

## Course Outline

Spring 2023

<b>Course Name: Set Theory</b>		
<b>Course Code: MATH-210</b>	<b>Course Type: Pre-requisite</b>	<b>Course Credits: 3</b>
<b>Class Timings: M, W, F</b> 10:00 am – 10:50 am (S-412)	<b>Section: A</b>	<b>Student Meeting Hours/ Office Hours:</b> <b>M W:</b> 11:00 am – 02:00 pm <b>F:</b> 11:00 am – 12:00 pm <b>T R:</b> 09:30 am – 10:30 am
<b>Instructor Name: Imrana Shafique</b>		
<b>A Note from the Instructor:</b> “I CAN” is 100 times more important than “I.Q”		
<b>Instructor Contact Details</b> <b>Email:</b> imranashafique@fccollege.edu.pk <b>Mobile:</b> 0311-2826362 <b>Guidelines for contacting instructor:</b> You may visit my office during office hours. In order to get some other time slot for meeting kindly email. You may call on my number in between 9:00 am to 7:00 pm except Saturday and Sunday.		
<b>Course Description:</b> <b>Pre-requisites:</b> Math-101 / A-level / FSc pre-engineering <b>Course Contents:</b> Course contents include the following: Sets and basic operations on sets, relations, functions, cardinal numbers, computing cardinals, denumerable and countable sets, power of continuum, cardinal arithmetic, Cantor-Bernstein theorem, ordered sets, ordinal numbers, axioms of choice, well ordering theorem, and Zorn’s lemma.		
<b>Main Mode of Instruction:</b> On-Campus <b>Technology Requirements:</b> Notes and soft copy of book will be shared through moodle.		
<b>Course Objectives or <a href="#">Student Learning Outcomes (SLOs)</a></b> Upon Successful completion of this course, the students will be able to <ol style="list-style-type: none"><li>1. describe membership of sets including empty set using proper notation</li><li>2. determine cardinality of a given set</li><li>3. describe relations between sets such as equality, subset, proper subset</li><li>4. perform operations on sets such as union, intersection, composition and difference</li><li>5. draw Venn diagrams of relations and operations on sets</li><li>6. solve problems using Venn diagrams</li><li>7. participate effectively in group activities.</li></ol>		

## Course Content, Learning Material & Activities Schedule

Week	Topics	Assessment
1	Discussion of Course Plan: course introduction, policies, requirements and grading criteria. <b>Sets and Basic Operations on Sets:</b> Introduction, Sets and elements, Universal and empty set, Venn diagram, Set operations, Algebra of sets.	
2	Finite sets, Counting principles, Classes of sets and power sets, Mathematical induction. <b>Further Theory of Sets and Functions:</b> Operations on collection of sets, Indexed collections of sets.	
3	<b>Relations:</b> Product sets, Relations, Pictorial representation of relations, composition of relations.	<b>QUIZ-1</b>
4	Types of relations, Closure properties, Partitions, Equivalence relations	
5	Partial ordering relations, n-Ary relations. <b>Functions:</b> Definition, Composition of functions.	<b>Assignment1</b>
6	One-to-One, Onto and Invertible functions, Mathematical functions	<b>Quiz-2</b>
7	Exponential and Logarithmic functions, Recursively defined functions.	
8	<b>Cardinal Numbers:</b> One-to-One correspondence, Equipotent sets.	<b>Mid Term</b>
9	Denumerable and Countable sets, Real numbers and power of continuum, Cardinal numbers.	
10	Ordering of cardinal numbers, Cantor's theorem, Cardinal arithmetic. <b>Ordered Sets and Lattices:</b> Ordered sets, Partially ordered sets and Hasse diagrams	
11	Minimal and maximal elements, First and last elements, Supremum and Infimum	<b>Quiz-3</b>
12	Isomorphic ordered sets. <b>Ordinal Numbers:</b> Well-Ordered sets, Transfinite induction, Limit elements.	

13	Initial segments, Similarity between a well-ordered and its subsets, Comparison of well-ordered sets	Assignment 2
14	Ordinal numbers, Inequalities and ordinal numbers, Ordinal addition and multiplication	QUIZ-4
15	Auxiliary construction of ordinal numbers, <b>Axiom of Choice, Zorn's Lemma, well-Ordering Theorem:</b> Cartesian product and choice function, Axiom of choice, Well-Ordering theorem and Zorn's Lemma.	Presentation
16	Discussion	Presentation
	FINAL EXAM	As announced by university

### 'Out-of-class'

Students are expected to learn the attended lecture and practice the given questions regularly. Coming to the class with a prior idea of lecture will be beneficial for the student.

### Textbooks, Materials and other Resources

#### Set theory and Related topics

By Seymour Lipschutz,( Schaum's Outlines), 2<sup>nd</sup> Edition.

Notes and soft Copy of book is available on moodle course page.

### Course Requirements:

#### Class Participation

Attending a lecture is not enough, for maximizing the learning students need to participate in class as well. 5% marks of your total score is covered by attendance and class participation that includes discussions and participation in the class activities.

#### Assignment

After due date, assignment will be marked as zero. One best of two will be counted towards your total score.

#### Presentation

In presentation, students are expected to present assigned topic (already taught in class) answering the questions asked by their class fellows or instructor. They may use their hand-written notes during presentation.

Average score of assignment and presentation will cover 10% of total score.

#### Quiz and Exam

There will be no make-up quiz. Three best of four quizzes will be counted towards your total score.

Only make up of mid-term or final can be considered if solid proof will be provided within three days after exam. 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 for necessary action.

Mobile phones are not allowed. Bring your calculator if you want to you use it.

The breakup is as follows:

<b>Attendance and Class Participation</b>	<b>5%</b>
<b>Assignments and Presentation</b>	<b>10%</b>
<b>Quizzes:</b>	<b>15%</b>
<b>Midterm exam:</b>	<b>30%</b>
<b>Final term exam:</b>	<b>40%</b>
<b>TOTAL</b>	<b>100%</b>

**Attendance Policy:**

If a student arrives 10 minutes late, he/she will not be marked as present. *Minimum 70% attendance is required to appear in the final term exam.*

Attendance marks (5) will be distributed as follows,

95% - 100 %	5 marks
87% - 94%	4 marks
83% - 88%	3 marks
77% - 82%	2 marks
71% - 76%	1 mark
below 70%	not allowed to appear in the final exam.

**Classroom Participation:**

Students must behave well in class. Participate in discussions, class activities and bonus activities.

**Grade Determination & Course Assessment as per FCC Policy:**

**Grading Legend**

Below is the grading legend of FCCU (published in all catalogs and available on the FCCU website) as approved by the Academic Council

<b>Grade</b>	<b>Point Value</b>	<b>Numerical Value</b>	<b>Meaning</b>
A	4.00	93-100	Superior
A-	3.70	90-92	
B+	3.30	87-89	Good
B	3.00	83-86	
B-	2.70	80-82	
C+	2.30	77-79	Satisfactory
C	2.00	73-76	
C-	1.70	70-72	
D+	1.30	67-69	Passing

D	1.00	60-66	
F	0.00	59 or below	Failing

### Student Conduct & Other Issues:

*The classroom interactions must remain civil, respectful, and supportive.*

- If any student faces any issues or has any concerns regarding the classroom climate and interactions, please feel free to contact VR office \_\_\_\_ [gloriacalib@fccollege.edu.pk](mailto:gloriacalib@fccollege.edu.pk)

### Changes to the Syllabus:

This syllabus was designed to convey course information and requirements as accurately as possible. It is important to note however that it **may** be subject to change during the course depending on the needs of the class and other situational factors. Such changes would be for your benefit and you will be notified of them as soon as possible.

### Student Support Services

[Student Counseling Services](#). Students can contact the [Campus Counseling Center](#) at 0331-444-1518 or email [ccc@fccollege.edu.pk](mailto:ccc@fccollege.edu.pk).

[Writing Center](#)

[Mercy Health Center](#)

### Other Useful FCCU Policy Documents:

[Sexual Harassment Policy](#)

[Anti-Corruption Policy](#)

[Academic integrity](#)

[Plagiarism Policy](#)

[Academic Calendar](#)

**Additional Communication** for students that you might add to your course outline or email as below:

1. Honor FCC Core Values:

*I expect that you will strictly follow the core values of FCCU and put your entire effort to learn as per the course requirements, attend classes, read the textbook(s)/other assigned reading material and do the assignments in the stipulated time period*

2. Clarify Expectations for Teacher Response to students,

*"I generally respond to emails between the hours of 9 AM and 9 PM. If I do not respond within 48 hours, feel free to send a follow-up email."*