ESCUELA SUPERIOR POLITÉCNICA DEL LITORAL
COLLEGE OF NATURE SCIENCES AND MATHEMATICS
COURSE SYLLABUS

1. COURSE CODE AND CREDITS — LINEAR ALGEBRA (ICM00604)

2. CREDITS AND CONTACT HOURS

CREDITS :	**Theoretical: 4**	**Practical: 0**

3. RESPONSIBLE FOR SYLLABUS ELABORATION AND ELABORATION DATE

Instructor	Carlos Martín Barreiro

4. COURSE TEXTBOOK AND REFERENCES

COURSE TEXTBOOK	**Linear Algebra** (2006) Author: Bernard Kolman and David R. Hill, Eighth Edition. Publisher Pearson Education, Mexico.
REFERENCES	1. **Linear Algebra and its Applications** (2007) Author: Gilbert Strang, Fourth Edition. Publisher Thomson Learning, Mexico. 2. **Linear Algebra** (2012) Author: Stanley Grossman, Seventh Edition. Editorial Mc.Graw-Hill, Mexico. 3. **Matlab Manual updated**

5. COURSE DESCRIPTION

This course consists of four parts: the first deals with the theory of real vector spaces, which are the properties that must satisfy a set to be considered a vector space, it discusses related subspaces, linear independence, and generator set basic concept and dimension of a vector space. The second part studies the relationships between finite dimensional vector spaces by means of linear transformations, we introduce the concepts of kernel and image of a linear transformation, through which you can determine if a linear transformation is injective, surjective and bijective. Invertible linear transformation and associated matrix are defined. The third part presents the real inner product in a vector space, through which we present the notion of orthogonality and orthogonal complements, ending with the Gram-Schmidt procedure to orthogonalize bases. The fourth and final part describes the theory of eigenvalues and eigenvectors of a linear transformation as well as the concept of diagonalizable matrix and quadratic form. Although the course is primarily devoted to real vector spaces, we even discuss examples of complex vector spaces and vector spaces over the binary field. In addition, there are issues related to infinite dimensional vector spaces. Matlab is used as computer support to the material presented. This course provides the basics of vocabulary and other engineering courses.

PRE-REQUISITES AND CO-REQUISITES

PRE-REQUISITES	Release Review Approval or Leveling Course Race
CO-REQUISITES	ICM01958 Integral Calculus

TYPE OF COURSE: BT

6. SPECIFIC GOALS FOR THE COURSE

At the end of the course, the student will be able to:

1. Recognize the vector space structure and understand how various operations defined on the same set vector spaces result with completely different properties.
2. Solve vectors in n-dimensional space.
3. Recognize subspaces and operate correctly with them.
4. Identify if the joint sets are linearly dependent and independent.
5. Build foundations for a space or subspace and calculate the dimension of these spaces.
6. Identify when a function is a linear transformation and know their applications.
7. Sort injective, surjective and bijective linear transformations, calculate its inverse, if it exists.
8. Represent in matrix form, a linear transformation.
9. Identify the functions that are inner products in a vector space.
10. Calculate the standard distance vectors and vector spaces.
11. Determine if two vectors are orthogonal and compute the orthogonal projection of a vector onto a subspace.
12. Build orthonormal bases.
13. Know and calculate eigenvalues and eigenvectors of a matrix.
14. Use the diagonalization of matrices in solving relevant problems
15. Identify the geometrical shape corresponding to a quadratic form.

RELATIONSHIP BETWEEN CAREER AND COURSE LEARNING OBJECTIVES.

A	**B**	**C**	**D**	**E**	**F**	**G.1**	**G.2**	**H**	**I**	**J**	**K**	**L**
X	X	X	X	X	X	X		X	X	X	X	

7. COURSE OUTLINE

CHAPTER I: VECTOR SPACES (23T)
CHAPTER II: SPACES ASSOCIATED WITH MATRIXES (4T)
CHAPTER III: LINEAR TRANSFORMATIONS (10T)
CHAPTER IV: INTERNAL PRODUCT SPACES (6T)
CHAPTER V: CHARACTERISTIC VALUES AND VECTORS (3T)
CHAPTER VI: ANALOGOUS MATRIXES AND DIAGONALIZATION (10T)