NATIONAL UNIVERSITY OF SAN MARCOS

FACULTY OF MATHEMATICAL SCIENCES

SYLLABUS

1. GENERAL INFORMATION

1.1 Course name	:	Discrete Structures I
1.2 Code	:	CS1D1
1.3 Academic Program	:	Scientific Computing
1.4 Credits	:	4
1.5 Prerrequisites	:	MA100. Basic Mathematics. (1^{st} Sem)
1.6 Type of Course	:	Mandatory
1.7 Area of Studies	:	Estudios Generales
1.8 Number of Weeks	:	16
1.9 Hours per week	:	2 HT; 4 HP;
1.10 Cycle	:	I
1.11 Learning modality	:	Face to face
1.12 Academic Period	:	2026-I
1.13 Semester Start Date	:	
1.14 Semester End Date	:	

2. PROFESSORS

Meetings after coordination with the professor

3. INTRODUCTION TO THE COURSE

Discrete structures are the backbone of computer science. This first course focuses on the fundamental logic and formal reasoning necessary to evaluate the correctness of computational processes. Students will master the formal language of mathematics to avoid ambiguity and will learn various proof techniques essential for the rigorous analysis of algorithms and software specifications.

4. GOALS

- Understand the principles of mathematical logic and propositional calculus.
- Apply predicate logic to model complex constraints in computing.
- Master multiple proof techniques, including direct, contradiction, and induction.
- Develop the ability to formally argue the correctness of mathematical statements.

5. COMPETENCES

ABET-1) An ability to identify, formulate, and solve broadly defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to the discipline. (Usage)

ABET-2) An ability to formulate or design a system, process, procedure, or program for the intended purpose. (Familiarity)

6. TOPICS

Unit 1: Discrete Mathematics (24 hours)	
Competences Expected: ABET-1,ABET-2	
Topics	**Learning Outcomes**
• Logic: propositional and predicate logic, quantifiers, proofs • Sets: operations, cardinality, power sets, Cartesian products • Relations: properties, equivalence relations, partial orders • Functions: injective, surjective, bijective, composition, inverse • Advanced logic: proof systems, completeness, decidability • Advanced set theory: infinite sets, Cantor's diagonal argument	• Explain propositional and predicate logic [Explain] • Construct simple logical proofs [Apply] • Define basic set operations and relations [Explain] • Define properties of relations [Explain] • Define types of functions [Explain]
Readings : [**Rosen2019**], [**Lehman2018**]	

Unit 2: Discrete Mathematics (24 hours)	
Competences Expected: ABET-1,ABET-2	
Topics	**Learning Outcomes**
• Logic: propositional and predicate logic, quantifiers, proofs • Advanced relations: closures, lattices • Advanced functions: recursive functions, computability	• Construct simple logical proofs [Apply] • Apply set operations to solve problems [Apply] • Determine if a relation is an equivalence relation [Apply] • Compose functions and find inverses [Apply]
Readings : [**Rosen2019**], [**Velleman2019**]	

7. WORKPLAN

7.1 Methodology

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

7.2 Theory Sessions

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

7.3 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.

8. EVALUATION SYSTEM

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

9. BASIC BIBLIOGRAPHY