Forman Christian College, Lahore
(A Chartered University)
Department of Mathematics
Spring 2023

Instructor Information:

Name: Dr. Ahmad Mahmood Qureshi

>   (Associate Professor & Dean Faculty of Computer and Mathematical Sciences)

Office: S - 204

Office Hours: Tuesday & Thursday (12:30 PM   to 02:00 PM)

>   **OTHERWISE GET APPOINTMENT FIRST.**

Email: mahmoodqureshi@fccollege.edu.pk

Course Information:

Course Code and Title: MATH 403/CSCS 403: Graph Theory (4 credits)

Prerequisite: COMP 113: Discrete Mathematics or
            MATH 303: Discrete Mathematical Structures

Class Room: S - 216

Lectures Time: Monday & Wednesday (02:00 PM – 03:40 PM)

Text Book:
1. Introduction to Graph Theory by Gary Chartrand and Ping Zhang, McGraw-Hill publication, 2005.

Reference Book:
1. Introduction to Graph Theory 4th Edition by Robin J. Wilson, Addison Wesley Longman Limited.
2. Introduction to Graph Theory 2nd Edition by Douglas B. West, Prentice-Hall.

Course Objectives:

The purpose of this course is to:

1. provide a basic knowledge of the notions and important results in Graph Theory.

2. develop the ability to understand rigorous proofs by applying various proof techniques.

3. prepare the students to apply the concepts of Graph Theory to work out practical problems.

Learning Outcomes:

After successfully completing this course, the students would be able to:
 1. comprehend graph theoretical notions and fundamental results.
 2. write short proofs of new problems.
 3. use their knowledge and skills to work with applications.

Course Requirements:

Students are expected to attend every class. **I will follow the university's attendance policy** as indicated in *Baccalaureate Student Handbook* **especially** the rule that **student whose attendance is less than 70% won't be allowed to take the final exam.**

Students must arrive at class on time and **those coming after attendance call won't be marked present. Inside the classroom Mobile phones will remain switched off** and **no one will sleep.**

Working regularly, understanding the lectures, doing assignments will be very helpful in quizzes, mid-term and final to get a good grade. **Your ability to problem solving will be a reflection of your grades.**

Quizzes/Exams Distribution: Quizzes/Exams will be distributed in the class but if anyone is going to be absent then he/she should get quizzes from the class representative. Quizzes/Exams will be **discussed** within **first three days only** (after the quiz/exam).

Course Evaluation:

Grading will be based on following criteria:

Class Participation and behavior	10%
Quizzes and Assignments/presentation	25%
Mid Term	25%
Final Exam	40%

Grading Legend

Grades	**Quality Points**	**Numerical Value**	**Meaning**
A	4.00	93-100	Superior
A-	3.70	90-92	
B+	3.30	87-89	
B	3.00	83-86	Good
B-	2.70	80-82	
C+	2.30	77-79	
C	2.00	73-76	Satisfactory
C-	1.70	70-72	
D+	1.30	67-69	
D	1.00	60-66	Passing
F	0.00	59 or below	Failing

Course Outline:

Week	Topics	Pages in Text Book
1	1) Discussion of Course Plan 2) Introduction to Graph Theory 3) Basic Terminology and Examples	Pages: 1 – 9 Pages: 8 – 17
2	1) Connected Graphs-I 2) Connected Graphs-II	Pages: 9 – 19 Pages: 9 – 19
3	1) Common Classes of Graphs 2) Operations on Graphs	Pages: 19 – 23 Pages: 23 – 25
4	1) The Degree of a Vertex 2) Regular Graphs	Pages: 31 – 37 Pages: 38 – 42
5	1) Degree Sequence 2) Isomorphic Graphs	Pages: 43 – 47 Pages: 55 – 63
6	1) Bridges and Trees 2) Properties of Trees	Pages: 85 – 89 Pages: 89 – 94
7	1) Properties of Trees cont… 2) Minimum Spanning Tree	Pages: 89 – 94 Pages: 94 – 100
8	**MID-TERM** **Mid-Term Course: Topics covered** in **first 7 weeks**	
9	1) Cut-Vertices 2) Vertex connectivity	Pages: 107 – 111 Pages: 115 – 118
10	1) Edge Connectivity 2) Eulerian Graphs	Pages: 118- 124 Pages: 133-140
11	1) Hamiltonian Graphs-I 2) Hamiltonian Graphs-II	Pages: 140 – 152 Pages: 140 – 152
12	1) Planar Graphs-I (Euler Identity) 2) Planar Graphs-II (Kuratowski's Theorem)	Pages: 227-234 Pages:235- 241
13	1) Graph Coloring 2) Vertex Coloring	Pages:259- 262 Pages: 267-275
14	1) Edge Coloring 2) Digraphs	Pages: 280-288 Pages: 161-164
15	1) Tournaments	Pages: 169-172
16	**FINAL EXAM (FROM THE WHOLE COURSE)**	