douglas college Course Information

A: Division: ACADEMIC — DATE: January 14, 1993

B: Department: SCIENCE & MATHEMATICS — New Course: ______

Revision of Course Information form: Y

DATED: October 1979

C: Subject & Course No.	D: Descriptive Title	E: Semester Credit
MAT 232	Linear Algebra	3

F: Calendar Description:

A one semester introductory course designed to provide a solid foundation in the mathematics of linear algebra. This course [illegible] the first course in abstract mathematics and the student is taught how to prove theorems. Topics include the solving of systems of equations, matrices [illegible] dimensional Euclidean space, general vectors spaces, linear transformations, eigenvalues and eigenvectors and diagonalization of matrices.

Summary of Revisions:
(Enter date & section)

Dec. 11, 1992. F, N, O, P, R

G: Type of Instruction: Hours Per Week/Per Semester

- Lecture 4 Hrs.
- Laboratory ______ Hrs.
- Seminar ______ Hrs.
- Clinical Experience ______ Hrs.
- Field Experience ______ Hrs.
- Practicum ______ Hrs.
- Shop ______ Hrs.
- Studio ______ Hrs.
- Student Directed Learning ______ Hrs.

H: Course Prerequisites:
MAT 120

I: Course Corequisites:
NONE

J: Course for which this course is a pre-requisite
MAT 421

K: Maximum Class Size:

tudent:

N. Textbooks and Materials to be Purchased By S

O. Course Objectives:

Upon completion of MAT 232 the student should be able to:

- solve systems of n equations in m unknowns using Gauss-Jordan elimination and Gaussian eli
- solve problems in electrical network analysis or traffic flow (Optional)

Course Objectives (continued)

Upon completion of MAT232 the student should be able to:

of vectors, bases and dimension in $\mathbf{R}^n$.

determine the rank of a matrix, the basis and dimension of the column space of a matrix and the basis and dimension of the row space of a matrix.

prove and apply the basic properties of the dot product and use the dot product to solve problems and define the norm of a vector, the angle between two vectors, the distance between two vectors and orthogonality in $\mathbf{R}^n$.

prove the triangular inequality using the Cauchy-Schwartz Inequality.

calculate the projection of one vector onto another in $\mathbf{R}^n$.

prove and apply the basic properties of the cross product and use the cross product to calculate the area of a triangle and the volume of a parallelepiped.

the distance from a point to a plane and the distance from a point to a line.

prove that the set of polynomials of degree less that or equal to n, P_n, and the set of 2 x 2 matrices, M_{22}, are vector spaces.

of vectors, basis and dimension in P_n and M_{22}.

prove and apply the basic properties of an inner product in P_n and M_{22} and use the inner product to solve problems and define the norm of a vector, the angle between two vectors, the distance between two vectors and orthogonality.

O. Course Objectives (continued):

- [illegible]
- [illegible] transformations
- [illegible] transformations from given linear transformations
- [illegible] form composite trans
- [illegible] rd matrix for a linear transformation from $\mathbb{R}^n$ to $\mathbb{R}^m$.
- [illegible] determine the standa
- [illegible] es that describe a rotation, a shear, a dilation or contraction and a reflection
- [illegible] determine the matric
- [illegible] matrix describe the transformation in terms of the foregoing
- [illegible] in $\mathbb{R}^2$ and $\mathbb{R}^3$
- [illegible] determine the
- [illegible] of a subspace
- [illegible]
- [illegible] determine if a linear transformation is one-to-one
- [illegible] determine if a linear transformation is onto
- [illegible] vectors of vectors in P_2 and M_{22}
- [illegible] determine the coordinate
- explain isomorphism of vector spaces
- [illegible]
- [illegible] relative to given bases and the image of a given vector using the matrix of the transformation
- find the matrix of a linear transformation
- determine the characteristic polynomial, eigenvalues and corresponding eigenspaces of a given matrix
- prove that similar matrices have the same eigenvalues and use this property to diagonalize a square matrix
- compute the power of a square matrix using the fact that $A^n = PD^nP^{-1}$
- [illegible] equations
- solve systems of first order recurrence equations and second order recurrence (difference equations (Optional)

P. Course Content:

1. Solving Systems of Equation
2. The Algebra of Matrices
3. Determinants.
4. The Vector Space $\mathbb{R}^n$
5. Vector Geometry
6. General Vector Spaces.
7. Inner Product Spaces.
8. Linear Transformations and Linear Operators
9. Eigenvalues and Diagonalization

Lectures, problem sessions and assignments.

Course Evaluation:

Evaluation will be based on written course outline with specific evaluation criteria at the beginning of the semester. Evaluation will be based on some of the following:

1. Weekly tests	{ 0 - 40% }
2. Micterm tests	{ 20 - 70% }
3. Assignments	{ 0 - 15% }
4. Attendance	{ 0 - 5% }
5. Class participa	{ 0 - 5% }
6. Final Examina	{ 30% }