A) COURSE

Course Id:	Course
0042	ALGEBRA B

Class Hours per Week	Lab hours per week	Complementary practices	Credits	Total hour course
3	2	3	8	80

B) GENERAL COURSE INFORMATION

	EE (IEA)	ME (IM)	MME (IMA)	EME (IME)	MTE (IMT)
Level:	III	II	II	II	II
Course Type (Required/Elective)	Required	Required	Required	Required	Required
Prerequisite Course:	ALGEBRA A	ALGEBRA A	ALGEBRA A	ALGEBRA A	ALGEBRA A
CACEI Classification:	CB	CB	CB	CB	CB

C) COURSE OBJECTIVE

At the end of the course, the student will be capable of:
To understand, interpret and apply the basic concepts of linear and polynomial algebra to a specific concept in his more advanced subjects and in his professional practice through the critical analysis in solving problems that involve vectors, matrixes or equations.

D) TOPICS (CONTENTS AND METHODOLOGY)

1.- POLYNOMIALS AND N DEGREE EQUATIONS OF PARTICULAR GOAL	
Specific Objective:	On concluding the teaching process and having achieved its learning, the student will be able to: a) Carry out n degree polynomial operations. b) Find a maximum common divider of two n degree polynomials. c) Obtain the root of a polynomial through algebra methods. d) Graphically interpret the n degree functions and the solution of the corresponding equations.
1.1 Definition, classification and numeric value of a polynomial 1.1.1Polynomial equalness 1.2 Operations and properties 1.3 Polynomial Equations 1.4 Transforming equations 1.5 Solving degree equations (calculating their roots) 1.5.1Whole and rational roots 1.5.2Irrational roots (solving by the Horner, Newton method and by linear interpolation) 1.6 Property of the roots	
Readings and other resources	Readings to investigation of concepts, as well as to complement and strengthen the topics discussed in class.
Teaching methods	Exhibition topics by teacher and / or students; use of some didactic techniques like teamwork, learning based in problems and/or projects.

Learning activities	Exercise class and homework, as well as them respective interpretation of results.

2.- MATRIXES AND DETERMINANTS	
Specific Objective:	At the end of this unit, the student will be able to: a) Plan the mathematical model of a problem when this problem corresponds to a linear equation system b) Solve linear equation systems applying elemental transformations c) Carry out operations with matrixes d) Calculate determinants e) Solve problems that require the properties of matrixes and determinants
2.1 linear equation system and matrixes 2.1.1 Gauss and Gauss- Jordan elimination 2.1.2 Homogenous and non-homogeneous linear equation systems (elemental line operations) 2.2 Matrixes and determinants 2.2.1 Operations with matrixes 2.2.2 Special matrixes (zero matrixes, scalar, periodic, nilpotent and idempotent identity,) 2.2.3 Symmetrical matrix and anti-symmetrical matrix 2.3 Determinant and the Cramer rule 2.3.1 Calculating n order determinants 2.4 Inverse matrix 2.4.1 Solving linear systems through the inverse	
Readings and other resources	Readings to investigation of concepts, as well as to complement and strengthen the topics discussed in class.
Teaching methods	Exhibition topics by teacher and / or students; use of some didactic techniques like teamwork, learning based in problems and/or projects.
Learning activities	Exercise class and homework, as well as them respective interpretation of results.

3.- VECTORS AND VECTOR SPACES	
Specific Objective:	On concluding this unit, the student will be able to: a) Differentiate the meaning of vector and scalar b) Carry out operations with vectors c) Explain the meaning of the scalar (internal) and vector (external) product of two geometric vectors and calculate them. d) Calculate the norm (magnitude), the angle, the distance and projection between two vectors e) Understand what a vector space means and identify it f) Define linear dependence and independence of a vector space set of vectors g) Define the base of a vector space, find bases in simple cases, realize base changes and find orthonormal bases h) Apply vectors to geometric and mechanical problems i) Identify the dimension of a vector space j) Obtain the transition matrix of a vector space

3.1 definition of a vector 3.2 Vectors on a plane and in space 3.3 Vector operations (scalar addition, subtraction and product) 3.3.1 Angle between two vectors and the projection of one vector over another 3.3.2 Vector product, triple scalar product and their geometrical representations 3.3.3 Geometrical and mechanical applications of vectors 3.4 Generalization of an n dimension 3.5 Vector spaces and subspaces 3.5.1 Linear dependence and independence 3.5.2 Linear combination and space generation 3.5.3 Concept of base and dimension. Orthonormal bases 3.5.4 Gram-Schmidt Orthonormalization 3.5.5 Base changes in vector spaces 3.5.6 Transition matrix of a vector space	
Readings and other resources	Readings to investigation of concepts, as well as to complement and strengthen the topics discussed in class.
Teaching methods	Exhibition topics by teacher and / or students; use of some didactic techniques like teamwork, learning based in problems and/or projects.
Learning activities	Exercise class and homework, as well as them respective interpretation of results.

4.- LINEAR TRANSFORMATIONS AND LINEAR PROGRAMMING	
Specific Objective:	On concluding this unit, the student must be able to: a) Define what a linear transformation is b) Distinguish linear transformations from non linear ones c) Explain the meaning of the terms, core, nullity, range and distanced traveled of a linear transformation as well as its obtainment d) Define what a transformation matrix is, obtain it and describe the effect of the linear transformation e) Obtain the characteristic values and vectors of a matrix f) Determine if two matrixes, associated to a transformation are similar or not g) Understand what a linear programming h) Graph a system of linear inequations i) Solve simple linear programming problems in a graphic way and applying the simplex method
4.1 Definition and properties of linear transformations 4.1.1 Kernel (core) and image (distance traveled) of a linear transformation 4.1.2 Nullity and range of a linear transformation 4.1.3 Matrix representation of a linear transformation (transformation matrix) 4.1.4 Characteristic values and vectors of a matrix 4.2 Introduction to linear programming 4.2.1 Linear inequalities on two variables 4.2.2 Concept and use of linear programming 4.2.3 Geometric focus (graphic method) 4.2.4 Problems	
Readings and other resources	Readings to investigation of concepts, as well as to complement and strengthen the topics discussed in class.
Teaching methods	Exhibition topics by teacher and / or students; use of some didactic techniques like teamwork, learning based in problems and/or projects.
Learning activities	Exercise class and homework, as well as them respective interpretation of results.

E) TEACHING AND LEARNING METHODOLOGIES

The course will be organized around three sessions presentations by the teacher, and two sessions for discussion and solution of problems. It also frees the teacher to use new technology techniques to strengthen and increase learning.

F) EVALUATION CRITERIA

All features demonstrating a change in student conduct such as class participation, extra outside class research assignments, homework; class attendance, teamwork and exams will be considered and taken into account.

G) BIBLIOGRAPHY AND ELECTRONIC RESOURCES

Main Books:

- Granville Willian Anthony, Cálculo Diferencial e Integral Ed. Uthea
- U.V.Uspensky. Teoría de Ecuaciones. Ed. Limusa.
- Larson Roland E. Cálculo y Geometría Analítica. Ed. McGraw-Hill.
- Lemhan Charles H. Álgebra. Ed. Limusa.
- Murray R. Spiegel. Álgebra Superior. Ed. McGraw-Hill.
- Briton R.Jack, Bello Ignacio. Matemáticas Contemporaneas .Ed. Harla
- Howard Anton. Introducción al Álgebra Lineal. Ed. Limusa.
- Florey F,G, Fundamentos de Álgebra Lineal. Ed. Prentice Hall
- Grossman Stanley Y. Álgebra lineal. Ed. Limusa.
- Perry William L. Álgebra Lineal con Aplicaciones. Mc.Graw-Hill
- Haward Anton. Aplicaciones de Álgebra Lineal. Ed. Limusa.
- Grossman Stanley I. Aplicaciones de Álgebra Lineal. Mc.Graw-Hill

Complementary Books: