DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
College of Science, UP Baguio

Course Number: MATH 140
Course Title: Topological Structures
Credit Units: 3 units (3 hours lecture)
Prerequisite: Junior Standing

Objectives: At the end of the course, the student will be able to:

CO1: Familiarize with basic set theory concepts;
CO2: Explain the importance of topology as a field of mathematics;
CO3: Define and give examples of topological spaces, basis of a topology and subspaces;
CO4: Use the definitions of the subspace, order, product, and quotient topologies to prove their properties and be familiar with standard examples
CO5: Explain notions of closure, interior, limit points, and solve problems involving these;
CO6: Prove theorems and solve problems involving topological spaces, continuous functions, and topological equivalence;
CO7: Enumerate, give examples, and solve problems involving metric spaces and metrizability.
CO8: Explain notion of connectedness and be familiar with basic properties and some standard applications.
CO9: Recognize when a topological space is compact and be familiar with basic properties of compact spaces;
CO10: Demonstrate understanding of countability and separation axioms and illustrate their uses; and
CO11: Familiarize with Urysohn Metrization Theorem and Tietze Extension Theorem.

Course Requirements:

3 Long Exams
Problem Sets/Quizzes
Final Exam

C O U R S E O U T L I N E

1. SET THEORY AND LOGIC

Week 1	CO1	Fundamental Concepts	Assignments Quizzes
	CO1	Functions & Relations	
Week 2	CO1	Finite Sets	
	CO1	Countable and Uncountable Sets	
Week 3	CO1	Infinite Sets and the Axiom of Choice	
	CO1	Partially Ordered and Well-Ordered Sets	

2. TOPOLOGICAL SPACES AND CONTINUOUS FUNCTIONS

Week 4	CO1 CO2 CO3	Topological Spaces	Problem Set Assignments Quizzes
Week 5	CO3	Basis for a Topology	
		1st LONG EXAMINATION	

Week 6	CO4	The Order Topology	Problem Set Assignments Quizzes
	CO4	The Product Topology on XxY	
Week 7	CO4	The Subspace Topology	
Week 8	CO5	Closed Sets and Limit Points	
Week 9-10	CO6	Continuous Functions	
	CO7	The Metric Topology	
		2nd LONG EXAMINATION	

3. CONNECTEDNESS AND COMPACTNESS

Week 11	CO8	Connected Spaces	Assignments Quizzes
		Connected Sets in the Real Line	
Week 12	CO9	Compact Spaces	
		Compact Sets in the Real Line	

4. COUNTABILITY AND SEPARATION AXIOMS

Week 14	C10	The Countability Axioms	Problem Set Assignments Quizzes
		The Separation Axioms	
Week 15	C10	Normal Spaces and the Urysohn Lemma	
Week 16	C11	Urysohn Metrization Theorem	
		Tietze Extension Theorem	
		3rd LONG EXAMINATION	

Textbook: Munkres, J. (2000). *Topology: A First Course, 2nd ed.* New Jersey: Prentice-Hall

References:

Arnold, B. H. (2011). Intuitive Concepts in Elementary Topology. New York: Dover Publications

Krantz, S. (2010). Essentials of Topology with Applications. Boca Raton: CRC Press

Lipschutz, S. (2012). General Topology. New York: McGraw-Hill

Nash, C. (2011). Topology and Geometry for Physicists. New York: Dover Publications, Inc.

Simmons, G. F. (2003). Introduction to Topology and Modern Analysis. Malabar: Krieger Publishing.

Singh, T. (2013). Elements of Topology. Boca Raton: CRC Press

Wayne Patty, C. (2009). *Foundations of Topology, 2nd ed.* MA: Jones & Bartlett Publishers