HOSTOS COMMUNITY COLLEGE
DEPARTMENT OF MATHEMATICS

MAT 320	**LINEAR ALGEBRA with VECTOR ANALYSIS**
CREDIT HOURS:	**3.0**
EQUATED HOURS:	**3.0**
CLASS HOURS:	**3.0**
PREREQUISITES:	**MAT 310 Calculus III, with C or higher**
SUGGESTED TEXTS:	**For Vector Analysis Part: Tomas's Calculus, Early Transcendental, 13th Edition. Publisher: Pearson, 2014** **For Linear Algebra Part: Anton: Elementary Linear Algebra, 10th Edition. Publisher: Wiley 2005.**
REFERENCE TEXTS:	**Grove: Student Solutions….. Wiley Publisher**
DESCRIPTION:	**The student will study matrix theory, linear equations, Gauss elimination, determinants, eigenvalue problems and first order systems of ordinary differential equations, vector field theory, theorems of Green, Stokes, and Gauss.**
EXAMINATIONS:	**A minimum of four partial tests and a comprehensive final examination.**
GRADES:	**A, A-, B+, B, B-, C+, C, D, I, F**

Student Learning Outcomes:

1. Interpret and draw appropriate inferences about matrices and linear equations and their properties from quantitative representations.
2. Use algebraic, numerical and graphical methods to solve mathematical problems including finding the determinant of a matrix, finding the eigenvalues and eigenvectors of a matrix and the theorems of Green, Gauss and Stokes including application problems.
3. Represent quantitative problems expressed in natural language in suitable algebraic, functional and graphical form with emphasis on matrix representation of linear systems.
4. Effectively communicate solutions to mathematical problems in written, graphical or analytic form.
5. Evaluate solutions to problems and graphs of functions for reasonableness by inspection.
6. Apply calculus based methods to problems in other fields of study such as Physics, Economics, Geometry, Chemistry or Biology.

More specifically, after taking this course, the student should be able to:

1. Solve linear systems and find matrix inverses ,determinants, eigenvalues and eigenvectors
2. Relate characteristics of solutions of a linear system to determinant and rank of its associated matrices;
3. Use eigenvector methods to solve a system of first-order ordinary differential equations
4. Construct precise descriptions of curves, surfaces, and solids using parametrizations or equations/inequalities;
5. Compute work, flux, and mass integrals on curves, surfaces, and solids, respectively;
6. Find lengths, areas, and volumes of curves, surfaces, and solids.
7. Choose co-ordinate systems (polar, spherical, cylindrical, rectangular) appropriate to a given problem
8. State and apply the theorems of Green's, Stokes', and Divergence theorems.
9. Find and use potential functions, when appropriate, to find work integrals along curves; and
10. Solve application problems appropriate for a course in linear algebra and vector analysis

MAT 320 COURSE OUTLINE

Topic	Hours
Part 1: Vector Calculus: 24 hours. (Thomas Calculus)	**24 hours**
Parametrized curves	1
Vector Fields	1
Line Integrals	2
Fundamental theorem for line integrals	2
Green's Theorem	3
Curl and Divergence	2
Triple integrals; cylindrical and spherical coordinates	2
Parametric Surfaces and their areas	2
Surface Integrals	3
Stokes' Theorem	3
Divergence Theorem	3
Part 2: Linear Algebra: (Anton: Elementary Linear Algebra, 10th Ed.)	**14 hours**
Matrices and Matrix Algebra	1
Linear Systems, Elementary Row Operations	2
Varieties of Systems of Linear Equations	2.5
The Determinant of a Matrix	2
The Inverse of a Matrix	1.5
Orthogonal Matrices and Changes of Coordinates	1.5
The Eigenvalue Problem with applications to systems of ODEs	3.5

The syllabus leaves a total of 4 hours for exams and review.