Philadelphia University
Faculty of Science
Department of Basic sciences and mathematics
semester, academic year

Course syllabus	
Course title: Graph Theory	**Course code:** 250351
Course level: 300	**Course prerequisite (s) and/or corequisite (s): 250241**
Lecture time:	**Credit hours: 3**

Academic Staff Specifics

Name	Rank	Office number and location	Office hours	E-mail address

Course module description

This course is an introduction to Graph Theory and its applications, covering topics in Graph isomorphism, Trees and its applications, Bipartite Graphs and Matching, Euler and Hamiltonian Graphs, Graph Coloring, Planar Graphs, Metrical Representations, Digraphs and Networks, with numerous graph algorithms throughout.

Course module objective:

Analyze the regularity of some graph. Determine whether or not a sequence is graphical. between two graphs. Produces a spanning tree of G. Produce a minimal spanning tree of The concept of the isomorphism a weighted graph G. Coloring bipartite graphs. When the graph is planar. Find the distance between the vertices. Find the shortest closed walk. Find the adjacency, and incidence matrices. Find the distance matrix**.**

Course/ module components

Books (title , author (s), publisher, year of publication)

Goodaire and Parmenter, Discrete Mathematics with Graph Theory, 3rd Edition 2006, Prentice **Hall.**

Teaching methods:

Duration: 16 weeks in second semester, 32 hours in total.
Lectures: 45 hours in total, 3 per week (including two 1-hour midterm exams)

Learning outcomes:

To give the student the necessary information to deals with graph.

To give the student the necessary algorithm to determine whether or not a sequence is graphical. Analyze the regularity of the graphs. The necessary algorithm to spanning tree, to count the number of spanning tree.

Increase the ability to compute d(a,b) in a weight graph and find the shortest path from a to b.

Assessment instruments

Short reports and/ or presentations, and/ or Short research projects
Quizzes.
Homework
Final examination

Allocation of Marks	
Assessment Instruments	**Mark**
First examination:	**20**
Second examination:	**20**
Final examination: Sun to Tue.	**40**
Reports, research projects, quizzes, homework, Projects:	**20**
Total	**100**

Documentation and academic honesty

Documentation style (with illustrative examples)
Protection by copyright
Avoiding plagiarism.

Course/module academic calendar

Week Dates Topics:

1. Introduction to the uses of Graphs, basic definitions, with special properties, Degree Sequence of a graph
2. Isomorphism of Graphs, Sub graphs, Self-Complementary **Graphs**
3. Trees, Acyclic Graphs, Spanning Trees, Depth-First Search Algorithm, Kirchoff's **Algorithm**
4. Weighted Graphs, Minimal Spanning Trees,**Kruskal's** Algorithm and Prim's Algorithm
5. Bipartite Graphs, A Coloring Algorithm
6. Matching, Hall's Marriage Theorem
   **** First Examination***
7. Vertex Coloring, , Sequential Coloring Algorithm Maximum Color –Degree
8. Planar Graphs, Euler's Formula, Kuratowski's Theorem, The Four Color Theorem
9. Shortest Paths, Dijkstra's Algorithm, Euler Walks
10. The Chinese Postman Problem, Hamilton Cycles, The Traveling Salesman Problem
11. Adjacency and Incidence Matrices, The Distance **Matrix**
    ****Second Examination***
12. From A to D Algorithm, Floyd- Warshall Algorithm for weighted graphs
13. Digraphs, The One Way Street Algorithm, Tournaments and Hamilton Paths
14. Acyclic Digraphs, Rooted Trees, Bellman's Algorithm
15. Review for Final Exam
16. ****Final Examination***

Expected workload:

On average students need to spend 2 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

Books

Goodaire and Parmenter, Discrete Mathematics with Graph Theory, 3rd Edition 2006 Prentice **Hall**

Buckley and Lewinter, A Friendly Introduction to Graph Theory, 2003, Prentice Hall

Reinhard Diestel, Graph Theory, 3rd Edition 2005, Springer Verlag

Bondy and Murty, Graph Theory with Applications, 1976, Elsevier

Course Notes:

Revision Notes can be downloaded from Amin Witno Website. There are also links to some graph theory e-books for self-reading which you can find at the site.

Websites:

Basic Sciences Department- **http://www.philadelphia.edu.jo/math**