

Topology

Credit Hours:	3	Course Code:	MATH-3117	Prerequisites:	None
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Course Introduction: This course provides a foundational understanding of metric and topological spaces, emphasizing concepts such as open and closed sets, compactness, connectedness, and separation axioms. Students will explore continuity, homeomorphisms, and fixed point theorems in metric spaces. The course also introduces advanced topics like quotient spaces and Tychonoff's theorem.

Course Learning Outcomes: Upon successful completion of this course, a students should be able to:

CLO1: Define basic concepts of topology.

CLO2: Distinguish between metric and nonmetrizable topologies.

CLO3: Apply connectedness, compactness and Tychono theorem.

CLO4: Distinguish between countability and separation axioms including countable basis, countable dense subsets, normal spaces, Urysohn lemma and Tietze extension theorem.

PLO/CLO Mapping:

	PLO1	PLO2	PLO3
CLO1	✓		✓
CLO2	✓	✓	
CLO3	✓		
CLO4		✓	✓

Course Contents: Metric Spaces: Open and closed sets, convergence, complete- ness. Continuous and uniformly continuous mappings. Pseudo metrics. Fixed point theorem for metric spaces. Topological Spaces: Open bases and sub-bases. Relative topology, Neighbourhood systems, Limit points, First and second countable spaces. Separable spaces. Products of spaces, Interior, Exterior, Closure and Frontier in product spaces. Open and closed maps, continuity and Homeomorphisms, Quotient spaces. Separation: Housdor spaces, regular, completely regular and normal spaces, Urysohn's Lemma. Compactness: Compact spaces, Tychono's theorem and locally compact spaces, compactness for Metric spaces. Connectedness: Connected spaces, Components of a space, totally disconnected spaces, local connectedness and path wise connectedness.

Recommended Books: Following are the recommended books.

1. Munkres J. R., Topology, A First Course, Prentice Hall, Inc. EnglewoodCliffs, New Jersey, 1975.
2. Simmons G. F., Introduction to Topology and Modern Analysis, McGraw-Hill International Book, New York, 1963.
3. Ahmad B., General Topology, 1998.