

# Course Outline

<b>Course Title</b>	Discrete Mathematics																										
<b>Course Code</b>	CMP-200																										
<b>Course Email</b>	Abdul.hameed@pucit.edu.pk																										
<b>Instructor</b>	Abdul Hameed																										
<b>Course Material</b>	<a href="http://informationtechnology.pk/pucit">http://informationtechnology.pk/pucit</a>																										
<b>Teacher Assistant(s) (T.A)</b>	None																										
<b>Credit Hours</b>	3 credit hours	Lectures:	2 / week																								
	Duration		1.5 hrs.																								
<b>Prerequisite Course</b>																											
<b>Prerequisite Skill/Knowledge/Understanding</b>	<ul style="list-style-type: none"> <li>○ Basic understanding of computers and programming.</li> <li>○ Student should be comfortable with abstract arguments and objects</li> <li>○ Basic skill and knowledge of arithmetic and mathematics</li> </ul>																										
<b>Follow Up</b>	CMP-210 Data Structures and Algorithms CMP-211 Data Structures and Algorithms Laboratory Analysis of Algorithms Theory of Automata and Formal Languages																										
<b>Program Name</b>	BS Computer Science																										
<b>Aims and Objectives</b>	<ul style="list-style-type: none"> <li>○ To equip the learner with the philosophy and necessary skills to formulate solutions of real world problems using a mathematical approach</li> <li>○ To provide the necessary background for advanced subjects in computer science like Analysis of Algorithms and Theory of Automata and formal languages</li> </ul>																										
<b>Syllabus</b>	<b>Topics:</b> Propositional Logic, Rules of Inference, Proof methods, Sets, Functions and their growth, Mathematical Induction, Recursive Algorithms, Complexity of Algorithms, Basic knowledge of Counting techniques and Graph Problems																										
<b>Text Book(s)</b>	Kenneth H. Rosen "Discrete Mathematics and Its Applications", 6 <sup>th</sup> Ed., Mc. Graw Hill, 2007.																										
<b>Reference Material</b>	Handouts.																										
<b>Assessment Criteria</b>	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 25%;">Sessional .....</td> <td style="width: 25%;">25%</td> <td style="width: 25%;">Mid .....</td> <td style="width: 25%;">35%</td> <td style="width: 25%;">Final .....</td> <td style="width: 25%;">40%</td> </tr> <tr> <td>Quizzes</td> <td>25</td> <td>Written Exam .....</td> <td>35</td> <td>Written Exam .....</td> <td>40</td> </tr> <tr> <td>Total</td> <td>25</td> <td></td> <td>35</td> <td></td> <td>40</td> </tr> <tr> <td></td> <td colspan="5">100</td> </tr> </table>			Sessional .....	25%	Mid .....	35%	Final .....	40%	Quizzes	25	Written Exam .....	35	Written Exam .....	40	Total	25		35		40		100				
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<b>Lecture Breakdown</b>			
<b>Week</b>	<b>Lecture</b>	<b>Topic</b>	<b>Source</b>
<b>1</b>	1	Introduction to the course, Propositional Logic, Logical Operators, Conditional Statements, Biconditional Statements	1.1
	2	Converse, Contrapositive and Inverse, Translating English Sentences, Logic Puzzles	1.1
<b>2</b>	3	Propositional Equivalences, Predicates & Quantifiers, Negating Quantified Statements	1.2, 1.3
	4	Nested Quantifiers, Order of Quantifiers, Negating Nested Quantifiers	1.4
<b>3</b>	5	Rules of Inference, Building Argument, Fallacies, Introduction to Proofs	1.5, 1.6
	6	Direct Proofs, Proofs by Contraposition, Proofs by Contradiction	1.6
<b>4</b>	7	Mistakes in Proofs, Proof Methods and Strategy	1.6, 1.7
	8	<b>Quiz # 1</b> Sets, Subsets, Power Sets, Set Operations and Identities, Computer Representation of Sets	2.1, 2.2
<b>5</b>	9	Functions, One-to-One and On-to Functions, Inverse Functions, Compositions of Functions	2.3
	10	Sequences and Summations, Countable and Uncountable Sets	2.4
<b>6</b>	11	<b>Quiz # 2</b> Introduction to Algorithms, Linear Search, Binary Search	3.1
	12	Sorting, Bubble Sort, Insertion Sort, Greedy Algorithms	3.1
<b>7</b>	13	The growth of functions, Big-O, Big-Omega, Big-Theta Notations, Complexity of Algorithms	3.2, 3.3
	14	The Integers and Division, Modular Arithmetic	3.4
<b>8</b>	15	Prime Numbers, LCM and GCD, Euclidean Algorithm	3.5, 3.6
	16	The Chinese Remainder Theorem, Algorithms for Matrices	3.7, 3.8
<b>Mid Term Examination</b>			
<b>9</b>	17	Mathematical Induction, Few Proofs using Argument of Mathematical Induction	4.1

	18	Strong Induction and Well-Ordering, Few Proofs Using Strong Induction	4.2
<b>10</b>	19	Recursive Definitions and Structural Induction	4.3
	20	Recursive Algorithms, Correctness Proof of Recursive Algorithms	4.4
<b>11</b>	21	<b>Quiz # 3</b> The Basics of Counting, The Pigeonhole Principle	5.1, 5.2
	22	Permutations, Combinations, Binomial Coefficients	5.3, 5.4
<b>12</b>	23	Graphs and Graph Models, Hand-Shaking Theorem	9.1, 9.2
	24	Some Special Graphs, Bipartite Graphs, Applications of Graphs	9.2
<b>13</b>	25	<b>Quiz # 4</b> Graph Representation, Graph Isomorphism	9.3
	26	Paths, Connectivity of Graphs, Strongly Connected Components of a Graph	9.4
<b>14</b>	27	Euler and Hamilton Paths, Circuits, Dirac's Theorem, Ore's Theorem	9.5
	28	<b>Quiz # 5</b> Shortest Path Problem and Dijkstra's Algorithm	9.6
<b>15</b>	29	Planar Graphs, Euler's Formula	9.7
	30	Graph Coloring, Four Color Theorem	9.8
<b>16</b>	31	Introduction to Trees, Tree Traversal, Minimum Spanning Tree Problem	10.1, 10.3, 10.5
	32	Revision and Final Exam Preparation	-
<b>Final Term Examination</b>			

### Code of Conduct

- Quizzes will be announced
- Mobile Phones must be switched off during the class.