A) COURSE

Course Id:	Course
0041	Algebra A

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

A) GENERAL COURSE INFORMATION

	EE (IEA)	ME (IM)	MME (IMA)	EME (IME)	MTE (IMT)
Level:	I	I	I	I	I
Course Type (Required/Elective)	Required	Required	Required	Required	Required
Prerequisite Course:	No-one	No-one	No-one	No-one	No-one
CACEI Classification:	CB	CB	CB	CB	CB

C) COURSE OBJECTIVE

At the end of the course, the student will be capable of:
Translating ordinary expressions to numerical systems, and develop functions such as tools concerning other subjects in his field.

D) TOPICS (CONTENTS AND METHODOLOGY)

1.- THEORY OF SETS AND THEIR APPLICATION	
Specific Objective:	Employing the basic concepts regarding the theory of sets and their application to problems posed.

1.1 Historic antecedents **1.2 Concept of sets** **1.3 Notation of sets** **1.4 Classification of sets, regarding: extension, comprehension** **1.5 Relationship of pertainance** **1.6 Special sets: universal, empty, finite, infinite** **1.7 Cardinality of sets** **1.8 Equality and inequality of sets** **1.9 Inclusion** **1.9.1 Relationship between equality and inclusion** **1.9.2 Proper and improper subsets** **1.9.3 Relationship between inclusion and the empty set** **1.9.4 Properties of equality and inclusion of sets** **1.10 Equivalence of sets** **1.10.1 Univocal and biunivocal correspondence** **1.10.2 Relationship of equivalence** **1.11 Comparison of sets: disjunctive, non-comparative** **1.12 Set of sets** **1.13 Power set** **1.14 Complementation and its properties** **1.15 Intersection and its properties** **1.16 Union and its properties** **1.17 Difference of sets** **1.1.8 Linear diagrams** **1.1.9 Venn-Euler diagrams** **1.19.1 Regions on the diagrams** **1.19.2 Demonstration of properties using diagrams** **1.20 Tables of regions and pertainance** **1.20.1 Presenting operations** **1.20.2 Demonstrations using tables of pertainance** **1.21 Product set** **1.21.1 Tree diagram** **1.22 Laws of algebra sets** **1.22.1 Demonstration of Theorems using the laws of algebra sets.** **1.22.2 The Duality principle** **1.23 Number of elements in the union of sets** **1.24 Obtainment, analysis and assessment of Information**	
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.- MATHEMATICAL LOGIC	
Specific Objective:	**Simplify the symbolic form. Demonstrate the veracity of proposals, presenting the mathematical demonstrations of the proposals.**

2.1 Definition and the purpose of logic **2.2 General division of logic** **2.3 Demonstration methods** **2.4 Proposals and connectors ("and"," or", "no")** **2.5 Fundamental operations of mathematical logic, Conditional statements, biconditional, and implication** **2.6 Veracity tables, tautology, contradiction** **2.7 Laws of Mathematical Logic** **2.8 Applications of Mathematical Logic Mathematical Logic** **2.8.1 Logical circuits (in series, in parallel; construction and simplification)** **2.8.2 Arguments (valid argument, fallacy, logical implication)** **2.8.3 Quantifiers (existential, universal, negation of proposals containing quantifiers)**	
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.- NUMERICAL STRUCTURES	
Specific Objective:	To employ all kinds of numbers with their different operations and properties, as well as handle the different numerical systems.

3.1 Brief history of the ancient numerical systems 3.1.1 Comparison of ancient numerical systems with the decimal system 3.2 Converting the decimal system to other numerical systems 3.2.1 Binary system 3.2.2 Octal system 3.2.3 Hexadecimal system 3.3 Converting other systems to the decimal system 3.4 Elemental operations on different bases 3.4.1 Addition 3.4.2 Subtraction 3.4.3 Multiplication 3.4.4 Division 3.5 Natural numbers 3.5.1 Definition 3.5.2 Peano postulates 3.5.3 Operations (addition and product) 3.6 Properties 3.6.1 Law of Trichotomy 3.7 Mathematical induction 3.8 Whole numbers 3.8.1. Definition 3.8.2. Binary relationships (addition and product) 3.8.3 Isomorphism 3.8.4 Prime numbers 3.8.5 Maximum common divider 3.9 Rational and irrational numbers 3.9.1 Definition 3.9.2 Equality and inequality 3.9.3 Decimal notation and its transformations 3.9.4 Elemental operations 3.9.5 The existence of irrationals 3.10 Real numbers 3.10.1 Family of numbers 3.10.2 Properties 3.10.3 Numerical straight line 3.10.4 Inequalities (absolute, conditional, absolute value) 3.11 Complex numbers 3.11.1 Definition Classification and equality 3.11.2 Pure imaginaries 3.11.3 Elemental operations in their rectangular form 3.11.4 Conjugating a complex number 3.11.5 Polar for (notation, transforming from rectangular to polar and vice versa) 3.11.6 Polar form operations (multiplication and division) 3.11.7 De Moivre Theorem 3.11.8 Equations with complex roots

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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.- FUNCTIONS	
Specific Objective:	a) Identify the concept of function as a relationship. b) Employ the basic concepts and applications regarding the development of functions in power series.

4.1 Functions
4.2 Product set, (arranged pairs)
4.3 Relationships
4.4 Definition (analytical, conjunctive)
4.5 Definition of functions, domain and co-domain
4.6 Function composition
4.7 Types of functions: Injective, surjective
4.8 Arithmetic progression
4.8.1 Definition
4.8.2 nth term
4.8.3 Summatory
4.9 Geometrical progression
4.9.1 Definition
4.9.2 nth term
4.9.3 Summatory
4.10 Indefinite geometric progression
4.11 harmonic progression
4.12 Successions: delimited, increasing, decreasing, convergent and divergent
4.13 Series
4.13.1 Definition
4.13.2 Obtaining the nth term
4.13.3 Convergent
4.13.4 Divergent
4.13.5 Convergent and divergent criteria for positive series: criteria of: comparison, quotient
4.13.6 Alternate series (convergence and divergence criteria)
4.13.7 Power series, definition and development; Taylor and Maclaurin series)

Readings and other resources	Readings to investigation of concepts, as well as to complement and strengthen the topics discussed in class.
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Learning activities	Exercise class and homework, as well as them respective interpretation of results.

E) TEACHING AND LEARNING METHODOLOGIES

- In class they will develop individually and team exercises topics to promote abstract and analytical reasoning.
- The use of teaching techniques will be promoted to encourage meaningful learning in some of the topics of the course are used.
- Management, search and interpreting of information related to the topics will be promoted.
- The use of ICTs will be promoted through homework or projects.

F) EVALUATION CRITERIA

Suggested Form of Evaluation and weighing	Schedule	Include	Weighing
First partial exam			25 %
Second partial exam			25 %
Third partial exam			25 %
Fourth partial exam			25 %
Total			100%
Ordinary exam			
Lab			
Extraordinary exam			
Title exam			
Regularization exam			

G) BIBLIOGRAPHY AND ELECTRONIC RESOURCES

MAIN BOOKS

- Kleiman Ariel. Conjuntos: Aplicaciones matemáticas a la Administración. Ed. Limusa.
- Briton/Bello. Matemáticas Contemporáneas. Ed. Harla.
- Lipschutz. Teoría de conjuntos y temas afines. Ed. McGraw-Hill Serie Schaum.
- Smith Karl. Introducción a la lógica. Grupo Editorial Iberoamérica.
- Lipschutz S. Matemáticas Finitas. Ed. McGraw-Hill Serie Schaum.
- Spiegel. Algebra Superior. Ed. McGraw-Hill. Serie Schaum.
- Ayres/Mendelson. Cálculo Diferencial e Integral. Ed. McGraw-Hill Serie Schaum.
- Hall/Knigth. Álgebra Superior Ed. Cecsa.
- Swokowski E. Algebra, Geometría y Trigonometría Grupo Editorial Iberoamérica.

- Ayres Frank. Álgebra Moderna. Ed.McGraw-Hill.