**Module Code: MATH MA-445 S2021**

**Module Title: Topology**

**Module Rating: 3 Cr. Hours**

Dr. Naeem Saleem

Associate Professor

Department of Mathematics

University of Management and Technology, Lahore, Pakistan.

naeem.saleem@umt.edu.pk

***Topology***

**Definitions, examples, related results and exercises (Week 1,2)**

1. Open and closed sets in R , R^2 and in general Topological space
2. Subspaces of R , R^2 and in general Topological space
3. Neighborhoods and system in R , R^2 and in general Topological space
4. Limit points, closure of a set in R , R^2 and in general Topological space
5. Interior, exterior and boundary of a set in R , R^2 and in general Topological space
6. Sequence and convergent sequence in R , R^2 and in general Topological space
7. Assignment 01
8. Quiz 01

 **Bases and Sub-bases, Definitions, examples, related results and exercises (Week 3,4)**

1. Base and sub bases
2. Neighborhood bases
3. Topologies generated by classes of sets
4. Local Bases
5. Assignment 02
6. Quiz 02

**Separable spaces, Definitions, examples, related results and exercises (Week 5,6)**

1. First countability
2. Second countability
3. Separable spaces
4. Lindelöf spaces
5. Assignment 03
6. Quiz 03

**Continuous functions, Definitions, examples, related results and exercises (Week 7,8)**

1. Continuous functions
2. Sequential continuity
3. Open and closed functions
4. Homeomorphic spaces
5. Assignment 04
6. Quiz 04
7. Mid term

**Weak Topology, Definitions, examples, related results and exercises (Week 9,10)**

1. Weak topologies
2. Arbitrary closeness
3. Finite product spaces
4. Assignment 05
5. Quiz 05

**Separation axioms, Definitions, examples, related results and exercises (Week 11,12)**

1. Separation Axioms
2. Regular spaces
3. Completely regular spaces
4. Normal spaces
5. Assignment 04
6. Quiz 04
7. Mid Term Exam

**Compact Spaces, Definitions, examples, related results and exercises (Week 13,14)**

1. Compact topological spaces
2. Countably compact spaces
3. Sequentially compact spaces
4. Assignment 05
5. Quiz 05

**Connectedness, Definitions, examples, related results and exercises (Week 15,16)**

1. Connected spaces
2. disconnected spaces
3. Totally disconnected spaces
4. Components of topological spaces
5. Assignment 06
6. Quiz 06
7. Final Term

***Recommended Books***

1. James R. Munkres, Topology, 2nd edition, (Prentice Hall Inc., 2003) **(Text Book 1)**
2. Seymour Lipschutz, General Topology, (Schaum's Outline Series, McGraw Hill Book Company 2004) **(Text Book 2)**
3. J. Dugundji, Topology, (Allyn and Bacon Inc., Boston 1966)
4. G. F. Simmon, Introduction to Topology and Modern Analysis, (McGraw Hill Book Company, New York, 1963)
5. Stephen Willard, General Topology, (Addison-Wesley Publishing Co., London, 1970)