

QFO-AP-VA-008	رمز النموذج :	اسم النموذج : خطة المادة الدراسية	 جامعة فيلادلفيا Philadelphia University
2	رقم الإصدار: (Rev)	الجهة المصدرة: نائب الرئيس للشؤون الأكاديمية	
2021-5-4	تاريخ الإصدار:	الجهة المدققة : اللجنة العليا لضمان الجودة	
4	عدد صفحات النموذج :		

Course Title: Discrete Mathematics		Course code: 750120	
Course Level: 1		Course prerequisite (s) and/or corequisite(s):	
Lecture Time:		Credit hours: 3	
UR ☐	FR ☐	DR ☒	C ☐ E ☐

Academic Staff Specifics				
Name	Rank	Office No. and Location	Office Hours	E-mail Address
Dr. Mohammad Taye	Assistant professor	7309		mtaye@philadelphia.edu.jo

The Learning Style Used in Teaching the Course

The Learning Style			
Blended Learning ☐			
Electronic Learning ☐			
Face-to-Face Learning ☒			
Face-to-Face	Electronic	Blended	Percentage
100%			

Course/Module Description:

This course studies the mathematical elements of computer science. Topics include propositional logic; predicate logic; mathematical reasoning; techniques of proof; mathematical induction; set theory; number theory; matrices; sequences and summations; functions, relations and their properties, elementary graph theory, and tree.

Course/Module Objectives:

- Simplify and evaluate basic logic statements including compound statements, implications, inverses, converses, and contrapositives using truth tables and the properties of logic.
- Express a logic sentence in terms of predicates, quantifiers, and logical connectives
- Apply the operations of sets and use Venn diagrams to solve applied problems.
- Determine the domain and range of a discrete or non-discrete function, identify function types, and perform the composition of functions.

- List the terms in a sequence, write a sequence in closed form, compute the sum of a finite sequence,
- Use elementary number theory including the divisibility properties of numbers to determine prime numbers and composites, the greatest common divisor, and the least common multiple; perform modulo arithmetic
- Perform basic matrix operations including sums, products, and transpose and perform 0-1 matrix operations.
- Apply rules of inference, and methods of proof including direct and indirect proof forms, proof by contradiction, and mathematical induction and write proofs using symbolic logic and Boolean Algebra.
- Describe binary relations between two sets; determine if a binary relation is reflexive, symmetric, or transitive or is an equivalence relation; combine relations using set operations and composition.
- Determine if a given graph is simple or a multigraph, directed or undirected, cyclic or acyclic, and determines the connectivity of a graph.
- Represent a graph using an adjacency list and an adjacency matrix and apply graph theory to application problems such as computer networks.
- Determine if a graph is a tree or not; use the properties of trees to classify trees, identify ancestors, descendants, parents, children, and siblings; determine the level of a node, the height of a tree or subtree.
- Perform tree traversals using preorder, in order, and post order traversals and apply these traversals to application problems.

Course/ module components

- **Textbook:**

Discrete Mathematics and Its Applications, Kenneth H. Rosen, McGraw Hill, 7th edition, 2013.

Supporting material(s): Lectures handouts

Teaching methods:

Duration: 16 weeks, 48 hours in total

Lectures: 44 hours (3 hours per week),

Tutorials: 4 hours (1 per week),

Learning outcomes

A-Knowledge and understanding: with the ability to ...

A1) recognize basic concepts of logic and proofs.

A2) recognize basic structures: sets, functions, integers and matrices, relations, and graphs.

B- Intellectual skills: with the ability to ...

B1) Use propositional and predicate calculus in reasoning.

B2) Prove equivalences and properties.

B3) Identify operations and properties of sets, functions, calculate GCD and LCM, relations, matrices, graphs, and trees

B4) Recognize the relationship between graphs, relations, and matrices

C- Subject specific skills – with ability to ...

C1) Use proper proof method for a given problem.

C2) Apply mathematical structures to represent real situations and find their properties.

D- Transferable skills – with ability to

D1) Work in a group in order to represent mathematically specific subject.

Learning outcomes achievement

A1, A2, B2, B3, B4, and B8 are achieved through lectures and assessed by quizzes and examinations

B1, B2, B3, C1, C2, and D1 are achieved and assessed by homework: practical and research works

Assessment instruments

<u>Allocation of Marks</u>	
Assessment Instruments	Mark
mid examination	30%
Final examination	40%
Quizzes, homework and tutorial contributions	30%
Total	100%

Course/Module Academic Calendar

Week	Basic and support material to be covered	Homework/reports and their due dates
(1,2,3,4)	Propositional Logic Applications of Propositional Logic - Propositional Equivalences - Predicates and quantifiers Nested quantifiers	
(5,6)	Sets and Set operations	- Quizzes, Homework.
(7,8)	Functions, Sequences, and summations	-
(9)	Matrices	-
(10)	Divisibility and modular arithmetic Primes and greatest common divisors	Quizzes, Homework
(11,12)	Relations and their properties Representing relations Closures of relations Equivalence relations	- Quizzes, Homework.
	Graphs and graph models,	- Quizzes,

(13)	Graph terminology and special types of graphs, Representing graphs Connectivity	Homework
(14)	Introduction to trees Tree Traversal	
(15)	Revision	
(16) Final Examination	Final Exam	

Expected workload:

On average students need to spend 3 hours of study and preparation for each 50-minute lecture/tutorial.

Attendance policy:

Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Module references

Students will be expected to give the same attention to these references as given to the Module textbook(s)

A- Required book (s), assigned reading and audio-visuals:

Discrete Mathematics and Its Applications, Kenneth H. Rosen, McGraw Hill, 7th edition, 2012.

B- Recommended books, materials, and media:

- Discrete Mathematics with Applications, Susanna S. Epp, Brooks Cole, 4th Edition, 2010.

- Logic and Discrete Mathematics A Computer Science Perspective, Winfried K. Grassman and Jean Paul Tremblay, Prentice Hall, 1995.

- Discrete and Combinatorial Mathematics: An Applied Introduction, Ralph P. Grimaldi, 5th edition, Addison Wesley, 2003.

Website(s):

Useful site:

www.mhhe.com/rosen