Course Title and Code	MATH313 – Advanced Discrete Mathematics

I. Course Identification and General Information:

Course Title	Advanced Discrete Mathematics	Course Code	MATH313	Pre-requisite	MATH212
Department	Computer Science	Course Level	8	Credit Hours	3 (3+0)

II. Course Description/Topics: The following course topics will be covered.

- 1. Number Theory and Cryptography
- 2. Induction and Recursion
- 3. Advanced Counting Techniques
- 4. Boolean Algebra
- 5. Modeling Computation

III. Course Outcomes: Summary of the main learning outcomes for students enrolled in the course.

- Divisibility and Modular, Integer Representations and Algorithms, Primes and Greatest Common Divisors, Solving Congruences, Applications of Congruences, Cryptography
- Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness.
- Applications of Recurrence Relations, Solving Linear Recurrence Relations,Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion–Exclusion, Applications of Inclusion–Exclusion.
- Boolean Functions, Representing Boolean Functions, Logic Gates, Minimization of Circuits.
- Languages and Grammars, Finite-State Machines with Output, Finite-State Machines with No Output, Language Recognition, Turing Machines.

IV. Required Text:

- Discrete Mathematics and its Applications, 7/e, Kenneth H. Rosen, McGraw-Hill Education, 2012, ISBN: 978-0-07-338309-5, MHID 0-07-338309-0

V. References:

- Discrete Mathematics and its Applications: with combinatorics and graph theory, Kenneth H. Rosen, McGraw-Hill Education - Europe; 7th edition (2011), ISBN13: 978-0070681880