

Discrete Mathematics

1. **Course number and name:** 020MADN11/020DMAN11 Discrete Mathematics
2. **Credits and contact hours:** 6 ECTS credits, 3x1:15 contact hours
3. **Name of course coordinator:** Tony Nicolas
4. **Instructional materials:** Course handouts, PowerPoint slides

References: Mathématiques tout-en-un MPSI, C. Deshamps, F. Moulin, A. Warusfel, Dunod 2013

5. Specific course information

a. Catalog description:

Propositional logic - Mathematical reasoning - Sets - Relations – Natural numbers, induction - Applications - Algebraic calculation - Binomial coefficient and Pascal triangle - Polynomials - Arithmetic

b. Prerequisites: None

c. Required/Selected Elective/Open Elective: Required

6. Educational objectives for the course

a. Specific outcomes of instruction:

- Analyze and resolve logical problems.
- Determine a method to proof properties.
- Recognize applications and their properties.
- Manipulate and calculate algebraic expressions.
- Determine the properties of the relationship.
- Manipulate and make calculations on polynomials.
- Studying the numbers and their properties.

b. PI addressed by the course:

PI	1.3
Covered	x
Assessed	x

7. Brief list of topics to be covered

- Propositional logic: Proposition logic, basic logic, logical connectives, truth tables
- Notion of proof: proof by implication, converse, inverse, contrapositive, negation, and contradiction, direct proof, proof by using truth table direct reasoning, reasoning by recurrence (10 lectures)

- Universal and existential quantification (4 lectures)
- Sets and Binary relations: properties of relation, equivalence relation, ordering relation (10 lectures)
- Applications: infectivity, subjectivity, one to one, direct image, composition (4 lectures)
- Algebra calculation (3 lectures)
- Polynomials and fractions (4 lectures)
- Arithmetic of integers (2 lectures)