FORMAN CHRISTIAN COLLEGE, LAHORE
(A Chartered University)

Course Outline for Spring 2023

Instructor Information:
Dr Burhan ul Haq (PhD Mathematics, LUMS)
Assistant Professor, Department of Mathematics, FCCU.
Office: S-031 (Armacost Science Building)
Email: burhanulhaq@fccollege.edu.pk

Office Hours:

Monday, Wednesday, Friday : 9:00 AM – 10:00 AM

11:00 AM – 11:50 AM

Course Information:

Title: Group Theory
Course Code: MATH 313
Credit Hours: 3
Lectures Time: MWF: 10:00-10:50 AM (S-410)
Prerequisite: Math 103 & Math 210

Recommended Books:

1. A course in Abstract Algebra by V. Khanna & S. Bhambri, Vikas Publishing House, India
2. Krishna's Textbook on Algebra, A. R. Vasishtha
3. Lecture notes (Compiled by Dr. Wasiq Hussain, Professor Dept. of Mathematics, FCCU) [To be uploaded on Moodle]

Course Learning Outcomes:

After the successful completion of the course, students will be able to:

- Understand the important basic notions of Group theory with the aid of groups and their subgroups.
- Apply the concepts of Group theory to further classification of groups like Cyclic groups and Normal subgroups.
- Demonstrate the applications of some key results in Group theory like Lagrange theorem and Cayley's theorem.
- Build the ability to construct mathematical proofs of theorems and results in abstract algebra.
- Develop the structural invariance between different groups (Homomorphism).
- Analyze important recurring examples of some non-abelian groups such as Symmetric and Dihedral groups.
- Understand the algebraic notions like equivalence classes and direct product of two groups.

Course Policies:

- Students must arrive at class on time, should remain in class for the entire class period and mobile phone should be switched off or on silence. Students failing to maintain at least 70% attendance will not be allowed to appear for Final Exam.
- Course assessment will be through **quizzes, attendance, assignments, midterm and final exam**.
- There will be **no make up** for the missed quizzes and assignments. There will be 4 Quizzes and best 3 will be considered while making aggregate. Make up of midterm and final exam is possible only under extremes cases (only if verified through Mercy Health Center). In case of make-up exam there will be a 0-20% deduction in marks depending upon case to case basis.
- Academic dishonesty or cheating will result in zero points (grade F) and will be referred to AIC (Academic Integrity Committee) at FCC.

Course Evaluation

Assignments	10%
Attendance/Class participation	5%
Quizzes (3 out of 4)	15%
Midterm Exam	30%
Final Exam	40%

GRADING SCALE

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	Fair
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	Assessment
1	Definition and examples of Group	
2	Subgroups	
3	Cyclic groups	
4	Cosets	**Quiz 1**
5	Lagrange's theorem, Normalizer	
6	Centralizer, Center of a Group	**ASSIGNEMENT 1**
7	Conjugacy classes	**Quiz 2**
8	Normal subgroups	
9	Quotient groups	**Midterm Exam**
10	Quotient groups	
11	Homomorphism	
12	Homomorphism, Kernal and Image of Homomorphism	
13	Isomorphism and automorphism	**Quiz 3**
14	Isomorphism theorems	
15	Permutation groups	**ASSIGNEMENT 2**
16	Alternating groups, Caley's theorem	**Quiz 4**
17	Direct Product of two groups	