هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Discrete Mathematics**
Course Code:	**MTHS 122**
Program	**Applied Statistics & Data Management**
Department:	**Mathematics**
College:	**Science**
Institution:	**Majmaah University, Saudi Arabia**
Version:	**2023**
Last Revision Date:	**26/09/2023**

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A. General information about the course:

1. Course Identification

1. Credit hours: (3(2+2))					
2. Course type					
A.	☐University	☐College	☐Department	☐Track	Others
B.	☒Required		☐Elective		
3. Level/year at which this course is offered: (2.)					
4. Course general Description:					
Logic: Propositional Logic, Conditional Statements, Truth Tables of Compound Propositions, Logical Equivalence, Constructing New Logical Equivalence, Rules of Inference. **Proofs: Introduction to Proofs, Methods of Proving Methods: Direct Proofs, Proof by Contraposition, Proofs by Contradiction, Mistakes in Proofs, Looking for Counter Examples.** **Relations: Relations and Their Properties, Equivalence Relations** **Graph Theory - terminology – hand shaking theorem – types of graphs – paths – Chromatic number of graphs – four color theorem - Euler and Hamilton paths and circuits and Trees.** **Introduction to Boolean Algebras.**					
5. Pre-requirements for this course (if any)**:**					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
1. Explain Propositional Logic, Conditional Statements, Truth Tables of Compound Propositions, Logical Equivalence, Constructing New Logical Equivalence, Rules of Inference. **2. Analyze Introduction to Proofs, Methods of Proving.** **3. Recognize and prove the Relations and Their Properties, Equivalence Relations.** **4. Prove hand shaking theorem – types of graphs – paths – Chromatic number of graph – four color theorem - Euler and Hamilton.** **5. Demonstrate knowledge of the concepts of Introduction to Boolean**					

Algebras.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	20	66.5%
2	E-learning	10	33.5%
3	Hybrid • Traditional classroom • E-learning	0	0
4	Distance learning	0	0

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	20
2.	**Laboratory/Studio**	
3.	**Field**	0
4.	**Tutorial**	20
5.	**Others (specify)**	0
Total		40

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Deepen students' concepts	K1	**Direct teaching**: Inquiry-based instruction Power Points and discussions **Aimed teaching**: Discovery and oral questions	Homework Quizzes Midterms Final Exam E-exam Discussions E-Exam
1.2	Improve students understanding and		**Direct teaching**: Inquiry-based instruction Power	Homework Quizzes

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	awareness.	K1	Points and discussions **Aimed teaching**: Discovery and oral questions	Midterms Final Exam E-exam Discussions E-Exam
1.3	Expand students' exposure to solve the problems	K1	**Direct teaching**: Inquiry-based instruction Power Points and discussions **Aimed teaching**: Discovery and oral questions	Homework Quizzes Midterms Final Exam E-exam Discussions E-Exam
1.4	Recognize and prove the Relations and Their Properties, Equivalence Relations.	K3	**Direct teaching**: Inquiry-based instruction Power Points and discussions **Aimed teaching**: Discovery and oral questions	Homework Quizzes Midterms Final Exam E-exam Discussions E-Exam
2.0	**Skills**			
2.1	Students should be able to solve any Discrete mathematics problem in appropriate manner without predetermining them.	S1	**Direct teaching**: Inquiry-based instruction Power Points and discussions **Aimed teaching**: Discovery and oral questions	Homework Quizzes Midterms Final Exam E-exam Discussions E-Exam
2.2	Analytical skills involving paying attention to detail and ability to construct logical arguments using correct technical language related to Statistics and Data science	S1	**Direct teaching**: Inquiry-based instruction Power Points and discussions **Aimed teaching**: Discovery and oral questions	Homework Quizzes Midterms Final Exam E-exam Discussions E-Exam
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	**The Language of Mathematics** **Mathematical statements, propositions and predicates, or, and not;**	**9**

	truth tables, implication, necessary and sufficient, if rules of arithmetic; quantifiers, proof and negation of statements with quantifiers.	
2.	**Direct proof, proof by contradiction, contrapositives, the induction principle and proof by induction; changing the base case; strong induction .**	**9**
3	**Sets** **Historical origins, natural numbers to complex numbers; notation, belongs to, definitions (by listing, by conditions, by construction); subsets, equality, operations on sets, union, intersection, identities, power set, Cartesian products; power set.**	**9**
4	**Functions** **Definition and examples, domain, codomain, image, formulae and examples, equality, restriction, composition, sequences and indexing, restriction, graphs ,injections, surjections ,bijections, their compositions, inverse functions .**	**9**
5	**Counting Sets** **Finite sets, cardinality, the Pigeonhole Principle, inclusion-exclusion, Counting infinite sets ,count ability ,remunerability of the rationales unaccountability of the reals; power sets and their cardinality, algebraic and transcendental numbers .**	**9**
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm	6	30%
2.	Homework	Through of semester	5%
3.	Project -Presentation	10	10%
4	Quizzes	Through of semester	10%
5	E-Tests	9	5%
6	Final Examination	12	40%
	TOTAL		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	P.J. Eccles, An Introduction to Mathematical Reasoning: Numbers, Sets and Functions, Cambridge University Press. Cengage learning, 1997
Supportive References	
Electronic Materials	NA
Other Learning Materials	NA

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room with speakers and internet .access .Classroom with capacity of 30-students Library.
Technology equipment (projector, smart board, software)	.Blackboard
Other equipment (depending on the nature of the specialty)	Laboratory.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Faculty	Direct
Effectiveness of Students assessment	Program	Direct
Quality of learning resources	Leaders	Direct
The extent to which CLOs have been achieved	, Program	Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	