

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 (Spring) 2021/2022
7.	Final Qualification	Bachelor's degree
8.	Other department (s) involved in teaching the course	None
9.	Language of Instruction	English
10.	Date of production/revision	October, 2022
11.	Required/ Elective	Required

12. Course Coordinator:

Mrs. Lubna Nasir Eddeen
Office numbers: KASIT 125
Phone number: 22581
Email addresses: Lubna@ju.edu.jo

13. Other instructors:

- Prof. Ahmad Al Sharieh
- Dr. Mohammad Al Otoum
- Dr. Ahmad Al Hwaitat
- Mrs. Ansar Khouri
- Dr. Muneer Hasan

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 function 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.*

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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	ABET Outcomes	TLA (teaching, learning and Assessment)
1. Propositional Logic	1	A1	1	T: Online Lecture, videos L: Reading Section 1.1 A: Quiz, Midterm, Final
2. Applications of Propositional Logic	2	A1, B2, C2, D2	1	T: Online Lecture, videos L: Reading Sections 1.2, 1.3 A: Quiz, Midterm, Final
3. Propositional Equivalences				
4. Predicates and quantifiers	3	A1, B2	1	T: Online Lecture, videos L: Reading Sections 1.4, 1.5 A: Quiz, Midterm, Final
5. Nested quantifiers				
6. Rules of Inference	4	A1, B1, C2, D1, D2	1	T: Online Lecture, videos L: Reading Section 1.6 A: Quiz, Midterm, Final
7. Introduction to proofs	5	A1, C1	1	T: Online Lecture, videos L: Reading Section 1.7 A: Quiz, Midterm, Final
8. Sets	6	A2, B3, C2, D2	1	T: Online Lecture, videos L: Reading Sections 2.1, 2.2

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9. Set operations				A: Quiz, Midterm, Final
10. Functions	7	A3, B4, B5, C2	1	T: Online Lecture, videos L: Reading Section 2.3, 2.4 A: Quiz, Final
11. Sequences and summations				
12. Matrices	8	A6, B6, C2	1	T: Online Lecture, videos L: Reading Sections 2.6 A: Quiz, Final
Midterm exam	8			A: Written or Automated exam on materials in Sections 1.1-1.7 and Sections 2.1, 2.2
13. Divisibility and modular arithmetic	9	A5, B8	1	T: Online Lecture, videos L: Reading Sections 4.1, 4.3 A: Quiz, Final
14. Primes and greatest common divisors				
15. Mathematical Induction	9	A1, B2, C1	1	T: Lecture, and discussion L: Reading Sections 5.1 A: Quiz, Final
16. Relations and their properties	10	A7, B6, B7, C2, D2	1	T: Online Lecture, videos L: Reading Sections 9.1, 9.3, 9.4, 9.5, 9.6 A: Quiz, Final
17. Representing relations				
18. Closures of relations				
19. Equivalence relations				
20. Partial Orderings				
21. Graphs and graph models	11	A8, B6, B7, C2, D2	1	T: Online Lecture, videos L: Reading Sections 10.1, 10.2, 10.3, 10.4 A: Quiz, Final
22. Graph terminology and special types of graphs				
23. Representing graphs				
24. Connectivity				
25. Introduction to trees	12	A9, B6, C2, D2	1	T: Online Lecture, videos L: Reading Sections 11.1, 11.3 A: Quiz, Final
26. Tree Traversal				
27. Revision	13			
Final	14			

28. Evaluation Methods and Course Requirements (Optional):

- Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

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.

29. 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, 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 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	20%
- Final Exam:	50%

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

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and/or their academic advisor, preferably in a written format, about their needs no later than the 4th week of classes.

30. Required equipment:

31. References:

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

Discrete Mathematics and Its Applications, Kenneth H. Rosen, McGraw Hill, 8th edition, 2019.

B- Recommended books, materials, and media:

- *Discrete Mathematics with Applications, Susanna S. Epp, Brooks Cole, 11th Edition, 2014.*
- *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.*

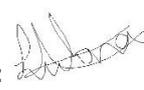
32. Additional information:

One hour weekly synchronous class will be on Microsoft Teams

*Course website:
elearning.ju.edu.jo*

Date: 23/10/2022

Name of Course Coordinator: Lubna Nasir Eddeen

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