جامعة الزيتونة الأردنية
Al-Zaytoonah University of Jordan
كلية العلوم وتكنولوجيا المعلومات
Faculty of Science and information Technology

" عراقة وجودة"
"Tradition and Quality"

QF01/0408-4.0E	**Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Mathematics Department**

Study plan No.	2021/2022	University Specialization	**Bachelor of Mathematics**
Course No.	0101370	**Course name**	**Graph Theory**
Credit Hours	3	**Prerequisite/ Co-requisite**	**Foundations of Mathematics**

Course type	☐ MANDATORY UNIVERSITY REQUIREMENT	☐ UNIVERSITY ELECTIVE REQUIREMENTS	☐ FACULTY MANDATORY REQUIREMENT	☐ Support course family requirements	☐ Mandatory requirements	✓ Elective requirements
Teaching style	☐ Full online learning		✓ Blended learning		☐Traditional learning	
Teaching model	☐ 1 Synchronous: 1 asynchronous		✓ 1 face to face : 1 asynchronous		☐2 Traditional	

Faculty member and study divisions' information (to be filled in each semester by the subject instructor)

Name	Academic rank	Office No.	Phone No.	E-mail

Division number	Time	Place	Number of students	Teaching style	Approved model

Brief description

Some counting techniques such as the principle of inclusion and exclusion, Graphs, Paths, Trees and networks and useful algorithms on networks such as shortest path algorithm, Minimal spanning tree algorithm and flow algorithms in networks.

Learning resources

Course book information (Title, author, date of issue, publisher ... etc)	Introduction to Graph Theory, by Robin J. Wilson, 4th Ed.
Supportive learning resources (Books, databases, periodicals, software, applications, others)	1. Discrete Mathematics with Combinatorics, by J. A. Anderson, 2nd Ed. 2. Discrete Mathematics and Its Applications, by K. H. Rosen, 6th Ed. 3. Discrete Mathematics and Combinatorics, by Sengadir, 2009. 4. Discrete Mathematics and Graph Theory, by Satyanarayana & Pras, 2009.
Supporting websites	1. "Graph theory", Encyclopedia of Mathematics, EMS Press, 2001 [1994] 2. Graph theory tutorial 3. A searchable database of small connected graphs 4. Graph Theory Software — tools to teach and learn graph theory
The physical environment for teaching	✓ Class room ☐ labs ✓ Virtual educational platform ☐ Others
Necessary equipment and software	
Supporting people with special needs	

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For technical support	

Course learning outcomes (S= *Skills, C= Competences K= Knowledge,*)

No.	Course learning outcomes	The associated program learning output code
Knowledge		
K1	Define basic notions in graph theory.	MK 2
K2	Recognize the concept of three puzzles, paths and cycles connectivity and Eulerian graphs.	MK 2
K3	Identify the Eulerian graphs and Hamiltonian graphs.	MK 2
K4	Classify the theory of trees and counting trees.	MK 4
K5	Compare digraphs, Eulerian digraphs and tournaments.	MK 4
K6	Apply Markov chains.	MK 2
Skills		
S1	Use the algorithms that are treated in the course for solving graph theoretical problems	MS 4
S2	Apply the theorems that are treated in the course for problem solving and proofs	MS 4
S3	Apply the students will be able to their knowledge of graph theory to problems in other areas, possibly demonstrated by a class project.	MS 4
Competences		
C1	Decide in what situations the theorems that are treated in the course can be applied.	MC 1
C2	Develop the individual's ability to communicate and interact with other mathematical courses	

Mechanisms for direct evaluation of learning outcomes

Type of assessment / learning style	Fully electronic learning	Blended learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
Midterm exam	30%	**30%**	40%	30%
Participation / practical applications	0	**0**	10%	30%
Asynchronous interactive activities	30%	**20%**	0	0
Final exam	40%	**50%**	50%	40%

Schedule of simultaneous / face-to-face encounters and their topics

Week	Subject	learning style	Reference
1	Introduction. What is a graph?	Lecture	1-7 Ref 1
2	Definition	Lecture	8-16 Ref 1
3	Examples	Lecture	17-20 Ref 1
4	Three puzzles	Lecture	21-25 Ref 1
5	Paths and cycles.	Lecture	26-30 Ref 1

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6	Eulerian graphs	Lecture	31-34 Ref 2
7	Connectivity	Lecture	31-34 Ref 2
8	Hamiltonian graphs	Lecture	35-37 Ref 2
9	Some algorithms Medexam. 30%	Lecture	38-42 Ref 2
10	Trees. Properties of trees	Lecture	43-46 Ref 2
11	Counting trees	Lecture	47-50 Ref 2
12	Digraphs.	Lecture	100-104 Ref 2
13	Definitions	Lecture	100-104 Ref 2
14	Eulerian digraphs and tournaments	Lecture	105-107 Ref 2
15	Markov chains	Lecture	108-112 Ref 2
16	**Final Exam**		

Schedule of asynchronous interactive activities (in the case of e-learning and blended learning)

Week	Task / activity	Reference	Expected results
1	Background		Self-reading and Discussion
2	Video 1 Solving exercises	E-learning	Discussion in the class
3	Home work1: On the subjects studied on the first three weeks	(Lecture notes and Ref.1)	Submit a pdf or word sheet
4	Quiz 1	On the subjects studied on the first three weeks	Submitting on the E-learning
5	Assignment 1: On Frenet-Serret frame	Internet sources and the other Supportive learning resources	Presentation
6	Video 2	Solving exercises	Discussion in the class
7	Home work 2 On the subjects studied in the weeks 4,5 and 6	(Lecture notes and Ref.1)	Submit a pdf or word sheet
8	Assignment 2: On Bertrand curves	Internet sources and the other Supportive learning resources	Submitted with the mid exam
9	Self-reading	Some Examples on graph (Ref.2)	Talk
10	Video3 Solving exercises	E-learning	Discussion in the class
11	Home work 3: On the subjects studied after the midexam	(Lecture notes and Ref.1)	Submit a pdf or word sheet
12	Self-reading	Surface area (Ref.2)	Talk
13	Quiz 2	On the subjects studied on the subject studied after midexam	Submitting on the E-learning
14	Presentation of the subject: The second fundamental form.	Internet sources and the reference book	Video
15	Video 4 Revision of all the course	E-learning	
16	**Final Exam**	-	