing calculator such as the *TI*-86. This calculator will be used in classroom demonstrations. In addition, it is also expected that students will be able to use a computer algebra system (CAS) such as *Derive*. Assignments will be made which will require the use of each of these types of technology.

Diversity

In order to accommodate differences in student learning style and enhance learning, several different teaching methods are used in this class to include lecture, discussion, demonstration, and cooperative learning activities. Graphing calculator demonstrations as well as demonstrations with *Derive* are used in this course. In the study of vector spaces and subspaces of vector spaces, geometrical interpretations are used when appropriate, appealing to students who are visual learners and emphasizing the connections between the disciplines of geometry and algebra. Assignments emphasizing writing will be used in this class and topics from abstract algebra will be integrated with the course content.

Course Objectives

Upon completion of the course, the student will be able to:

1.   Solve systems of linear equations by the Gaussian elimination method.
2.   Solve applied problems dealing with linear systems.
3.   Perform operations with matrices and solve applied problems dealing with matrix operations
4.   Evaluate the determinant of a square matrix.
5.   Solve applied problems involving determinants.
6.   Find and recognize vector spaces and subspaces.
7.   Prove that given sets with defined operations constitute vector spaces.
8.   Prove that a given subset of a vector space is a subspace of a vector space.
9.   Determine whether a set of vectors in a vector space is linearly independent or linearly dependent.
10.   Determine whether a set of vectors in a vector space spans the space.
11.   Determine whether a set of vectors in a vector space is a basis for the vector space.
12.   Determine the dimension of a vector space.
13.   Determine the rank of a matrix.
14.   Use linear algebra techniques to analyze and solve problems in the social, biological, and managerial sciences.

15.	Use technology including the TI-85/TI-86 calculator and computer software to solve problems presented throughout the semester.
16.	Construct proofs of basic matrix operations and vector space characteristics.
17.	Determine whether a function is a linear transformation.
18.	Find the kernel and the range of a linear transformation.
19.	Find the standard matrix for a linear transformation.

Activities and Requirements

1.	Class attendance, as determined by the regulations of the university and the department.
2.	Homework exercises to be completed by the student.
3.	Participation in class discussion.
4.	Scheduled tests will be given periodically throughout the semester. Students will be given adequate notice.
5.	Regular and punctual attendance is necessary for successful completion of this course.
6.	Students who are enrolled in MAT 442 will be required to read and summarize an article related to linear algebra. The article summaries will be evaluated by a committee of departmental faculty members and according to a rubric which will be provided to the student when the assignment is made.

Presentation Methods

Lecture with demonstration to include the use of graphing calculators and computer software (75%); class discussion (25%).

Evaluation and Grading

A series of three class tests, pre-announced, will be administered during the semester and returned promptly to the students. In addition, a comprehensive final exam will be administered and will constitute approximately one-third of the grade for the semester.
Exam Date: Monday, December 7, 2009 at 12 noon
Because communication of ideas is an essential part of mathematics as well as everyday life, assignments involving writing will be made and graded. These assignments will frequently be in the form of proofs of theorems or other properties integral to the study of linear algebra. It is important that you learn the process for writing proofs in order to clearly communicate mathematical ideas. Selected topics from abstract algebra will be integrated with the content of this course.

Grading Scale

Grades will be assigned according to the following scale:

A (90% - 100%)	B (80% - 89%)	C (70% - 79%)	D (60%- 69%)
F (below 60%)

Cheating and plagiarism are not tolerated. If it is established that a violation has occurred, the instructor may determine the penalty, or he may report the offense to the department chair and dean of the school. The usual penalty involves a grade of zero on the test, examination, or paper in question.

Make up Tests, Class Attendance, and Tardiness

A student absent from class and missing a scheduled test is entitled to a make up test if evidence is presented to the instructor that the absence was due to personal illness or death in the immediate family. Absences authorized by the Vice President for Academic Affairs for official purposes (athletics, performing groups, student government, etc.) also entitle a student to make up test privileges. Any absence from scheduled work must be covered by an excuse from the Vice President for Academic Affairs, Student Health Services, or a doctor before the student is allowed to make up that work. Any exception to this rule must be arranged before the missed work! Each student is directly responsible to the individual faculty member for making up work missed due to excused absences. ALL makes up work must be completed with one week after returning to class. In order to receive credit in this course, a student must attend a minimum of 75% of the class meetings. Students in this class will be allowed no more than 7 absences, excused and unexcused. If a student exceeds the allowable number of absences, a grade of "F" will be assigned in the course. Absences accrue from the first day the class meets; not the first day a student attends the class. If you are late registering for the class, any class meeting you missed prior to the first class meeting you attend will be considered an absence. In order to be counted present, a student must arrive on time for class and remain in class the entire time. When a student is tardy for a class, it is the student's responsibility to talk to the faculty member about changing the recorded absence to a tardy. This must be done on the day that the tardy occurred. Failure to do so will result in a recorded absence.

Classroom Policies

1.   Do not use tobacco or eat in the classroom.
2.   Do not bring guests, including children, to class.
3.   Come to class on time.
4.   Be prepared to start class at the scheduled time. Have paper, pencil, book, homework, etc., out and ready.
5.   Do not ask to leave class early. Schedule any appointments at times that do not conflict with classroom time.
6.   Calculator use is permitted and encouraged on all homework assignments and tests.
7.   Be sure to show all work on homework assignments and tests. No partial credit can be given if no work is shown.
8.   Homework will be collected and graded at the discretion of the instructor. Homework must be turned in at the time when it is requested. No late homework will be accepted.

9.   Cheating and plagiarism are not tolerated. If it is established that a violation has occurred, the penalty will be a zero on the test, examination, or paper in question.
10.   Cell phones and pagers must be turned off and stored out of sight while in class.
11.   If a student has a disability that qualifies under the American with Disabilities Act and requires accommodation, he should contact Dr. Richard Houston in the office of Disability Services at 846-4690.

Important Dates

Students who remain in the course more than one week after the first test and who then elect to drop the course will receive a grade of **W** if passing or a grade of **F** if failing the course at the time of the drop. A drop is not effective and complete unless the drop slip has been signed by all designated parties and turned in to the registrar's office. No course may be dropped after Friday, December 4. If you plan to audit this class, you must notify the instructor by Friday, August 28. You will not be allowed to change your status from credit to audit after this date. The final exam for this class is scheduled for Monday, December 7, 2009 at 12 noon. That is when it <u>must</u> be taken.

Instructor: Dr. Paula Norris

Instructor's Office: Walters 270 E

Office Phone: 846-4515

Instructor's e-mail address: pnorris@deltastate.edu

Instructor's Office Hours:

Monday	Tuesday	Wednesday	Thursday	Friday
8:30 – 9:00	9:15 – 10:45	8:30 – 9:00	9:15 – 10:45	8:30 – 9:00
10:00 – 10:50	1:30 – 3:30	10:00 – 10:50	1:30 – 3:30	10:00 – 10:50
1:30 – 3:30		1:30 – 3:30		