

الإصدار: ١/١
التاريخ: 2017/03/9
الصفحات: ١١/١

الجامعة الأردنية
رمز النموذج: QF-AQAC-03.02B
اسم النموذج: مخطط المادة الدراسية



The University of Jordan
Accreditation & Quality Assurance Center

COURSE Syllabus

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1.	Course title	Graph Theory
2.	Course number	1901443
3.	Credit hours (theory, practical)	3 hours
	Contact hours (theory, practical)	3 Theory per Week
4.	Prerequisites/corequisites	Theory of algorithms (١٩٠١٣٤١)
5.	Program title	Computer Science / Undergraduate
6.	Year of study and semester (s)	Third Years and Forth – first Semester
7.	Final Qualification	Bachelor of Computer Science
8.	Other department (s) involved in teaching the course	None
9.	Language of Instruction	English
10.	Date of production/revision	Feb/2023
11.	Required/ Elective	Elective

12. Course Coordinator:

Dr. Basima Elshqeirat

Office Location: KASIT First Floor – CS Department

Office Phone Number: 06-5355000 ext. 22592

Office Hours: Wednesday 1:00-2:30pm

E-mail: b.shoqurat@ju.edu.jo

13. Other instructors:

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14. Course Description:

Concepts of a graph. Undirected graphs vs. directed graphs. Computer representation of graphs; Euler graph and De Bruijn sequences. Graph isomorphism. Shortest path algorithm. Minimum Spanning trees algorithms: Kruscal and Prim algorithms. Depth first search for directed and undirected graphs. Maximum flow in a network: Ford-Fulkerson Algorithm. NP-complete graph problems: graph coloring, maximum independent set, minimum vertex cover, traveling salesman problem.

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The students assessment will be based on assignment, quizzes and exams

15. Course aims and outcomes:

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A- Aims:

Upon successful completion of this course:

- A1. Students will be prepared to start graduate study in graph theory, while students will be prepared to undertake advanced study in graph theory aimed toward original research.
- A2. Students not specializing in graph theory will nevertheless be prepared to follow applications of graph theory to other disciplines—especially in computer science and operations research, but also in social science and mathematical biology.
- A3. Students will have a solid overview of the questions addressed by graph theory and its applications, will have been exposed to current areas of research.

B- Intended Learning Outcomes (ILOs):

Upon successful completion of this course, students should be able to:

A: Understanding and Knowledge

- A1. Know and understand the precise and accurate mathematical definitions of objects in graph theory.
- A2. Understand basic definitions and examples of graphs, connectedness, Eulerian and Hamiltonian paths and cycles, and trees. planarity and graph colouring, directed graphs, traversal theory, and network flow.

B: Cognitive and Intellectual

- B1- Present solution for problems using mathematical construct examples and to distinguish examples from non-examples.
- B2 - Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.

C: Analysis

- C1 - Analyze problems in graph theory.
- C2- Provide solutions to problems (traverse, search, critical path, flow, puzzle, ...) using graph theory.

D: Transferable

- D1. Formulate related problems in the language of graphs.
- D2 – Represent problems in graphs and its presentation in lists and matrices.

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16. Topic Outline and Schedule:

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Topic Details	Weeks	Achieved ILOs	ABET outcome	Teaching/Learning & Evaluation Methods
<p>Concepts of a graph:</p> <p>Undirected graphs vs. directed graphs graph, vertex, vertex set, edge, edge set, order and size of a graph, neighborhood of a vertex, edges incident to a vertex, isolated-vertex, end-vertex Edge types Graph types Bipartite concepts and applications Cycle Trees rooted</p>	1-3	A1, B1, C1	1,2	<p>T: Lecture & Discussion L: Reading lecture notes and Chapter 1 of TB</p> <p>A: In class questions</p>
<p>Computer representation of graphs;</p> <p>Euler graph and De Bruijn sequences</p>	4-6	A1, A2, B1	2	<p>T: Lecture & Presentation L: Reading lecture notes and Ch 2 A: Quiz-1</p>
<p>Graph isomorphism</p>	7	A2, D1, D2	1,6	<p>T: Lecture & Presentation L: Reading lecture notes and Ch2. A: homework 1.</p>
<p>Shortest path algorithm. Minimum Spanning trees algorithms:</p> <p>Kruscal and Prim algorithms</p>	8-9	B2, C1, C2, D2	1,2	<p>T: Lecture & Presentation L: Reading lecture notes, and Ch 4 A: Quiz-2</p>

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Depth first search for directed and undirected graphs.	10	A2, B2, C2, D1	1,6	T: Lecture & Presentation L: Reading lecture notes, Ch4. A: Midterm Exam
NP-complete graph problems: graph coloring, maximum independent set, minimum vertex cover, traveling salesman problem.	11-13	A2, B1, C1, C2, D1	6	T: Lecture & Presentation L: Reading lecture notes , and Ch 3+5. A: Quiz-3
Maximum flow in a network: Ford-Fulkerson Algorithm Max-flow Min-cut	14-15	A2, C1, C2, D1	2	T: Lecture & Presentation L: Reading lecture notes, Ch 7 A: Homework 2

17. Evaluation Methods and Course Requirements (Optional):

Development of ILOs is promoted through the following teaching and learning methods:

Teaching (T) Methods:

- Class contact is 3 hours per week. The Course will be delivered using different means like lectures, presentations, and discussion.
- Class lecture is 1 hour, lecture notes, exams (midterm and final) and quizzes are designed to achieve the course goals and objectives.

Learning (L) Methods:

- You should read the assigned topics before class, and participate in class and do whatever it takes for you to grasp this material. Also, ask any question related to

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graph theory.

- You are responsible for all material covered in the class.
- Please communicate with me regarding any concerns or issues related to graph theory by either in class, course web page, phone or email.
- The web page (elearning.ju.edu.jo) is a primary communication vehicle. Lecture notes, presentations and syllabus are available on the web.

Assessment (A) Methods:

- There will be several assessment methods of evaluation the performance of the students such as attending and class participation, quizzes, Tests, Homework, conducting the midterm and the final exams.

18. Course Policies:

<p>Opportunities to demonstrate achievement of the ILOs are provided through the following <u>assessment methods and requirements</u>:</p> <p>Exams: The format for the exams is generally (but NOT always) as follows: General Definitions, Multiple-Choice, True/False, Analyze a Problem, Short Essay Questions, Solving Problems etc.</p> <p>Quizzes/Tests: The instructor may give quizzes or Homeworks or both; usually it is left up to the instructor. Usually 3 quizzes and two Homeworks are given in semester; it is left up to the instructor. No makeup quizzes.</p>		
Evaluation Type	Expected Due Date	Weight
Midterm Exam	27/4/2023	30%
Final Exam	TBA	40%
Quizzes/Homeworks	TBA	30%
Cheating	<ul style="list-style-type: none"> • Cheating or copying on exam or quiz is an illegal and unethical activity. • Standard University of Jordan policy will be applied. • All graded assignments must be your own work (your own words). 	
Attendance	<ul style="list-style-type: none"> • Excellent attendance is expected. • The University of Jordan policy requires the faculty member to assign ZERO grade (F) if a student misses 10% of the classes that are not excused. • Sign-in sheets will be circulated. • If you miss class, it is your responsibility to find out about any 	
Workload	<ul style="list-style-type: none"> • Average work-load student should expect to spend 6 hours per week. 	

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Participation	<ul style="list-style-type: none"> Participation in and contribution to class discussions will affect your final grade positively. Raise your hand if you have any question. Making any kind of disruption and (side talks) in the class will affect you negatively. 	
Concerns or Complaints	<ul style="list-style-type: none"> Concerns or complaints should be expressed in the first instance to the module lecturer; if no resolution is forthcoming, then the issue should be brought to the attention of the module coordinator (for multiple sections) who will take the concerns to the module representative meeting. Thereafter, problems are dealt with by the Department Chair and if still unresolved the Dean and then ultimately the Vice President. For final complaints there will be a committee to review grading the final exam 	
University Regulations	<ul style="list-style-type: none"> For more details on University regulations please visit: http://www.ju.edu.jo/rules/index.htm 	
Intended Grading Scale		
Weight	Points	Grade
85 – 100	4	A
80 – 84	3.75	A-
75 – 79	3.5	B+
70 – 74	3	B
65 – 69	2.75	B-
60 – 64	2.5	C+
55 – 59	1.75	C
50 – 54	1.75	C-
45 – 49	1.5	D+
40 – 44	1	D
36 – 39	0.75	D-
0 – 35	0	F

19. Required equipment:

No equipment required except for a desk top computer, which has MS-Office and Adobe Reader, which are available in KASIT Labs.

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20. References:

A- Text Book:

D.B.West: Introduction to Graph Theory, Prentice-Hall of India/Pearson, 2009 (latest impression)

B - Recommended books, materials, and media:

- 1- *Graph Theory*, Springer 2000 (Electronic Edition), R. Diestel,
- 2- J.A Bondy and U.S.R. Murty, *Graph Theory*, Springer 2008 (Second Edition)

21. Additional information:

Moodle:

<http://elearning.ju.edu.jo/>

User Name and Password are similar to the student's Internet account at the university

Regulations:

- University Regulations should be respected. <http://www.ju.edu.jo/rules/index.htm>

Date: 18/1/2023

Name of Course Coordinator: -----Dr.Basima Elshqeirat----- Signature: -----

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

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

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

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

Copy to:
Head of Department

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Assistant Dean for Quality Assurance

Course File