

# **BARTON COMMUNITY COLLEGE COURSE SYLLABUS**

## **I. GENERAL COURSE INFORMATION**

Course Number: MATH 1833

Course Title: Linear Algebra

Credit Hours: 3

Prerequisites: MATH 1832 Analytic Geometry & Calculus I with a C or better

Division/Discipline: Academics/Mathematics

Course Description: Basic concepts of linear algebra with applications.

## **II. INSTRUCTOR INFORMATION**

## **III. COLLEGE POLICIES**

Students and faculty of Barton Community College constitute a special community engaged in the process of education. The College assumes that its students and faculty will demonstrate a code of personal honor that is based upon courtesy, integrity, common sense, and respect for others both within and outside the classroom.

Plagiarism on any academic endeavors at Barton Community College will not be tolerated. The student is responsible for learning the rules of, and avoiding instances of, intentional or unintentional plagiarism. Information about academic integrity is located in the Student Handbook.

The College reserves the right to suspend a student for conduct that is determined to be detrimental to the College educational endeavors as outlined in the College Catalog, Student Handbook, and College Policy & Procedure Manual. (Most up-to-date documents are available on the College webpage.)

Any student seeking an accommodation under the provisions of the Americans with Disability Act (ADA) is to notify Student Support Services via email at [disabilityservices@bartonccc.edu](mailto:disabilityservices@bartonccc.edu).

## **IV. COURSE AS VIEWED IN THE TOTAL CURRICULUM**

This course is designed for mathematics, science and engineering students who have successfully completed MATH 1832 Analytic Geometry & Calculus I.

## V. ASSESSMENT OF STUDENT LEARNING

Barton Community College is committed to the assessment of student learning and to quality education. Assessment activities provide a means to develop an understanding of how students learn, what they know, and what they can do with their knowledge. Results from these various activities guide Barton, as a learning college, in finding ways to improve student learning.

### Course Outcomes, Competencies, and Supplemental Competencies

- A. Solve systems of linear equations
  1. Use elementary row operations to solve systems of linear equations.
  2. Determine if a system of linear equations is consistent.
  3. Determine if a system of equations has a nontrivial solution.
  4. Solve a system of equations and write the solution in parametric form.
  5. Use systems of linear equations to solve applications.
  
- B. Use matrices to solve problems
  1. Compute sums, products, and scalar products of matrices.
  2. Compute matrix transposes and products of transposed matrices.
  3. Find the inverse of a matrix.
  4. Use the inverse of a matrix to solve linear systems.
  5. Solve applications using matrix inverses.
  
- C. Use determinants to solve problems
  1. Compute determinants of matrices using cofactor expansions.
  2. Calculate determinants using row reduction.
  3. Use determinants to determine if a matrix is invertible.
  4. Use Cramer's rule to compute the solutions of systems of equations.
  5. Find the area of a parallelogram or parallelepiped using matrix determinants.
  
- D. Define vector space
  1. Find a vector in a vector space, or determine if a vector is in a vector space.
  2. Determine if sets of vectors are a basis for  $\mathbb{R}^n$ .
  3. Find the column space and the null space of a matrix.
  4. Find a coordinate vector in a subspace.
  5. Find a basis of a subspace and determine the dimension.

- E. Define general vector space
  - 1. Demonstrate that a given set is or is not a vector space.
  - 2. Determine whether a given set is a subspace.
  - 3. Find a spanning set for a subspace.
  - 4. Determine whether a vector or matrix is in a given subspace.
  - 5. Determine whether a vector is in the null or column space of a matrix.
  - 6. List vectors that span a null space.
  - 7. Determine whether or not a given space is a vector space.
  - 8. Find a matrix for which a given vector is in its column space.
  - 9. Perform operations on vectors using the inner products.
  - 10. Compute inner products and vector norms.
  
- F. Utilize linear transformations to solve problems
  - 1. Identify and use the kernel and range of a linear transformation.
  - 2. Find bases for the column, row, and null spaces of a matrix.
  - 3. Apply the rank theorem to systems of equations.
  - 4. Map a coordinate vector in one base to a coordinate vector in another base.
  
- G. Use eigenvalues and eigenvectors to solve problems
  - 1. Determine if a vector or a value is an eigenvector or eigenvalue.
  - 2. Find the eigenvalues of matrices.
  - 3. Use the Diagonalization Theorem to find the eigenvalues of a matrix and a basis for each eigenspace.

## **VI. INSTRUCTOR'S EXPECTATIONS OF STUDENTS IN CLASS**

## **VII. TEXTBOOKS AND OTHER REQUIRED MATERIALS**

## **VIII. REFERENCES**

## **IX. METHODS OF INSTRUCTION AND EVALUATION**

## **X. ATTENDANCE REQUIREMENTS**

## **XI. COURSE OUTLINE**