The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

1.	Course title	Discrete Mathematics
2.	Course number	1901101
3.	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	3
4.	Prerequisites/corequisites	None
5.	Program title	Computer Science
6.	Year of study and semester (s)	First year (Fall)
7.	Final Qualification	Bachelor degree
8.	Other department (s) involved in teaching the course	None
9.	Language of Instruction	English
10.	Date of production/revision	February, 2018
11.	Required/ Elective	Required

12. Course Coordinator:

Mrs. Lubna Naisr Eldeen

Office numbers: KASIT 121

Email address: lubna@ju.edu.jo

Office hours: Sunday, Tuesday 9:00 - 10:00

13. Other instructors:

Dr. Khair Eddin Sabri

Office numbers: KASIT 117
Office hours:
  Sunday, Tuesday: 10:00 – 10:00
  Tuesday: 11:00 – 12:00
Phone number: 22557

Email addresses: k.sabri@ju.edu.jo

14. Course 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.

15. Course aims and outcomes:

A- Aims:

Goal:

The main goal of this course is to equip students with required mathematical knowledge in discrete mathematics and its applications in computer science.

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 functions types, 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 determine 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, inorder, and postorder traversals and apply these traversals to application problems.*

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to …

A-Knowledge and understanding: with the ability to …
- *A1) Understand basic concepts of logic and proofs.*
- *A2) Understand basic concepts of sets.*
- *A3) Understand basic concepts of functions.*
- *A4) Understand basic concepts of sequences and summations.*
- *A5) Understand basic concepts of integers.*
- *A6) Understand basic concepts of matrices.*
- *A7) Understand basic concepts of relations.*
- *A8) Understand basic concepts of graphs.*
- *A9) Understand basic concepts of trees.*

B- Intellectual skills: with the ability to …
- *B1) Use propositional and predicate calculus in reasoning.*
- *B2) Prove equivalences and properties.*
- *B3) Identify set identities*
- *B4) Distinguish between geometric and arithmetic progression*
- *B5) Find a result of a summation*
- *B6) Identify operations and properties of sets, functions, relations, matrices, graphs, and trees*
- *B7) Recognize the relationship between graphs, relations, and matrices*
- *B8) Identify prime numbers, and calculate GCD and LCM*

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.*
- *D2) Communicate effectively by oral and written means.*

16. Topic Outline and Schedule:

Topic	Week	ILOs	SO/ABET Outcomes	TLA (teaching, learning and Assessment)
Propositional Logic	1	A1	a	T: Lecture L: Reading Section 1.1 A: Assignments: selective questions from Q:11,13,14,16,17,18,19,31-39 in Pages 13-15. Or Quiz on Truth table, translation Midterm, Final
- Applications of Propositional Logic **- Propositional Equivalences**	2	A1, B2, C2, D2	a,b	T: Lecture and discussion L: Reading Sections 1.2, 1.3 A: Assignments: selective questions from Q:2,3,5-10 in Pages 22-23, Or Assignments: selective questions from Q:1-6,9-33 in Pages 34-35, Or Quiz on Translation, Program Specification, proposition equivalences.

				Midterm, Final
Predicates and quantifiers **Nested quantifiers**	3	A1, B2	a	T: Lecture and discussion L: Reading Sections 1.4, 1.5 A: Assignments: selective questions from Q:9-16,22-29,35,36,43, in Pages 53-56, Or Assignments: selective questions from Q:1,2,8-17,24-28 in Pages 64-67, Or Quiz on Quantifications Midterm, Final
Rules of Inference	4	A1, B1, C2, D1, D2	a,b	T: Lecture and discussion L: Reading Section 1.6 A: Assignments: selective questions from Q:6,9,10,15,17,23-29 in Pages 78-80 Or Quiz on Inference rules Midterm, Final
Introduction to proofs	5	A1, C1	a	T: Lectures and discussion L: Reading Section 1.7 A: Assignments: selective questions from Q:1,2,6,17,18,26,27 in Page 91 Or Quiz on Proofs Midterm, Final
Sets **Set operations**	6	A2, B3, C2, D2	a,b	T: Lecture and discussion L: Reading Sections 2.1, 2.2 A: Assignments: selective questions from Q:1,2,5-24,27,32, in Pages 125-126, Or selective questions from Q:3,4,25,29,47 in Pages 136-137, Or Quiz on Set operations Midterm, Final
Midterm exam	7			A: Written exam on materials in Sections 1.1-1.7 and Sections 2.1, 2.2
Functions **Sequences and summations**	8	A3, B4, B5, C2	a	T: Lectures and discussion L: Reading Section 2.3, 2.4 T: Lecture and discussion L: Reading Sections 2.1, 2.2 A: Assignments: selective questions from Q:8-15,22,23 in Pages 152-153, Or selective questions from Q:1-4,29-34 in Pages 167-169, Or Quiz on Function Operators, Function properties, find a sequence formula. or summation. Short test, Final
Matrices	9	A6, B6, C2	a	T: Lecture and discussion L: Reading Sections 2.6 A: Assignments: selective questions from Q:1-5,10,26-29 in Pages 183-185, Or Quiz on Matrix Operators. Short test, Final
Divisibility and modular arithmetic	10	A5, B8	a,b	T: Lecture and discussion L: Reading Sections 4.1, 4.3

Primes and greatest common divisors				A: Assignments: selective questions from Q:9,10,20-25,28,29. in Pages 244-245,, Or Assignments: selective questions from Q:1-4,14-17,24,25, in Pages 272-273, Or Quiz on Finding mod, prime factorization, GCD, LCM Short test, Final
Mathematical Induction **Short Exam**	11	A1,B2, C1	a	T: Lecture, and discussion L: Reading Sections 5.1 A: Assignments: selective questions from Q:5, 14-16 in Pages 329-330, Or Quiz on proving by induction Short test, Final Short test in Sections: 2.3, 2.4, 2.6, 4.1, 4.3, 5.1
Relations and their properties **Representing relations** **Closures of relations** **Equivalence relations**	12	A7, B6, B7, C2, D2	a,b	T: Lecture and discussion L: Reading Sections 9.1, 9.3, 9.4, 9.5 A: Assignments: selective questions from Q:3,6,7,26-28,30,32. in Pages 581-583, Or selective questions from Q:1-4,13-15,22-28, in Pages 296-297, Or selective questions from Q:2,3,25,26, in Pages 606-607, Or selective questions from Q1,21,23,24 in Pages 615,616 Or Quiz on relation operator or representation. Final
Graphs and graph models **Graph terminology and special types of graphs** **Representing graphs** **Connectivity**	13	A8, B6, B7, C2, D2	a,b	T: Lecture and discussion L: Reading Sections 10.1, 10.2, 10.3, 10.4 A: Assignments: selective questions from Q:1-3,20,35,. in Pages 665-667, Or selective questions from Q:1-15 in Page 675, Or selective questions from Q:1-5, in Page 689 Or Quiz on graph terminology or representation. Final
Introduction to trees **Tree Traversal**	14	A9, B6, C2, D2	a	T: Lecture and discussion L: Reading Sections 11.1, 11.3 A: Assignments: selective questions from Q:1-9 in Page 755, Or selective questions from Q:7-16,23,24 in Pages 783-784 Or Quiz on Tree terminology or tree traversal. Final
Revision	15			
Final	16			

(Please mention instructors per topic if the course topics are being taught by more than one instructor)

17. Evaluation Methods and Course Requirements (Optional):

Opportunities to demonstrate achievement of the ILOs are provided through the following <u>assessment methods and requirements</u>:

There will be several assessment methods of evaluation the performance of the students such as attending and class participation, grading the quizzes; assignments; conducting the midterm, short test and the final exam.

18. Course Policies:

A- Attendance policies:

Deliberate abstention from attending 1901101 classes and any other similar acts will lead to student deprivation from the course according to the UJ regulations

B- Absences from exams and handing in assignments on time:

If you miss the midterm or the short test, then a makeup exam will not be provided unless you submit a valid absence excuse, within three days from the midterm, to your lecturer. This excuse must be signed and stamped from the UJ hospital in order to be valid. If your lecturer accepts the excuse then you will be able to take the makeup. You need to follow up the departmental announcements regarding the makeup date and time. Please note that the lecturer may either accept or reject your excuse based on UJ regulations

C- Health and safety procedures:

N/A

D- Honesty policy regarding cheating, plagiarism, misbehavior:

All students in this course must read the University policies on plagiarism and academic honesty

http://registration.ju.edu.jo/RegRegulations/Forms/All_Regulations.aspx

E- Grading policy:

- *Midterm Exam:*	*30%*
- *Quizzes, assignments and/or class participants*	*15%*
- *Short test*	*15%*
- *Final Exam:*	*40%*

F- Available university services that support achievement in the course:

N/A

G- Statement on Students with disabilities

Students with Disabilities: Students with disabilities who need special accommodations for this class are encouraged to meet with the instructor and/or their academic advisor as soon as possible. In order to

receive accommodations for academic work in this course, students must inform the course instructor and/or their academic advisor, preferably in a written format, about their needs no later than the 4th week of classes.

19. Required equipment:

Class rooms with data shows

20. References:

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 P(Tremblay, Prentice Hall, 1995.*
- *Discrete and Combinatorial Mathematics: An Applied Introduction, Ralph P. Grimaldi, 5th edition, Addison Wesley, 2003.*

21. Additional information:

Course website:
elearning.ju.edu.jo

Useful site:
www.mhhe.com/rosen

Date: ------------------------

Name of Course Coordinator: -------------------Signature: ------------------------

Head of curriculum committee/Department: ------------------------ Signature: ---------------

Head of Department: ------------------------ Signature: --------------------------------

Head of curriculum committee/Faculty: ------------------------ Signature: ---------------------

Dean: -- -Signature: --------------------------------

Copy to:
Head of Department
Assistant Dean for Quality Assurance
Course File;