GAVILAN COLLEGE
5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: MATH 2 DIVISION: 10 ALSO LISTED AS:

TERM EFFECTIVE: Spring 2021 CURRICULUM APPROVAL DATE: 12/8/2020

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
05 - Hybrid
71 - Dist. Ed Internet Simultaneous
72 - Dist. Ed Internet Delayed

STUDENT LEARNING OUTCOMES:

By the end of this course, a student should:

1. Define a homogenous linear system of m equations with n unknowns and identify a sufficient condition for its nontrivial solution. Define and apply Gaussian elimination method for solving systems of linear equations.

2. Add and multiply matrices and analyze the properties of Matrix multiplication.

3. Compute the transpose, determinant, and inverse for a given matrix and prove basic theorems relating to deteminants and matrices. Evaluate the determinants of matrices and apply Cramer's rule to solve linear systems.

4. 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.

5. Differentiate between linearly dependent and linearly independent sets of vectors and find a basis of the subspace; construct orthogonal and orthonormal bases using the Gram-Schmidt Process for a given basis.

6. Define eigenvalues and eigenvectors and perform at least one method to calculate eigenvalues, eigenvectors, and eigenspaces for both matrices and linear transformations. Construct the orthogonal diagonalization of a symmetric matrix.

7. Define linear transformation, transformations from R to R, matrix transformations, one-to-one, kernel, range, rank, nulity and isomotphism, and solve application problems using the properties of linear mappings: image and kernel.

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

Curriculum Approval Date: 12/8/2020

16 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.

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.

7 Hours

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

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.

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:

Instruction will follow a standard lecture/discussion format. Extensive homework will be assigned in order to assure mastery of the concepts covered in class. Students will also be required to utilize technology to enhance their understanding of the material. Students will be given opportunities to work together on problems given in class and group projects.

OUT OF CLASS ASSIGNMENTS:

Required Outside Hours: 108

Assignment Description:

1. Analyze and study pertinent text material, solved examples and lecture notes.
2. Apply principles and skills covered in class by solving regularly-assigned homework problems.
3. Regularly synthesize course materials in preparation for exams.
4. Projects to apply concepts learned in class

METHODS OF EVALUATION:

Problem-solving assignments

Percent of total grade: 10.00 %

Homework problems, quizzes.

Writing assignments

Percent of total grade: 10.00 %

Out of class projects.

Objective examinations

Percent of total grade: 80.00 %

In-class written exams.

REPRESENTATIVE TEXTBOOKS:

Larson, Ron. Elementary Linear Algebra 8th Edition. USA: Brooks/ Cole; Cengage Learning,2016.

ISBN: ISBN-13: 978-1305658004 ISBN-10: 1305658000

Reading Level of Text, Grade: 12 Verified by: Microsoft Word

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: Y
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: 250
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