



## Discrete Mathematics

<b>Course Code:</b>	MATH-161	<b>Semester:</b>	1 <sup>st</sup>
<b>Credit Hours:</b>	3+0	<b>Prerequisite Codes:</b>	None
<b>Instructor:</b>		<b>Class:</b>	BSCS, BESE
<b>Office:</b>		<b>Telephone:</b>	
<b>Lecture Days:</b>		<b>E-mail:</b>	
<b>Class Room:</b>		<b>Consulting Hours:</b>	
<b>Lab Engineer:</b>		<b>Lab Engineer Email:</b>	Not applicable
<b>Knowledge Group:</b>	Computational Maths	<b>Updates on LMS:</b>	

### Course Description:

This course covers concepts and application of Logic Elements, Combinatorial, Functions, Relations, Graphs, and Trees.

### Course Objectives:

The successful completion should develop understanding of the concepts which strengthen mathematical reasoning. Further, it should equip the students with mathematical techniques to assist them in tackling logic components of computing systems.

### Course Learning Outcomes (CLOs):

At the end of the course the students will be able to:	PLO	BT Level*
1. Define propositional /predicate logic as a language to communicate with machines.	1	C-1
2. Use discrete mathematical structures to analyze problems in real life (where applicable) and model them in computer science/engineering.	2	C-3
3. Develop/apply various algorithms for/to solve real life problems with the help of machines.	3	C-3
* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain		

### Mapping of CLOs to Program Learning Outcomes

PLOs/CLOs	CLO1	CLO2	CLO3
PLO 1 (Engineering Knowledge)	√		
PLO 2 (Problem Analysis)		√	
PLO 3 (Design/Development of Solutions)			√
PLO 4 (Investigation)			
PLO 5 (Modern tool usage)			
PLO 6 (The Engineer and Society)			
PLO 7 (Environment and Sustainability)			
PLO 8 (Ethics)			
PLO 9 (Individual and Team Work)			
PLO 10 (Communication)			
PLO 11 (Project Management)			



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PLO 12 (Lifelong Learning)

**Mapping of CLOs to Assessment Modules and Weightages (In accordance with NUST statutes)**

To be filled in at the end of the course.

Assessments/CLOs	CLO1	CLO2	CLO3	CLO4
Quizzes: 10%				
Assignments: 10%				
OHT-1: 15%				
OHT-2: 15%				
End Semester Exam: 50%				
Total : 100 %				

**Books:**

**Text Book:** K.H. Rosen, Discrete Mathematics and its Applications ,(4th Edition) McGraw Hill

**Reference Books:** Susanna S. Epp, Discrete Mathematics with Applications (3rd Edition), Brooks Cole

B Kolman, R.C. Busby & S.C. Ross, Discrete Mathematical Structures, (5th Edition) Pearson Education

**Topics to be Covered:**

1. Logic and Propositional Equivalences
2. Predicates and Quantifiers
3. Basic Set Theory
4. Functions
5. Sequences and Summation
6. Methods of Proof - Mathematical Induction
7. Algorithms
8. Basic counting and Pigeon hole principle
9. Relations and their Properties
10. Graphs
11. Trees
12. Shortest Path Problem, Tree Sorting, Spanning Trees
13. Boolean function, Logic gates

**Lecture Breakdown:**

Week No.	Topics	Sections	Remarks
1	Introduction, Logic, Propositional Equivalences, predicates and Quantifiers		
2	Basic Set Theory, Functions, Sequences and Summation		
3	The Integers and Division, Methods of Proof; Mathematical Induction		
4	Recursive Definition and Algorithms		
5	Basic counting, Pigeon hole principles		
6	<b>OHT-1</b>		
7	Relations and their Properties		
8	Relation Representation		



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9	Equivalence Relations, Partial Ordering
10	Intro to Graphs
11	Graph Isomorphism, Connectivity
12	<b>OHT-2</b>
13	Euler and Hamilton Path, Intro to Trees
14	Shortest Path Problem
15	Tree Sorting, Spanning Trees
16	Minimum Spanning Trees
17	Boolean function, Logic gates, minimization of circuits
18	<b>ESE</b>

**Tools / Software Requirement:**

Microsoft Office

**Grading Policy:**

**Quiz Policy:** The quizzes will be unannounced and normally last for ten minutes. The question framed is to test the concepts involved in last few lectures. Number of quizzes that will be used for evaluation is at the instructor's discretion.

**Assignment Policy:** In order to develop comprehensive understanding of the subject, assignments will be given. Late assignments will not be accepted / graded. All assignments will count towards the total (No 'best-of' policy). The students are advised to do the assignment themselves. Copying of assignments is highly discouraged and violations will be dealt with severely by referring any occurrences to the disciplinary committee. The questions in the assignment are meant to be challenging to give students confidence and extensive knowledge about the subject matter and enable them to prepare for the exams.

**Plagiarism:** SEECs maintains a zero tolerance policy towards plagiarism. While collaboration in this course is highly encouraged, you must ensure that you do not claim other people's work/ ideas as your own. Plagiarism occurs when the words, ideas, assertions, theories, figures, images, programming codes of others are presented as your own work. You must cite and acknowledge all sources of information in your assignments. Failing to comply with the SEECs plagiarism policy will lead to strict penalties including zero marks in assignments and referral to the academic coordination office for disciplinary action.