GAVILAN COLLEGE
5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: MATH 2 DIVISION: 10 ALSO LISTED AS:

TERM EFFECTIVE: Fall 2014 CURRICULUM APPROVAL DATE: 09/22/2014

SHORT TITLE: LINEAR ALGEBRA

LONG TITLE: Linear Algebra

Units	Number of Weeks	Type	Contact Hours/Week	Total Contact Hours
3	18	Lecture:	3	54
		Lab:	0	0
		Other:	0	0
		Total:	3	54

COURSE DESCRIPTION:

A standard one semester Linear Algebra course covering systems of linear equations, vectors and matrices, determinants, vector spaces, linear transformations, eigenvalues, and eigenvectors. Graphing calculators and computers will be used. (C-ID: MATH 250) PREREQUISITE: Mathematics 1C with a grade of 'C' or better.

PREREQUISITES:

Completion of MATH 1C, as UG, with a grade of C or better.

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion

STUDENT LEARNING OUTCOMES:

1. Students will be able to define and apply Gaussian elimination method for solving the systems of linear equations.

Measure: Project, HW, Exam

PLO: 1,2

ILO: 1,3,6,7

GE-LO: B3,B7

Year assessed or anticipated year of assessment: 2012

2. Define a homogenous linear system of m equations with n unknowns and identify a sufficient condition for its nontrivial solution.

Measure: Project, HW, Exam

PLO: 1,2

ILO: 1,3,4,6

GE-LO: B3,B7

Year assessed or anticipated year of assessment: 2015

3. Students will be able to add and multiply matrices and analyze the properties of Matrix multiplication.

Measure: Project, HW, Exam

PLO: 1,2

ILO: 1,3,6,7

GE-LO: B3,B7

Year assessed or anticipated year of assessment: 2015

4. Students will evaluate the determinants of matrices and will apply the Cramer's rule to solve linear systems.

Measure: Project, HW, Exam

PLO: 1,2

ILO: 1.2.3.7

GE-LO: B3,B7

Year assessed or anticipated year of assessment: 2015

5. Students will be able to compute the transpose, determinant, and inverse of matrices for a given matrix and prove basic theorems relating to deteminants and matrices.

Measure: Project, HW, Exam

PLO: 1,2

ILO: 1,3,6,7

GE-LO: B3,B7

Year assessed or anticipated year of assessment: 2015

6. Students will be able to define subspaces in R-2 and R-3 and inner products; determine the dimension of a subspace and analyze the function that maps two vectors from a vector space to a scalar and prove basic theorems about properties of subspaces.

Measure: Project, HW, Exam

PLO: 1,2

ILO: 1,3,6,7

GE-LO: B3,B7

Year assessed or anticipated year of assessment: 2015

7. Students will differentiate between linearly dependent and linearly independent sets of vectors and will be able to find a basis of the subspace; construct orthogonal and orthonormal bases using the Gram-Schmidt Process for a given basis.

Measure: Project, HW, Exam

PLO: 1,2

ILO: 1,3,6,7

GE-LO: B3,B7

Year assessed or anticipated year of assessment: 2012

8. Demonstrate the knowledge of constructing the orthogonal diagonalization of a symmetric matrix.

Measure: Project, HW, Exam

PLO: 1,2

ILO: 1,2,6,7

GE-LO: B3,B7

Year assessed or anticipated year of assessment: 2015

9. Demonstrate the knowledge of definitions of eigenvalues and eigenvectors and at least of one method to calculate eigenvalues, eigenvectors, and eigenspaces for both matrices and linear transformations.

Measure: Project, HW, Exam

PLO: 1,2

ILO: 2,3,6,7

GE-LO: B3,B7

Year assessed or anticipated year of assessment: 2012

10. Students will be able to define linear transformation, transformations from R to R, matrix transformations, one-to-one, kernel, range, rank, nulity and isomotphism, and to solve application problems using the properties of linear mappings: image and kernel.

Measure: Project, HW, Exam

PLO: 1,2

ILO: 1,3,6

GE-LO: B3,B7

Year assessed or anticipated year of assessment: 2015

PROGRAM LEARNING OUTCOMES:

1. Identify and utilize appropriate mathematical operations in the simplification of expressions and solution of equations.

2. Compare and contrast various mathematical models and then apply the appropriate model to real world problems.

3. Describe, compare and contrast various mathematical functions using everyday language

4. Describe, compare and contrast various mathematical properties and operations for real and imaginary numbers using everyday language

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Curriculum Approval Date: 09/22/2014

15 Hours

Systems of linear equations: basic terminology and notation. Homogeneous Linear Systems; trivial and nontrivial solutions. Introduction to Matrices. Addition and multiplication of matrices. Determinants, including Cramer's Rule. Gaussian elimination algorithm. Inverse of matrix: definition, inveritibility, method of computing, properties. Special matrices: diagonal, triangular, and symmetric.

Properties of the determinant function. LU -decomposition of a Matrix.

Homework problems from text and instructor, individual discussions with instructor.

14 Hours

Vector algebra for Rn. Linear combination of Vectors. Vector subspaces. Linear dependence, linear independence. Basis and Dimension. Elementary Operations. Row Space and Column Space. Null Space,

rank and nullity. General Vector Spaces. The dot product, norm of a vector. Inner Products. IP Spaces. Gram - Schmidt Orthogonalization Process.

Homework problems from text and instructor, individual discussions with instructor.

7 Hours

Eigenvalues and Eigenvectors. Characteristic Polynomial. Calculating Eigenvlaues and Eigenvectors and the Cayley- Hamilton Theorem. Properties of Eigenvalues.

Homework problems from text and instructor, individual discussions with instructor.

8 Hours

Diagonalization of matrices and symmetric matrices. Orthogonal Matrix. IP spaces. Angle in IP spaces. Linear transformations. Image and kernel.

Isomorphism. Inverse Linear Transformation.

Homework problems from text and instructor, individual discussions with instructor..

6 Hours

Linear mappings and Matrices. Similarity theorems.

Introduction to numerical methods of Linear Algebra.

3 Hours

Review/Final Exam(cumulative)

Comprehensive over the entire course with evaluation of each of the areas previously encountered.

METHODS OF INSTRUCTION:

Lectures; group work; discussions as appropriate

METHODS OF EVALUATION:

This is a degree-applicable course, but substantial writing assignments

are NOT appropriate, because the course primarily:

Involves skill demonstrations or problem solving

The problem-solving assignments required:

Homework problems

Quizzes

Exams

Other: Projects

The types of skill demonstrations required:

None

The types of objective examinations used in the course:

None

Other category:

None

The basis for assigning students grades in the course:

Writing assignments: 0% - 0%

Problem-solving demonstrations: 100% - 100%

Skill demonstrations: 0% - 0%

Objective examinations: 0% - 0%

Other methods of evaluation: 0% - 0%

REPRESENTATIVE TEXTBOOKS:

Required

Larson & Falvo. Elementary Linear Algebra 7th Edition. USA: Brooks/Cole, 2013. Or other appropriate college level text.

ISBN: 1133110878

Reading level of text, Grade: 12.3 Verified by: H. Jukl

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:
GAV B4, effective 200670
CSU GE:
CSU B4, effective 200670
IGETC:
IGETC 2A, effective 200670
CSU TRANSFER:
Transferable CSU, effective 200670
UC TRANSFER:
Transferable UC, effective 200670

SUPPLEMENTAL DATA:

Basic Skills: N
Classification: A
Noncredit Category: Y
Cooperative Education:
Program Status: 1 Program Applicable
Special Class Status: N
CAN: MATH26
CAN Sequence: XXXXXXXX
CSU Crosswalk Course Department: MATH
CSU Crosswalk Course Number: 2
Prior to College Level: Y
Non Credit Enhanced Funding: N
Funding Agency Code: Y
In-Service: N
Occupational Course: E
Maximum Hours:
Minimum Hours:
Course Control Number: CCC000293714
Sports/Physical Education Course: N
Taxonomy of Program: 170100