



National University of Engineering (UNI)

School of Civil Engineering

Syllabus 2027-I

1. COURSE

MA100. Basic Mathematics (Mandatory)

2. GENERAL INFORMATION

2.1 Course	: MA100. Basic Mathematics
2.2 Semester	: 1 st Semester.
2.3 Credits	: 5
2.4 Hours	: 3 HT; 4 HP;
2.5 Duration of the period	: 16 weeks
2.6 Type of course	: Mandatory
2.7 Learning modality	: Face to face
2.8 Prerequisites	: None

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

The Basic Mathematics course is mandatory and provides the conceptual tools necessary for logical reasoning and problem solving. The course ranges from propositional logic and set theory to the study of real numbers, complex numbers, polynomials, and matrices. These concepts are fundamental for developing the abstraction and mathematical formalization skills required in the later stages of the Computer Science program.

5. GOALS

- Develop logical reasoning and critical thinking skills through the use of formal languages.
- Understand and apply the properties of number systems (real and complex) in problem solving.
- Manipulate polynomial and matrix structures to solve systems of equations and interpret results.
- Introduce basic concepts of statistics and probability for data analysis.

6. COMPETENCES

ABET-1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (Familiarity)

7. TOPICS

Unit 1: Logic and Sets (16 hours)	
Competences Expected: ABET-1	
Topics	Learning Outcomes
• Propositional logic: Connectives, truth tables, and validity. • Logical-mathematical quantifiers. • Set theory: Operations, relations, and functions. • Families of sets and Cartesian product.	• Formalize natural language statements into propositional language [Familiarizarse]. • Operate with sets using algebraic laws and Venn diagrams [Usar]. • Prove basic properties of sets and logical relations [Evaluar].
Readings : [Lipschutz1991], [Rojo1995]	

Unit 2: Number Systems (16 hours)	
Competences Expected: ABET-1	
Topics	Learning Outcomes
• The real number system: Field and order axioms. • Mathematical induction and Newton's binomial theorem. • Complex numbers: Binomial, polar, and exponential forms. • Roots of complex numbers and De Moivre's theorem.	• Identify the algebraic structure of real and complex numbers [Familiarizarse]. • Apply the principle of mathematical induction in proofs of summations [Usar]. • Solve equations in the complex number field using various representations [Evaluar].
Readings : [Gentile1985], [Pinzon1973]	

Unit 3: Polynomials and Matrices (16 hours)	
Competences Expected: ABET-1	
Topics	Learning Outcomes
• Polynomials: Division algorithm and roots of polynomials. • Matrices: Types, operations, and determinants. • Inverse matrix and rank of a matrix. • Systems of linear equations: Gauss-Jordan method.	• Recognize the structure of polynomial rings and matrix algebra [Familiarizarse]. • Use elementary row operations to calculate the inverse of a matrix [Usar]. • Model and solve systems of linear equations applied to contextual problems [Evaluar].
Readings : [Gentile1984], [Rojo1995]	

Unit 4: Statistics and Probability (16 hours)	
Competences Expected: ABET-1	
Topics	Learning Outcomes
• Descriptive statistics: Measures of central tendency. • Dispersion measures and graphical representation. • Probability concepts: Sample space and events. • Conditional probability and independence.	• Describe data sets using basic statistical indicators [Familiarizarse]. • Calculate probabilities of simple and compound events in random experiments [Usar]. • Interpret statistical results for decision making in scientific environments [Evaluar].
Readings : [Peterson2005]	

8. WORKPLAN

8.1 Methodology

Individual and team participation is encouraged to present their ideas, motivating them with additional points in the different stages of the course evaluation.

8.2 Theory Sessions

The theory sessions are held in master classes with activities including active learning and roleplay to allow students to internalize the concepts.

8.3 Practical Sessions

The practical sessions are held in class where a series of exercises and/or practical concepts are developed through problem solving, problem solving, specific exercises and/or in application contexts.

9. EVALUATION SYSTEM

***** EVALUATION MISSING *****

10. BASIC BIBLIOGRAPHY