Lahore University of Management Sciences

MATH 407/Math 507
General Topology/ Advanced General Topology

Spring 2021-2022

Instructor	Imran Anwar, Shaheen Nazir
Room No.	9-155 A, 9-153A
Office Hours	TBA
Email	Imran.anwar@lums.edu.pk, shaheen.nazir@lums.edu.pk
Telephone	8228, 8250
Secretary/TA	TBA
TA Office Hours	TBA
Course URL (if any)	TBA

Course Basics				
Credit Hours	4			
Lecture(s)	Nbr of Lec(s) Per Week	2	Duration	100 min
Recitation/Lab (per week)	Nbr of Lec(s) Per Week		Duration	
Tutorial (per week)	Nbr of Lec(s) Per Week		Duration	

Course Distribution	
Core	Core for MS (pure math) students
Elective	
Open for Student Category	Juniors, Seniors, Graduate and PhD students
Close for Student Category	None

COURSE DESCRIPTION
This course has been designed as an introduction to general topology. The student enrolled in this course should have a back-ground in Set Theory (and preferably some knowledge of Real Analysis - I). This course covers basic point set topology, in particular, Metric and Topological spaces, Separation Axioms, Connectedness, Compactness, Product spaces and Quotient topology. We will, also cover some algebraic topology, i.e. fundamental groups of topological spaces.

COURSE PREREQUISITE(S)	
	MATH 205 Intro to Analysis I OR MATH 404 Real Analysis Or Grad

COURSE OBJECTIVES	
	Introduce and expose the students to the basic and important abstract notions of general topology.

Learning Outcomes	
	On the conclusion of the course the students will be able to appreciate abstract ideas/notions and write logical proofs of theorems.

Grading Breakup and Policy(tentative)
Assignment(s): 20%(best 5) Project(Written& Presentation): 10% Midterm Examination: 30% Final Examination:40 %

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Examination Detail	
Midterm Exam	Yes/No: Yes
Final Exam	Yes/No: Yes Exam Specifications:

COURSE OVERVIEW			
Week/ Lecture/ Module	Topics	Recommended Readings	Objectives/ Application
1-2	**Brief Overview of Set theory and Logic** Sets, algebra of sets, functions and relations, cardinality	Chapter 1[M]	Sets, functions and logic
3-9	**Topological Spaces and Continuous Functions** Topological Spaces, Basis for a Topology, The Order Topology, The Product Topology on X x Y, The Subspace Topology, Closed Sets and Limit Points, Continuous Functions, The Product Topology, The Metric Topology, The Quotient Topology	Chapter 2[M]	Definition of topological spaces and examples, maps between them
10-14	**Connectedness and Compactness** Connected Spaces , Connected Subspaces of the Real Line, Components and Local Connectedness, Compact Spaces , Compact Subspaces of the Real Line, Limit Point Compactness, Local Compactness	Chapter 3[M]	Concept of connectedness and compactness
15-22	**Countability and Separation Axioms** The Countability Axioms, The Separation Axioms, Normal Spaces, The Urysohn Lemma, The Urysohn Metrization Theorem, The Tietze Extension Theorem, Imbedding's of Manifolds	Chapter 4[M]	
23-28	**The Fundamental Group** Homotopy of Paths, The Fundamental Group, Covering Spaces, The Fundamental Group of the Circle	Chapter 9[M]	

Textbook(s)/Supplementary Readings
[M] Topology, 2nd Edition, James R. Munkres