Subject:	Algebra	Code	93.58
Credits:	9		
Department of Exact and Natural Sciences		Version	2018

Course: Computer Science Engineering

Curriculum: S10 A - Rev18, S10-Rev23, S10 - Rev18

Objectives:

No.	Description
	The general objective of the subject is to provide the student with basic knowledge of algebra, which will be of use to the students on the Computer Science Engineering course. At the end of the course, the student is expected to: 1. Model simple situations in algebraic language. 2. Read and write correctly in mathematical language. 3. Solve discipline-specific problems by appropriately combining theoretical reasoning with calculation methods. 4. To pose problems and solve them using the most appropriate theory. 5. Recognize and judge the main characteristics of the basic bibliography.

Contents:

Theory of sets. Combinatorics. Integers. Polynomials. Recurrence relations. Analytic geometry. Linear algebra: Linear algebra: matrices, systems of linear equations, Gaussian elimination, rank of a matrix, vector spaces, subspaces, linear independence, bases and dimension.

Required bibliography:

No.	Description
1	No bibliography has been uploaded.
2	No bibliography has been uploaded.
3	No bibliography has been uploaded.
4	No bibliography has been uploaded.

Optional bibliography:

No.	Description
1	No additional bibliography has been uploaded.
2	No additional bibliography has been uploaded.
3	No additional bibliography has been uploaded.
4	Lay, David C., Lay, David C., Linear Algebra and Its Applications, 3rd. edition, Pearson Addison Wesley, 2007.
5	Stillwell, John, Elements of number theory, Springer, 2003.

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Course transcript:

No.	Description

1 **Theory of sets.**

Operations with sets. De Morgan's Laws. Relations. Equivalence relations. Functions.

2 **Combinatorics.**

Counting principles. Permutations and combinations. Generalized permutations and combinations Combinatorial numbers

3 **Integers.**

Ring structure. Divisibility. Prime and composite numbers. Greatest common divisor. Euclidean algorithm. Least common multiple. Fundamental theorem of arithmetic. Congruences. Fermat's little theorem.

4 **Polynomials.**

Polynomials. Polynomial functions. Operations with polynomials. Divisibility. Division algorithm Irreducible polynomials Fundamental theorem of arithmetic. Formal derivative and multiple roots.

5 **Recurrence relations.**

Problems leading to recurrence relations. Solving first-order recurrence relations. Homogeneous and inhomogeneous linear recurrence relations of higher order.

6 **Systems of linear equations and matrices.**

Systems of linear equations and matrices. Associated matrices. Gaussian elimination. Rank of a matrix. Matrix operations. Inverse of a matrix.

7 **Vector spaces**

Vector spaces Subspaces. Linear independence. Bases and dimension. Fundamental subspaces of a matrix. Linear transformations. Kernel and image.

Practical assignments:

No.	Description

1 **Exercise Guides**

Guide1.Sets, relations and functions.
Guide 2. Combinatorics.
Guide 3. Integers.
Guide 4. Polynomials.
Guide 5. Recurrence relations.
Guide 6. Systems of equations.
Guide 7. Matrices.
Guide 8. Vector spaces.

Laboratory assignments:

1   **Not applicable to this subject. null**

| Professor in charge: | Mancilla Aguilar, Jose Luis |
| Head of Department: | Stripeikis, Jorge Daniel |