East West University
Department of Computer Science and Engineering
Course Outline
Summer 2026 Semester

Course: CSE106 Discrete Mathematics (Section: 04)

Credits and Teaching Scheme

	Theory	Laboratory	Total
Credits	3	0	3
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th Week		3 Hours/Week for 13 Weeks + Final Exam in the 14th Week

Prerequisite

CSE103 Structured Programming

Instructor Information

Instructor: Dr. Mohammad Salah Uddin
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GTA/UTA: TBA

Class Routine and Office Hour

Day	08:30-10:00	10:10-11:40	11:50-01:20	01:30-03:00	03:10-04:40	04:50-06:20
Sunday			Office Hour	CSE407 (5) AB3-802	CSE227 (1) LAB Room#215	CSE227 (1) LAB Room#215
Monday				Office Hour	CSE106 (4) Room#221	
Tuesday			CSE227 (1) Room#FUB-301	Office Hour	CSE110 (3) Room#221	
Wednesday		CSE110 (3) LAB Room#227	CSE110 (3) LAB Room#227	Office Hour	CSE106 (4) Room#221	
Thursday		Office Hour	CSE227 (1) Room#FUB-301	CSE407 (5) AB3-802	CSE110 (3) Room#221	

Course Objective

This course builds up the students' ability to think and express logically and mathematically. The course will address mathematical reasoning, combinatorial analysis, algorithmic thinking, and discrete structures. Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE110 Objected Oriented Programming, CSE207 Data Structures, CSE246 Algorithms, CSE302 Database Systems, CSE366 Artificial Intelligence, and CSE405 Computer Networks.

Knowledge Profile

K2: Conceptually-based mathematics, numerical analysis, statistics, and formal aspects of computer and information science
K3: Theory-based engineering fundamentals

Learning Domains

Cognitive - C2: Understanding, C3: Applying
Psychomotor - P3: Precision
Affective - A2: Responding

Program Outcomes (POs)

PO1: Engineering Knowledge

Complex Engineering Problem Solution

None

Complex Engineering Activities

None

Course Outcomes (COs) with Mappings

After completion of this course students will be able to:

CO	CO Description	PO	Learning Domains	Knowledge Profile	Complex Engineering Problem Solving/ Engineering Activities
CO1	**Interpret** and **apply** propositional logic, predicate logic, and theorem proving for mathematical reasoning.	PO1	C2, C3	K2	-
CO2	**Interpret** and **apply** counting principles for combinatorial analysis.	PO1	C2, C3	K2	-
CO3	**Interpret** and **apply** the growth of functions, complexity analysis of algorithms, and integer algorithms for algorithmic thinking; **demonstrate** this knowledge and **write** report for realistic problem solving.	PO1	C2, C3 P3 A2	K2, K3	-

CO4	**Interpret** and **apply** discrete structures such as sets, functions, relations, graphs, and trees for modeling discrete objects; **demonstrate** this knowledge and **write** report for realistic problem solving.	PO1	C2, C3 P3 A2	K2, K3	-

Course Topics, Teaching-Learning Method, and Assessment Scheme

Lecture-wise Subtopics / Details		Course Topic	Teaching-Learning Method	CO	Class Tests			Mid Semester Exam		Project	Final Exam		PO1 Mark
					1	2	3						
					C2	C2	C2	C2	C3		C2	C3	
Lec-01	Familiarization on the course (Course Outline). Propositions, Logical operators (connectives), Truth tables	Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers	Lectures and discussions inside and outside the class	CO1	5			8 [4+4]	8 [4+4]				21
Lec-02	Conditional and Biconditional statements. Translating English Sentences.												
Lec-03	Logical equivalences, Logical identities, Predicates and Quantifiers.												
Lec-04	Universal Quantifier, Existential Quantifier. Negating quantified expressions												
Lec-05	Nested quantifiers, negating nested quantifiers												
Lec-06	**Class Test 1** Proof strategies, Direct proof, Contraposition proof	Introduction to Proofs, Mathematical Induction	Do	CO1					7 [3+4]				7
Lec-07	Contradiction proof, Mathematical Induction and Proof by Mathematical Induction.												

Lecture-wise Subtopics / Details		Course Topic	Teaching-Learning Method	CO	Class Tests			Mid Semester Exam		Project	Final Exam		PO1 Mark
					1	2	3						
					C2	C2	C2	C2	C3		C2	C3	
Lec-08	Sets, Power set, Cartesian products	Sets, Set Operations, Functions, Recursive Functions, Relations and Their Properties	Do	CO4				6 [3+3]	6 [3+3]				12
Lec-09	Set operations - Union, Intersection, Complement, Difference, Computer representation of sets, membership table, set identities												
Lec-10	Functions as mappings, Injective, Surjective, Bijective functions												
Lec-11	Inverse functions, Composite function, Recursive functions												
Lec-12	Relations, Properties of Relations - Reflexive, Symmetric, Transitive, Equivalence relations												
Day-13	**MID Exam**												
Lec-14	Product and Sum Rule, Inclusion–Exclusion principle,	The Basics of Counting, The Pigeonhole Principle	Do	CO2		5					8 [4+4]	4 [4]	17
Lec-15	Tree Diagrams, Pigeonhole Principle												
Lec-16	**Clast Test 2**	Algorithms, The Growth of Functions,	Do	CO3			5			2.5	5 [5]	5 [5]	17.5

Lecture-wise Subtopics / Details		Course Topic	Teaching-Learning Method	CO	Class Tests			Mid Semester Exam		Project	Final Exam		PO1 Mark
					1	2	3						
					C2	C2	C2	C2	C3		C2	C3	
	Introduction to Algorithm, Max finding algorithm, Linear and Binary search algorithms	Complexity of Algorithms, The Integers and Division, Primes											
Lec-17	Growth of functions - Big-O, Big-Ω, Big-Θ notations												
Lec-18	Complexity analysis of Algorithms – Max finding complexity, Linear Search complexities (Worst and Average), Binary Search (complexity analysis), Complexity analysis of other algorithms												
lec-19	Division Algorithm, div and mod operations, Congruence, Modular arithmetic, Application of Congruence - Pseudorandom generator, Prime Factorization												
Lec-20	**Class Test 3** Definition of Graphs, Directed and Undirected graphs, Degrees, Handshaking Theorem												

Lecture-wise Subtopics / Details		Course Topic	Teaching-Learning Method	CO	Class Tests			Mid Semester Exam		Project	Final Exam		PO1 Mark
					1	2	3						
					C2	C2	C2	C2	C3		C2	C3	
Lec-21	Special graphs – Complete, Cycle, Wheel, Bipartite graphs, Subgraph, Union of graphs.	Graphs, Graph Terminologies and Special Types of Graphs, Subgraphs, Union of graphs, Representing Graphs, Isomorphic graphs, Connectivity – Paths and Circuits, Connected components, Euler Paths and Circuits, Hamilton Paths and Circuits. Introduction to Trees	Do	CO4						2.5	6 [3+3]	12 [4+4 +4]	20.5
Lec-22	Graph representations - Adjacency list and matrix. Isomorphic graphs.												
Day-23	Connectivity – Paths and Circuits, Connected components, Euler Paths and Circuits, Hamilton Paths and Circuits. Introduction to Trees.												
Lec-24	Definition of Trees, Rooted trees, Ordered Rooted trees. m-ary trees, Binary trees, sub-tree, properties of trees, level and height of threes, balanced trees.												
Day-25	**Mini-project presentation**												
lec-26	Review and Discussions												
					15			35		5	40		95

Mini Projects

Mini Project	Teaching-Learning Method	CO	EP/ EA	Mark of Cognitive Learning Level	Mark of Psycho-motor Learning Level	Mark of Affective Learning Level	CO Mark	PO1 Mark
				C3	P3	A2		
Mini Project with reports and presentation	Group-based moderately complex programming projects with report writing and presentation	CO3 CO4	- -	1.5 1.5	0.5 0.5	0.5 0.5	2.5 2.5	5
		Total		3	1	1	5	5
Dates of report submission and presentation will be announced in the class. Use of AI generated content is strictly prohibited.								

Overall Assessment Scheme

Assessment Area		CO				PO Marks	Sub-Total
		CO1	CO2	CO3	CO4	PO1	
Class Participation	5						5
Class Test		5	5	5		15	15
Mid Semester Exam		23			12	35	35
Final Exam			12	10	18	40	40
Mini Projects with report and presentation				2.5	2.5	5	5
Total Mark	**5**	**28**	**17**	**17.5**	**32.5**	**95**	**100**

Teaching Materials/Equipment

Textbook:

Kenneth H. Rosen, *Discrete Mathematics and Its Applications*, 9th Edn., McGraw-Hill, 2019.

Presentation Slides will be provided.

Mini Project:

Mini Project description will be provided in the class.

Grading System

Marks (%)	Letter Grade	Grade Point
80% and above	A+	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00

Exam Dates

Section	Class Slot	Mid Semester	Final

Academic Code of Conduct

Academic Integrity:

Any form of cheating, plagiarism, personification, falsification of a document as well as any other form of dishonest behavior related to obtaining academic gain or the avoidance of evaluative exercises committed by a student is an academic offence under the Academic Code of Conduct and **may lead to severe penalties as decided by the Disciplinary Committee of the university.**

Special Instructions:

- Students are expected to attend all classes and examinations. A student MUST have at least 80% class attendance to sit for the final exam.
- Students will not be allowed to enter into the classroom after 20 minutes of the starting time.
- For plagiarism, the grade will automatically become zero for that exam/assignment.
- Normally there will be **NO make-up exam**. However, in case of **severe illness, death of any family member, any family emergency, or any humanitarian ground**, if a student miss the **mid-semester exam**, the student MUST get approval of makeup exam by written application to the Chairperson through the Course Instructor **within 48 hours** of the exam time. Proper supporting documents in favor of the reason of missing the exam have to be presented with the application. **It is the responsibility of the student to arrange a Makeup Exam in consultation with the Course Instructor**.
- For **final exam**, there will be NO makeup exam. However, in case of **severe illness, death of any family member, any family emergency, or any humanitarian ground**, if a student miss the final exam, the student MUST get approval of **Incomplete Grade** by written application to the Chairperson through the Course Instructor **within 48 hours** of the final exam time. Proper supporting documents in favor of the reason of missing the final exam have to be presented with the application. **It is the responsibility of the student to arrange an**

Incomplete Exam within the deadline mentioned in the Academic Calendar in consultation with the Course Instructor.

- All mobile phones MUST be turned to silent mode during class and exam period.
- There is **zero tolerance for cheating** in exam. Students caught with cheat sheets in their possession, whether used or not; writing on the palm of hand, back of calculators, chairs or nearby walls; copying from cheat sheets or other cheat sources; copying from other examinees, etc. would be treated as cheating in the exam hall. The only penalty for cheating is **expulsion for several semesters as decided by the Disciplinary Committee of the university**.