


Sub.	Course Description – توصيف مقرر دراسي	الموضوع	 <b>كلية المعرفة</b> ALMAAREFA COLLEGE
Date		التاريخ	

Course Code & No	<b>MATH 251</b>	251 رياض	رقم المقرر ورمزه
Course Name	<b>Discrete Mathematics</b>	الرياضيات المتقطعة	اسم المقرر
Credit Hours	<b>3 (3 + 0 + 0)</b>	<b>( 0 + 0 + 3 ) 3</b>	عدد الساعات المعتمدة
Pre-requisite	<b>MATH 102, COMP 112</b>	102 رياض ، 112 حاسب	المتطلب السابق

<b>General Description</b>	<b>توصيف عام</b>
<p>The course will introduce the students to the basic language and ideas of discrete mathematics that occur in all branches of information technology. It will also begin the process of training the students to argue correctly, both informally and formally, about these structures. The students will begin to learn the use of abstract analysis to solve concrete problems. The topics include: Foundations (logic, sets, and functions); Algorithms, integers, and matrices; Mathematical reasoning (methods of proof, mathematical induction, recursive definitions and algorithms); Combinatorics (counting techniques, permutations and combinations); discrete probability and probability theory; Discrete structures (sets, relations, graphs and trees).</p>	

<b>Course Objectives</b>	<b>أهداف المقرر</b>
<ul style="list-style-type: none"> <li>• Be familiar with the idea of a discrete structure, and the notions of formal language and parse tree.</li> <li>• Have an understanding of the basic ideas of sets and functions, including Boolean combination of sets, and be able to manipulate such expressions</li> <li>• Have an understanding of the standard propositional logic connectives and be able to convert logical expressions into</li> </ul>	

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<p>conjunctive and disjunctive normal form.</p> <ul style="list-style-type: none"> <li>• Have an understanding of the universal and existential quantifiers</li> <li>• Be familiar with the general concept of binary relation, equivalence and order relations and methods of combining relations; be familiar with the standard graphical representations of relations,</li> <li>• Be familiar with the principle of mathematical induction and be able to perform proofs using this principle, also be aware of simple examples of structural induction on lists.</li> <li>• Be able to apply the inclusion-exclusion principle in simple counting examples</li> <li>• Be familiar with the basic ideas of probability, and be able to calculate probabilities in simple experiments</li> <li>• Enhance his problem-solving skills through modeling.</li> <li>• Develop a logical, mathematical approach to solving problems and will be able to solve problems and present solutions relevant to discrete structures and their applications to IT communications.</li> <li>• Further their ability to work with relatively little guidance on the subject matter and exercises associated with the course.</li> <li>• Obtain the basic mathematical background necessary to follow the rapidly changing developments in IT communications.</li> <li>• Improve their key skills in written communication, numeric and problem solving.</li> </ul>	
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Course Outlines	مفردات المقرر
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- The Foundations: Logic and Proof, Sets, and Functions
  - Logic
  - Propositional Equivalences
  - Predicates and Quantifiers
  - Nested Quantifiers
  - Methods of Proof
  - Sets
  - Set Operations
  - Functions
- The Fundamentals: Algorithms, the Integers, and Matrices
  - Algorithms
  - The Growth of Functions
  - Complexity of Algorithms
  - The Integers and Division
  - Applications of Number Theory
  - Matrices
- Mathematical Reasoning, Induction, and Recursion
  - Proof Strategy
  - Sequences and Summations
  - Mathematical Induction
  - Recursive Definitions and Structural Induction
  - Program Correctness
- Counting
  - The Basics of Counting
  - The Pigeonhole Principle
  - Permutations and Combinations
  - Binomial Coefficients Inclusion-Exclusion
  - Applications of Inclusion-

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<p>Exclusion</p> <ul style="list-style-type: none"> <li>• Discrete Probability</li> <li>• Relations           <ul style="list-style-type: none"> <li>○ Relations and Their Properties</li> <li>○ n-ary Relations and Their Applications</li> <li>○ Representing Relations</li> <li>○ Equivalence Relations</li> </ul> </li> <li>• Graphs           <ul style="list-style-type: none"> <li>○ Introduction to Graphs</li> <li>○ Graph Terminology</li> <li>○ Representing Graphs and Graph Isomorphism</li> <li>○ Connectivity</li> </ul> </li> <li>• Trees           <ul style="list-style-type: none"> <li>○ Introduction to Trees</li> <li>○ Applications of Trees</li> <li>○ Tree Traversal</li> <li>○ Spanning Trees</li> </ul> </li> <li>• Boolean Algebra           <ul style="list-style-type: none"> <li>○ Boolean Functions</li> <li>○ Representing Boolean Functions</li> <li>○ Logic Gates</li> </ul> </li> <li>• Modeling Computation           <ul style="list-style-type: none"> <li>○ Languages and Grammars</li> </ul> </li> </ul>	
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References	المراجع
<ul style="list-style-type: none"> <li>• Kenneth H. Rosen, <b><i>Discrete Mathematics And Its Applications</i></b>, 7<sup>th</sup> edition, 2011. McGraw Hill .</li> </ul>	