**Jimma University**

**College of Natural Sciences**

**Department of Mathematics**

**Course Outline**

**Course Offered to**:Department of Mathematics

**Course title**: Introduction to Topology

**Course code** : Math3131

**Credit hrs**: 3

**Course Category**: Elective

**Course Description**

This is an introductory course in topology dealing with metric spaces treating topics such as open sets,

closed sets, continuity, convergence and completeness, and it extends the ideas to general topological

spaces.

**Course Objectives**

On completion of the course students will be able to:

understand the definition of a metric space,

distinguish between open balls and closed balls in a metric space,

understand the definition and properties of open set in a metric space,

know the conditions for equivalent metrics,

understand the definition of a topology and topological space,

determine whether a collection of subsets of a set is topology,

distinguish the open and closed sets in a topological space,

understand the definitions and properties of compact space,

recognize compact subsets of a topological space,

understand the definitions and properties of connected space,

recognize connected subsets of a topological space,

prove that two topological spaces are homeomorphic

**Course Contents**

**Chapter 1. Metric spaces(14 Hrs)**

1.1 Definition and examples of a metric space

1.2 Open sets and closed sets in metric spaces

1.3 Interior, closure and boundary

1.4 Continuous functions

1.5 Equivalence of metric spaces

1.6 Complete metric spaces

**Chapter 2. Topological spaces(12 Hrs)**

2.1 Definition and some examples of a topological space

2.2 Interior, closure and boundary

2.3 Basis and subbasis

2,4. Continuity and topological equivalence

2.5 Subspaces

**Chapter 3. Connectedness(12Hrs)**

3.1 Definition and theorems on connectedness

3.2 Connectedness and continuity

3.2 Connected subspaces of the real line

3.3 Applications of connectedness.

**Chapter 4. Compactness(12 Hrs)**

4.1 Compact spaces and subspaces

4.2 Compactness and continuity

4.3 Properties related to compactness

4.4 One–point compactification

4. 5 The Cantor set

**Course Delivery Methods**

Lecture, Tutorial, Group Assignments, ...

**Assessment Techniques**

* Continuous Assessment: Quizzes, Test, Assignments, ... (50%)
* Final Examination (50%)

**Textbook:** - Fred H. Croom, Principles of Topology

-S. Lipschutz, Theory and problems of general topology, McGraw-Hill 1965

**References:**

-James R. Munkers, Topology a first course

- George F. Simmons, Introduction to Topology and Modern Analysis

-Bert Mendelson, Introduction to topology, 3rd ed., John D. Baum, Elements of point-set

topology,