**MTS-123: DISCRETE STRUCTURES**

**GENERAL INFORMATION**

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| **Course Number** | MTS-123 |
| **Credit Hours** | 4 hours |
| **Prerequisite** | N/A |
| **Course Coordinator** | Not Specified |

**COURSE OBJECTIVES**

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| Discrete Mathematics also known as finite mathematics, The main focus of this course is to understand a particular set of mathematical facts and how to apply them, more importantly, such a course should teach students how to think logically and mathematically. This course covers the discrete data structures such as sets, relations, discrete functions, graphs, and trees, the subject of discrete structures widely used in the field of computer science for programming and reasoning about data. |

**CATALOG DESCRIPTION**

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| MTS-123 |

**COURSE CONTENT**

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| **Session No.** | **Date/Week** | **Topics** | **Suggested Readings** |
| 01-04 | Week 01 | Introduction to numbers, Mathematical reasoning | Discrete Mathematics & its Applications  7th Edition, K.H Rosen  &  Discrete Mathematics with applications  4th Edition, Susanna S.Epp, |
| 05-08 | Week 01-02 | Introduction to logic , Propositional Logic, Negation, Disjunction, Conjunction, implications, ,Bicondition (Exclusives) & truth table |
| 09-12 | Week 03-04 | Rules of Inference, valid and invalid arguments and Applications of Propositional Logic |
| 13-16 | Week 05 | Propositional Equivalences, Predicates, Quantifiers, Introduction to Proofs & Method of proofs |
| 17-20 | Week 06 | Sets  Set Operations  Cardinality of Sets |
| 21-24 | Week 07 | Sequences & Summations  Mathematical Induction , Induction and Recursion |
| 25-28 | Week 08 | Function, Composite function and Inverse functions, Genrating Functions |
| 29-32 | Week 09-10 | Relations and Their Properties  n-ary Relations and Their Applications  Representing Relations  Equivalence Relations |
| 33-36 | Week 10-11 | Algorithms  The Growth of Functions  Complexity of Algorithms |
| 37-40 | Week 11-12 | Number Theory, Divisibility and Modular Arithmetic Integer Representations and Algorithms  Primes and Greatest Common Divisors |  |
| 41-44 | Week 13-14 | Solving Congruence  Applications of Congruence  Cryptography  An Introduction to Discrete Probability |
| 45-48 | Week 14 | The Basics of Counting  Permutations and Combinations |
| 49-52 | Week 15 | Graphs and Graph Models  Graph Terminology and Special Types of Graphs |
| 53-56 | Week 16 | Representing Graphs and Graph Isomorphism  Euler and Hamilton Paths  Shortest path problems |
| 57-58 | Week 17 | Boolean Algebra / Algebraic structures and coding theory |

**TEXT BOOK**

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| 1. K.H Rosen,Discrete Mathematics , 7th Edition 2. Susanna S.Epp, Discrete Mathematics with applications 4th Edition |

**REFERENCE MATERIAL**

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| 1. Richard Johnson Baugh, Discrete Mathematics, 7th Edition 2. Kolman, Busby & Ross, Discrete Mathematical Structures, 4th Edition |

**COURSE LEARNING OUTCOMES**

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|  | **Course Learning Outcomes (CLO)** |
| 1 | Understand the key concepts of discrete structures such as sets, permutations, relations, graphs and trees. |
| 2 | To apply logic in the proofs of the propositions. Develop mathematical skills by practicing problem solving, modeling, logical reasoning and writing precise proofs. |
| 3 | Apply these concepts to solve computational problems. |

**CLO-SO Map**

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|  | **SO IDs** | | | | | | | | | | |  |
| **CLO ID** | **GA1** | **GA2** | **GA3** | **GA4** | **GA5** | **GA6** | **GA7** | **GA8** | **GA9** | **GA10** | **GA11** | **GA12** |
| CLO 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CLO 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CLO 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**APPROVALS**

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| Prepared By | Iftikhar Ahmed Bhutto |
| Approved By |  |
| Last Update | 07/01/2020 |