JEFFERSON COLLEGE

COURSE SYLLABUS

MTH172

LINEAR ALGEBRA

3 Credit Hours

Prepared by:
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November 2012

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MTH 172: Linear Algebra

I.   CATALOG DESCRIPTION

      A.   Prerequisite: MTH134/134H with a "C" or better, MTH141
               Pre-calculus with a "C" or better, COMPASS college algebra score of at
               least 46 within the past two years, COMPASS trigonometry score of at
               least 31 within the past two years, or ACT math score of 25 or higher
               within the past two years and reading proficiency

      B.   3 semester credit hours

      C.   Linear Algebra is concerned with the study of matrices, vectors, vector
               spaces, linear transformations, Eigenvalues and Eigenvectors. Properties of
               the matrix and matrix operations are studied to develop it as a means to
               solve mathematical
               problems from a linear algebra point of view. The course also covers the
               matrix as an application to solve problems that arise in other disciplines
               including physics, chemistry, natural sciences, and social sciences. (F)

      D.   Elective course applies toward AA, AAT, and AS – Engineering emphasis
               degree requirement.

II.   EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT
        MEASURES

Expected Learning Outcomes	Assessment Measures
Students will compare and contrast solving problems with linear and nonlinear Algebra methods in terms of the speed of obtaining a solution.	Homework assignments/class presentation Quizzes Final exam
Students will develop tools to do algebraic manipulations needed in the calculus sequence, using linear algebra.	Homework assignments Class discussion Quizzes Final exam
Students will justify the purpose of learning linear algebra solving tools to handle the algebra that lies behind basic calculus-related problems.	Homework assignments/class presentation Class discussion
Students will express vectors as columns of numbers in a matrix and conceptualize the vector spaces of any dimension without a visible geometric structure.	Homework assignments Quizzes Final exam
Students will apply the basis theory to translate a difficult mathematical problem into an easier one and translate the result back into the traditional context.	Homework assignments Quizzes Final exam

Students will apply the theory of eigenvalues and eigenvectors with matrix theory on problems related to math, as well as other disciplines.	Homework assignments Quizzes Final exam

III.   OUTLINE OF TOPICS

A.   Linear equations in linear algebra
1.   Systems of linear equations
2.   Row reduction and echelon forms
3.   Vector equations
4.   The matrix equation $A\mathbf{x} = b$
5.   Solution sets of linear systems
6.   Applications of linear systems
7.   Introduction to linear transformations
8.   The matrix of a linear transformation
9.   Linear models in business, science, and engineering

B.   Matrix algebra
1.   Matrix operations
2.   The inverse of a matrix
3.   Characteristics of invertible matrices
4.   Partitioned matrices (optional)
5.   Matrix factorizations (optional)
6.   Leontief input-output models
7.   Applications to computer graphics
8.   Subspaces of R^n
9.   Dimension and rank

C.   Determinants
1.   Introduction to determinants
2.   Properties of determinants
3.   Cramer's Rule, volume and linear transformations (optional)

D.   Vector spaces
1.   Vector spaces and subspaces
2.   Null spaces, column spaces, and linear transformations
3.   Linear independent sets, bases
4.   Coordinate systems
5.   The dimension of a vector space
6.   Rank
7.   Change of basis
8.   Applications to different equations (optional)
9.   Application to Markov Chains

E.   Eigenvalues and Eigenvectors
1.   Eigenvalues and Eigenvectors
2.   The characteristic equation
3.   Diagonalization
4.   Eigenvectors and linear transformations
5.   Complex Eigenvalues
6.   Discrete dynamical systems, Leslie Matrices (optional)

F.   Orthogonality and least squares
1.   Dot product, length, orthogonality of vectors
2.   Orthogonal sets
3.   Orthogonal projections (optional, not needed for transfer)
4.   Gram Schmidt Process (optional, not needed for transfer)
5.   Least squares problems (optional, not needed for transfer)

IV.   METHODS OF INSTRUCTION

Lecture

V.   REQUIRED TEXTBOOK

Lay, David. *Linear Algebra* (Current Edition). Boston: Pearson.

VI.   REQUIRED MATERIALS

Graphing calculator (TI 83/84)

VII. SUPPLEMENTAL REFERENCES

None

VIII. METHODS OF EVALUATION

A .   Homework assignments, 40%

B .   Quizzes, 30%

C .   Final exam (comprehensive), 30%

IX.   ADA AA STATEMENT

Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (Technology Center 101; phone 636-481-3169).

X.   ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook (see College website, http://www.jeffco.edu).

XI.   ATTENDANCE STATEMENT

Regular and punctual attendance is expected of all students. Any one of these four options may result in the student being removed from the class and an administrative withdrawal being processed: (1) Student fails to begin class; (2) Student ceases participation for at least two consecutive weeks; (3) Student misses 15 percent or more of the coursework; and/or (4) Student misses 15 percent or more of the course as defined by the instructor. Students earn their financial aid by regularly attending and actively participating in their coursework. If a student does not actively participate, he/she may have to return financial aid funds. Consult the College Catalog or a Student Financial Services representative for more details.

XII.   OUTSIDE OF CLASS ACADEMICALLY RELATED ACTIVITIES

The U.S. Department of Education mandates that students be made aware of expectations regarding coursework to be completed outside the classroom. Students are expected to spend substantial time outside of class meetings engaging in academically related activities such as reading, studying, and completing assignments. Specifically, time spent on academically related activities outside of class combined with time spent in class meetings is expected to be a minimum of 37.5 hours over the duration of the term for each credit hour.