King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences
SYLLABUS
Semester II, 2016-2017 (162)
Dr. Mohammad Zuheir Abu-Sbeih

Course #: Math 425

Title: Graph Theory

Textbook: Graphs & Digraphs by G. Chartrand and L. Lesniak, 5th edition, 2011.

Lecturer Name: Mohammad Zuheir Abu-Sbeih

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Office hours: 11:00 – 12:50 AM – Sunday, Tuesday and Thursday (Other times by appointment)

Course description
Graphs and digraphs. Degree sequences, paths, cycles, cut-vertices, and blocks. Eulerian graphs and digraphs. Trees, incidence matrix, cut-matrix, circuit matrix and adjacency matrix. Orthogonality relation. Decomposition, Euler formula, planar and nonplanar graphs. Menger's theorem. Hamiltonian graphs.
Prerequisite: MATH 260 or MATH 280 or MATH 302

Course Learning outcomes

Related to the course contents, a student should be able to

1. use basic concepts in graph theory;
2. develop analytical and critical thinking.
3. analyze real life problems,
4. communicate mathematical skills.
5. develop skills to write clear and precise proofs

Evaluation (grades):

(1) Exam I	15%
(2) Exam II	15%
(3) Exam III	15%
(4) Homework	20%
(5) Final Exam	35%
Total	100%

Week	Date	Sec. #	Topics
1	Feb. 5 – 9	1.1	Graphs and Subgraphs
2	Feb. 12 – 16	1.2 1.3	Degree Sequences Connected Graphs and Distance
3	Feb. 19 – 23	1.4 2.1	Multigraphs and Digraphs Nonseparable Graphs
4	Feb. 26 – March 2	2.2 2.3	Trees Spanning Trees
5	March 5 - 9	**Exam I** 2.4	**Exam I is on Sunday, March 5, 2017 (1.1-2.3)** Connectivity and Edge-Connectivity
6	March 12 -16	2.5 3.1	Menger's Theorem Eulerian graphs
7	March 19 -23	3.2	Hamiltonian Graphs
8	March 26 –30	3.3	Powers of Graphs and Line Graphs
April 2 – 6 Midterm Break			
9	April 9 - 13	4.1 4.2	Strong Digraphs Tournaments
10	April 16 - 20	**Exam II** 4.3 5.2	**April 9, 2017 (2.4-4.1)** Flows in Networks The Automorphism Group of a Graph
11	April 23 - 27	Extra notes	Matrices of Graphs
12	April 30 – May 4	6.1 6.2	The Euler Identity Planarity versus Nonplanarity
13	May 7- 11	6.3 6.4 **Exam III**	The Crossing number of Graphs Hamiltonian planar graph **May 11, 2017 (4.1 – 6.2)**
14	May 14- 18	10.1	Matching and Independence in Graph
15	May 21 - 25	10.2	Factorization

Final Exam: Tuesday June 6 AT 12:30 PM. The Exam is comprehensive

There will be no "make–ups" for exams.*Unless a valid excuse is presented in advance, a missed exam or homework will receive the score 0.Of course, family vacations, commercial travel schedules, etc. are NOT acceptable excuses for missing scheduled classes.* Students must look at this syllabus carefully and ***plan well ahead***.

Homework: A number of problems will be assign regularly. It is recommended that you try to work out these problems after the lecture. The problems in the exams will be similar to the homework problems. You are encouraged to come to my office hours or make an appointment to discuss any difficulties related to the course, including the homework problems.Remember that "**The best way to learn Mathematics is to do Mathematics." Working as a group is recommended. However, each student needs to write his own solution.**

Attendance: KFUPM policy with regard to attendance will be enforced. Students are expected to attend all class meetings and are responsible for all of the material covered. Any changes in this syllabus or in the scheduling of exams, homework, etc. will be announced during class meetings. Students who miss a class meeting should copy a classmate's notes for that meeting.

Help: Individuals' questions regarding the course work should be directed to the lecturer, either immediately after class or during scheduled office hours.

Homework Exercises:

Section	Exercises	Hand Ins
1.1	8,12,13,14,21	7,18
1.2	1,3,6(a),8,	7,9,11
1.3	4,11,17,20,27	10(a), 13, 14, 26, 37
1.4	3,8,15,16	7,11,14
2.1	1,10	5,8,9
2.2	1,10,14,16,19	8,11,17
2.3	1,2,5,15,17,18	3,12,13,16,25
2.4		2,5,9,11,14
2.5	5,14	4,6,10,15
3.1	5,6	3,4,7,8
3.2	4,5,14,20,27	2,3,7,8,13,16,18,22,26
3.3	1,2,19	3,7,12,14
4.1	14,18	4,8,9,12,16,17,19
4.2	3,8,17,23	5,6,11,16,18, 21, 26, 27
4.3	6	3, 10b
5.2		4,7,8
6.1	2,5,7,10	4,8,9,11,14
6.2	8,16	7,11,12,15
6.3		4,6,7
6.4		1,2,4
10.1		2,4,5,13,15
10.2		3,9