Department	General Studies	Major						
Course Name	Discrete Math	Course Code	MATH 303					
D	M_{-4} + 201	Credit Hours3CTH4			4			
Prerequisites	Math 301	CRH	L	2	Р	2	Т	0

Course Description :

The course of discrete mathematics teach students how to think logically and mathematically, this course cover five important themes; Mathematical reasoning and mathematical logic, combinatorial analysis, discrete structure, algorithmic thinking , application and modeling

General Objective:

The course of discrete mathematics exposes students to aspects of mathematics which have found important applications in computer science and related areas. Logic is the basis of most computer programming, functions are paradigm for program modules, and relations provide the basis for the theory of data structures. This course is designed to student of science computer. The course give all of the mathematical foundations they need of their future studies.

Detailed Objectives:

2000	
]	Frainee will be able to:
1-	Construct mathematical argument and solve counting problems and analyze algorithms.
2-	Work with discrete structures that include sets, permutations, relations, graphs, trees and finite state machines.
3-	Solve certain problems by the specification of an algorithm and then a computer program can be constructed and verified in the mathematical portions that it work properly.
4-	Analyze the computer memory and time required to perform a given computer program
5-	Model with discrete mathematics that is an extremely important problem-solving skill, and develop by constructing their own models.

Detailed of Theoretical Contents						
Hours	Contents Assessment Tools					
4	The Foundations: Logic and Proofs:Quiz1					
	 Proposit 	Exam1				
	 Applicat 	tions of	of Propositional Logic	Final Exam		
	Predicates and Quantifiers					
	• Rules of Inference					
	Introduce	tion t	o proofs			
	Proof Methods and Strategy					
			M. Huth and M. Ryan, Logic in Computer Science, 2 ⁿ	^d ed, Cambridge		
	Textbook	1	university Press, Cambridge, England, 2004			
2	Basic Struc	tures	: Sets, Functions, Sequences, Sums, and	Homework1		
	Matrices			Exam1		
	• Sets			Final Exam		
	Set Oper	ration	S			
	Function	ıs				
	• Sequences and Summations					
	Cardinality of Sets					
	Matrices	5				

	Detailed of Theoretical Contents					
Hours	Contents Assessment Tools					
	R. A. Brualdi, Introductory Combinatorics, 5 th ed., Prentice-Hall,			entice-Hall,		
	Textbook	1	Englewood Cliffs, NJ,2009			
4	Algorithms: Quiz2					
	Algorith	• Algorithms				
	• The Gro	wth o	f Functions	Final Exam		
	Complex	kity of	ity of Algorithms			
	S. Baase and A. Van Gelder, Computer Algorithms: Introduction to		itroduction to			
	Textbook	I	Design and Analysis, 3 rd ed., Adisson-Wesley, Readin	g, MA, 1999		
2	Number Th	0.0 887	and Churtagraphy.	Homowork?		
2	Divisibil	ity on	and Cryptography: d Modular Arithmatic	From1		
	DIVISIUI	lity all Conroc	contations and Algorithms	Examin Final Exam		
	Integer representations and Argonumis Fillal Ex Primes and Greatest Common Divisors			Fillal Exam		
	 Times a Solving 	liu Oi Cona	running and Applications			
	• Solving	congi	ruencies and Applications			
		apity	Richard Crandall and Carl Domerance 2nd ad Drime	Numbers: A		
		1	Computational Derenactive Springer Verlag New Yo	winders. A		
		1	Computational Perspective, Springer-Verlag, New To	rk, 2010		
	Textbook		S Baase and A Van Gelder Computer Algorithms: It	ntroduction to		
		2	Design and Analysis 3 rd ed Adisson-Wesley Readin	σ MA 1999		
				5, IVII I, 19999		
2	Induction a	nd Re	ecursion:	Exam1		
	• Mathem	atical	Induction	Final Exam		
	• Strong Induction and Well-Ordering		on and Well-Ordering			
	• Recursiv	ve Def	initions and Structural Induction			
	• Recursiv	e Alg	orithms			
		U				
			D. A. Gunderson, Handbook of Mathematical Induction	on, Chapman and		
		1	Hall/CRC, Boca Raton, Florida, 2010			
	Textbook					
	ICALDOOK		Kenneth H. Rosen, 7 th ed., Discrete Mathematics and i	ts Applications,		
			MC Graw Hill, 2012			
				0:2		
2	Counting:			Quiz3		
	• The basi		ounting	Exam2		
	The Pige Dormutor		and Combinations	Fillal Exalli		
	 Permuta Pinomio 	1 Cost	fficients and Identities			
	Gaparali	rod D	armutation and Combinations			
		Zeu r	R B I T Allenby and A Slomson How to Count: An I	Introduction to		
		1	Combinatorias 2 nd ad Chapman and Hall/CDC Elor			
	Textbook	1	Combinatorics, 2 eu., Chapman and Han/CKC, 1401	Ida, 2010		
			Kenneth H. Rosen, 7 th ed., Discrete Mathematics and i	ts Applications.		
		2	MC Graw Hill. 2012			
			·			
2	Discrete Pro	obabi	lity:	Exam2		
	• An Intro	ductio	on to Discrete Probability	Final Exam		
	Probability Theory					
	Bayes' Theorem					
	• Expected Value and Variances					

Detailed of Theoretical Contents					
Hours			Contents	Assessment Tools	
	Textbook	1	Sheldon M. Ross, A First Course in Probability Theor Hall, Englewood Cliffs, NJ, 2009	y, 7 th ed., Prentice-	
	TCALDOOK		Kenneth H. Rosen, 7 th ed., Discrete Mathematics and its Applications, MC Graw Hill, 2012		
2	Relations:Homework3• Relations and Their Properties. The Pigeonhole PrincipleExam2• n-ray Relations and Their ApplicationsFinal Exam• Representing RelationsFinal Exam• Closures of RelationsEquivalence Relations• Partial OrderingsPartial Orderings				
	Textbook	1	R.P. Grimaldi, Discrete and Combinatorial Mathematic Wesley, Reading, MA, 2003	es, 5 th ed., Addison-	
6	Graphs and Trees:Exam2• Graphs and Graph ModelsFinal Exam• Graph Terminology and Special Types of GraphsFinal Exam• Representing Graphs, Isomorphism and ConnectivityEuler and Hamilton Paths• Shortest-Path ProblemsPlanar Graph and Graph Coloring• Tree and ApplicationsTree Traversal• Spanning Tree and Minimum				
	Textbook	1	G. Agnarsson and R Greenlaw, Graph Theory: Model and Algorithms, Prentice Hall, Englewood Cliffs, NJ,	ing, Applications, 2006	
4	 Boolean Alg Boolean Represent Logic G Minimiz 	gebra Func nting ates ation	tions Boolean Functions of circuits	Homework4 Final Exam	
	Textbook	1	M. Huth and M. Ryan, Logic in Computer Science, 2 ⁿ university Press, Cambridge, England, 2004	^d ed, Cambridge	
2	Modeling Computation:Quiz4• Finite-State MachinesFinal Exam• Language RecognitionTuring Machine			Quiz4 Final Exam	
	Textbook	1	J. G. Brookshear, Theory of Computation, Benjamin C Redwood city, CA, 1989	Cummings,	

	Detailed of Practical Contents				
Hours			Contents	Assessment Tools	
2	The Foundations: Logic and Proofs:				
	Propositional logic				
	Predicates and quantifiers				
	• Rules of	infere	ence and introduction to proofs		
		1	M. Huth and M. Ryan, Logic in Computer Science, 2 th	¹ ed, Cambridge	
	I extbook	1	university Press, Cambridge, England, 2004		
4	Basic Struc Matrices	tures	Sets, Functions, Sequences, Sums, and		
	• Sets, set operations and cardinality of sets				
	Function	ns, seq	uences and summations		
	Matrices	5			
	Textbook	1	R. A. Brualdi, Introductory Combinatorics, 5 th ed., Pre Englewood Cliffs, NJ,2009	ntice-Hall,	
2	Algorithms	:			
	 Algorith 	ms an	d complexity of algorithms		
	• The Gro	wth o	f Functions		
			S. Baase and A. Van Gelder, Computer Algorithms: Ir	itroduction to	
	Textbook	1	Design and Analysis, 3rd ed., Adisson-Wesley, Readin	g, MA, 1999	
4	Number Th	eorv	and Cryntography:		
т	• Divisibility modular arithmetic integer representations				
	 Primes a 	ind Gr	reatest Common Divisors		
	• Solving Congruencies and Applications				
	Cryptog	raphy	The second s		
			Richard Crandall and Carl Pomerance, 2 nd ed., Prime 1	Numbers: A	
	Textbook	1	Computational Perspective, Springer-Verlag, New Yo	rk, 2010	
2	Induction a	nd R	ecursion		
2	Mathematical Induction, strong Induction and Well-Ordering				
	• Recursive Definitions, structural Induction and recursive				
	Algorith	ms			
	U		Kenneth H. Rosen, 7th ed., Discrete Mathematics and i	ts Applications,	
	Textbook	1	MC Graw Hill, 2012		
2	Countings				
2	• The basi	c of (Counting		
	• The Dash	conho	le Principle		
	 The rigeonnoise Principle Permutations Combinations Binomial Coefficients and 				
	Identities				
			Kenneth H. Rosen, 7th ed., Discrete Mathematics and i	ts Applications,	
	Textbook	1	MC Graw Hill, 2012		
				-4.	
		~	R.P. Grimaldi, Discrete and Combinatorial Mathemati	cs, 5 ^m ed.,	
		2	Addison-Wesley, Reading, MA, 2003		
2	Digonata D-	ahahi	1:4		
2	Discrete Pr	Drob	my. ability and Probability Theory		
		11008			

	Detailed of Practical Contents					
Hours			Contents	Assessment Tools		
	 Bayes' Theorem Expected Value and Variances 					
	Textbook	1	Kenneth H. Rosen, 7 th ed., Discrete Mathematics and MC Graw Hill, 2012	its Applications,		
4	 Relations: Relation n-ray Reand Equ Partial C 	s and elation ivalen Drderii	Their Properties. The Pigeonhole Principle s, Representing Relations, Closures of Relations ce Relations 195			
	Teythook	1	R.P. Grimaldi, Discrete and Combinatorial Mathemati Addison-Wesley, Reading, MA, 2003	ics, 5 th ed.,		
	TEALDOOK	2	Kenneth H. Rosen, 7 th ed., Discrete Mathematics and MC Graw Hill, 2012	its Applications,		
4	 Graphs and Trees: Graphs, Graph Models, Graph Terminology, Representing Graphs, Isomorphism and Connectivity Euler and Hamilton Paths and Shortest-Path Problems Planar Graph and Graph Coloring Tree Tree Traversal Spanning Tree and Minimum 					
	Textbook	1	 G. Agnarsson and R Greenlaw, Graph Theory: Model and Algorithms, Prentice Hall, Englewood Cliffs, NJ, Kenneth H. Rosen, 7th ed., Discrete Mathematics and MC Graw Hill, 2012 	ing, Applications, 2006 its Applications,		
4	Boolean Al Boolean Logic G Minimiz	gebra Funct ates ation	: tions and it's Representation of circuits M. Huth and M. Ryan, Logic in Computer Science, 2 ⁿ	^{id} ed, Cambridge		
	Textbook	1	university Press, Cambridge, England, 2004			
2	Modeling Computation: • Finite-State Machines • Language Recognition • Turing Machine					
	Textbook	1	J. G. Brookshear, Theory of Computation, Benjamin C Redwood city, CA, 1989	Cummings,		

	1	M. Huth and M. Ryan, Logic in Computer Science, 2 nd ed, Cambridge university Press, Cambridge, England, 2004
	2	R. A. Brualdi, Introductory Combinatorics, 5 th ed., Prentice-Hall, Englewood Cliffs, NJ,2009
	3	S. Baase and A. Van Gelder, Computer Algorithms: Introduction to Design and Analysis, 3 rd ed., Adisson-Wesley, Reading, MA, 1999
	4	Richard Crandall and Carl Pomerance, 2 nd ed., Prime Numbers: A Computational Perspective, Springer-Verlag, New York, 2010
Textbook	5	Kenneth H. Rosen, 7 th ed., Discrete Mathematics and its Applications, MC Graw Hill, 2012
	6	D. A. Gunderson, Handbook of Mathematical Induction, Chapman and Hall/CRC, Boca Raton, Florida, 2010
	7	R.B.J.T Allenby and A. Slomson, How to Count: An Introduction to Combinatorics, 2 nd ed., Chapman and Hall/CRC, Florida, 2010
	8	Sheldon M. Ross, A First Course in Probability Theory, 7 th ed., Prentice-Hall, Englewood Cliffs, NJ, 2009
	9	G. Agnarsson and R Greenlaw, Graph Theory: Modeling, Applications, and Algorithms, Prentice Hall, Englewood Cliffs, NJ, 2006
	10	J. G. Brookshear, Theory of Computation, Benjamin Cummings, Redwood city, CA, 1989