Estd 1864

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

Instructor Information:

Name: Dr. Wasiq Hussain
Professor of Mathematics
Ph.D. (University of Glasgow, Scotland, U.K., 1999),
M.Phil. (Quaid-i-Azam University Islamabad, 1995)
M.Sc. (Quaid-i-Azam University Islamabad, 1993)

Office: **S 356** Armacost (Science) Building

Office Hours: 03:15 PM to 04:15 PM (Monday), 11:10 AM to 12:10 PM (Thursday)

The **students can** also **contact via WHATSAPP GROUP**: **GROUP THEORY SPRING 2022**.

Email: wasiqhussain@fccollege.edu.pk

Mobile: 03034442239

Course Information:

Title: Group Theory **Code:** Math 313 **Credits:** 3

Prerequisites: Math 103 (Introductory Linear Algebra) and Math 210 (Set Theory).

Class Room: **S-413**

Class Discussion Time: Tuesday and Thursday (12:30 PM- 01:45 PM)

Text Book: **A First Course** in **Abstract Algebra** by **John B. Fraleigh 7th Edition (**Pearson New International Edition**)**
Soft copy is available at:
https://www.academia.edu/26545062/A_First_Course_In_Abstract_Algebra_Jb_Fraleigh_7Ed_2003_

PDF FILE of this **text book** is **already UPLOADED** on **MOODLE**.

Course Objectives:

"Group Theory" is an important course for mathematics, physics, and other disciplines. Students apply the concepts and methods described in the syllabus and will become capable to solve problems using group theory, and they will be able to understand the logic (proof) behind a particular abstract concept. Video Lectures and class sessions will introduce the concepts, methods, applications, and proofs; students will practice them and solve practice problems and different assessments (to be graded). One of the main objectives of this course is to prepare students for courses which require a good back ground in group theory like "Ring Theory" and "Advanced Group Theory".

Learning Outcomes:

1) Understand, read and write the elementary results of Group Theory and acquire **basic** Mathematical knowledge like binary operations, and which binary algebraic structure forms a group leading to construction of group tables.

2) Apply further course knowledge creatively and critically to develop problem-solving skills based on logical and abstract explanation leading to determine possible subgroups of a group, identify normal subgroups of a group, examine symmetric and permutation groups, explain group and subgroup orders using Lagrange's theorem, identify cyclic groups and their generators, identify factor group, identify homomorphism and which homomorphism is an isomorphism with further applications.

3) Value the group learning environment by demonstrating ability for working in a group and help each other to develop interest in retaining and using the results throughout the course.

Course Requirements:

Students must arrive at class on time and **those coming after 10 minutes won't be allowed** unless there was an emergency and instructor was informed before the class. Students should remain in class for the entire class period and could only leave if there is an emergency but instructor must be informed in advance. If there is a genuine reason for coming late and **not possible to inform the instructor then please stay outside**, **lecture briefing will be given** and **average marks** of a **missed quiz** could be **given. Inside** the **class room Mobile phones** will be **turned off** and **no one will sleep.**

There is **no make up for missed quizzes** but *BEST **5** OUT OF **6** WILL BE COUNTED*. In extreme cases average marks for the missed quizzes might be given provided students should submit strong evidence **within 3 days** after missing the quiz. Make up for mid-term and final exam is possible only under extreme cases if student provides strong documentary evidence **within 3 days** after missing the Mid/Final. In case of make-up exam there will be a 0-20% deduction in marks depending upon case to case basis. **Medical Certificate** will be **acceptable** if it is **verified** by the **medical officer (mercy health centre)** of **FCC (A Chartered University)**.

We have **face-to-face sessions** that are **complimented** with **online material**/activities. **All** the **students** can also **watch videos** (**My** Online **YOUTUBE LECTURES**) on **WEEKLY BASIS** available at:
https://www.youtube.com/c/DrWasiqMathematicsUndergraduateLecturesMULTIMEDIA?sub_confirmation=1 in the **PLAYLIST** "**GROUP THEORY**".

YouTube RECORDED Multimedia Lectures have been **prepared** with **full detailed calculations** using **power-point presentations** having **animations** and **pictures**. **All** the **students MUST WATCH LECTURES** on **weekly basis in addition to face to face class sessions** and **online discussion**.

It is **strongly recommended** to **attend class sessions** and **watch** the **online lectures seriously. Online lecture** could be **watched more than once** and you **definitely find** it **useful.**

Working regularly, understanding the lectures, solving problem sets (practice questions), will be very helpful to get an overall good grade. **IN FACT IT IS VERY IMPORTANT TO CONCENTRATE ON GETTING THE KNOWLEDGE NOT JUST THE GRADE.**

These steps have been taken to maintain discipline and making course understandable but not to put pressure on the students and to **avoid** using the illegal ways like **cheating** to pass the exams.

(*Read Student handbook* **Pages 25-27** available at http://www.fccollege.edu.pk/wp-content/uploads/2012/09/Final-Bacc-Handbook-2012.pdf)**,** following are the **consequences** for **cheating**:

First offence: a grade of zero will be assigned to the paper, report, quiz or test. The student's final grade for the class must be reduced by *at least* one letter grade. **Case** will be **reported** to **Vice Rector**.

Second offence: an automatic dismissal from the course in which the second offence occurred with a resulting final grade of "F". **Case** will be **reported** to **Vice Rector**.

Third offence: the student will be called before an Academic Integrity Committee to show cause why the University should not suspend him or her. The Vice-Rector will convene such a hearing. **First offence** in **another course** will be **overall 3rd offence**, as **two already recorded before** that.

Technical Facilities:

Teaching will be done with the help of multimedia slides and there will be **no** need to copy notes *unless* asked to do so.

Please don't forget to watch the **RECORDED COLORFUL MULTIMEDIA YOUTUBE LECTURES,** for which**, important updates** will be **shared via Whatsapp and MOODLE**. **Soft Copies** (**Lectures**, **Problems Sets' Solutions, text book**) will be made **available via MOODLE**. *DUE TO COVID-19/OMICRON ISSUES* **NO** *HARD COPIES WILL BE PLACED IN FCC BOOKSHOP.*

Task is that the time spent in writing on board will be saved in explaining the concepts and the time spent to copy from the board must be spent in understanding the concept. Please don't hesitate to ask where you don't understand and try your best to ask intelligent questions (showing that you paid attention). Students can save all the soft copies of course notes (Lectures and Practice Questions Solutions) on a pen drive.

Course Evaluation:

Grading will be based on following criteria (provided we remain face to face throughout the semester):

Quizzes (6 and **best 5** will be counted)	30%
Mid Term	30%
Final Exam	40%

NOTE: **ASSESSMENTS MIGHT CHANGE IF WE GO ONLINE**

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

Week/Weeks (Starting Date)		Reading Material from Book
(1) 7th March	1) Discussion of Course Plan 2) Binary Operations	Pages: 20 - 27
(2) 14th March	1) Groups 2) Subgroups **QUIZ-1** (from **First Week Course)** on **Thursday** (**17th March)**	Pages: 36-48 Pages: 49-58

(3) **21st March**	Cyclic Groups and Generators	Pages: 59-69
(4) **28th March**	Permutation Groups **QUIZ-2** (from **2nd** and **3rd Weeks' Course)** on **Thursday** (**31st March**)	Pages: 75-80
(5) **4th April**	Orbits and Cycles Alternating Groups	Pages: 87-91 Pages: 92-95
(6) **11th April**	Cosets **QUIZ-3** (from **4th** and **5th Weeks' Course)** on **Tuesday (12th April)**	Pages: 96-99
(7) **19th April**	Theorem of Lagrange	Pages: 100-103
(8) **25th April**	Homomorphism and its properties	Pages: 125-131
(9) **9th May**	Normal Subgroup **MID-TERM (On Thursday 12th May)** **Mid-Term Course: Topics covered** in **first 8 Weeks Lectures**	Pages: 132-134
(10) **16th May**	Isomorphism	Pages: 29-33
(11) **23rd May**	**Cayley's** Theorem **QUIZ-4** (from **9th** and **10th Weeks' Course)** on **Thursday** (**26th May**)	Pages: 81-86

(12) **30th May**	**Factor** Groups	Pages: 135-138
(13) **06th June**	**Fundamental** Homomorphism Theorem First Isomorphism Theorem **QUIZ-5** (from **11th, 12th Weeks' Course)** on **Thursday** (**9th June**)	Pages: 139-143 Pages: 307
(14) **13th June**	Second Isomorphism Theorem	Pages: 308
(15) **20th June**	Third Isomorphism Theorem **QUIZ-6** (from **13th, 14th Weeks' Course)** on **Thursday** (**23rd June**)	Pages: 309-10
(16) **27th June**	**Final exams/assessments start. Date will be announced later.**	

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).