American University of Sharjah | College of Engineering

- **1.** Course Number and Course Title: CMP 213 – Discrete Structures
- 2. Credits and contact hours 3-0-3
- **3. Prerequisites and/or Co-Requisites:** Prerequisites: MTH 103 (Calculus I)
- **4. Name and Contact Information of Instructor:** Dr. Hicham H. Hallal

5. Course Description (Catalog Description):

(Equivalent to MTH 213). Covers propositional and predicate calculus, sets, major classes of functions and related algorithms, asymptotic analysis of functions, principle of mathematical induction, proof techniques, recursive definitions, counting, relations, graphs and trees.

6. Textbook and other Supplemental Material:

Textbook:

• Kenneth H. Rosen, Discrete Mathematics and its Applications 7th edition, McGrawHill, 2012

or

• R. Johnsonbaugh. Discrete Mathematics. 7th edition, Pearson New International Edition, Prentice Hall, 2014.

Other supplemental materials:

• Handouts and Lecture notes through iLearn

7. Specific goals for the course

Upon completing the course, student will be able to:

- 1. Express symbolically a given problem using propositions, predicates and quantifiers and then obtain conclusions using rules of equivalences and inferences
- 2. Identify sets and handle standard operations on sets: complement, union, intersection, difference and symmetric difference.
- 3. Analyze functions on sets: domain, co-domain, range, inverse images, onto, one to one, bijection, inverse function, composition of functions, and inverse of the composition.
- 4. Construct and validate proofs using different methods including induction and contradiction.
- 5. Define a recursive structure such as the factorial function, a string of characters and operations on strings (length and concatenation in particular).
- 6. Apply basic principles of counting including multiplication and addition rules, permutations and combinations, and the simple and generalized pigeonhole principles.
- 7. Apply asymptotic analysis of functions (big-O notation, etc ...) to evaluate the complexity of basic algorithms
- 8. Identify discrete structures such as Posets, lattices, graphs, trees and strings and apply relevant analysis algorithms

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8. Teaching and Learning Methodologies

Methods include lectures, labs, homework assignments, quizzes, exams and class discussions

Торіс	Weeks
Logic	2
Set theory	2
Relations and Functions	1
Asymptotic notation	1
Quantified logic	1
Proofs	2
Principles of Counting	1
Induction and recursion	2
Graph theory	1.5
Trees	1.5
Assessment and revision	1
Total	16

9. Course Topics and Schedule: