Approved in 45th BoA Meeting (18-02-22)

Course number : MA 516
Course Name : Topology
Credit Distribution : (3-1-0-4)
Intended for : UG/PG
Prerequisite : MA-511(Real Analysis)
Mutual Exclusion : None

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1. Preamble:

This is a basic course on Topology. The main objective of this course is to introduce the basic concepts of Topology. It is a field that has great importance in mathematics and has tremendous applications in various fields of Science and Technology, like applications to Biology, Robotics, Engineering, Computer Sciences, etc. This course will provide the students an opportunity to learn the fundamental concepts of topology, which will be useful for them to learn advanced courses like Algebraic Topology, Algebraic Geometry, etc.

2. Course Modules with quantitative lecture hours:

Module 1: Topological Spaces: open sets, closed sets, neighbourhoods, bases, subbases, limit points, closures, interiors, continuous functions, homeomorphisms. **[7Hours]**
Module 2: Examples of topological spaces: subspace topology, product topology, metric topology, order topology. **[5 Hours]**
Module 3: Compactness: compact spaces and its properties, locally compact spaces, one point compactification, paracompactness, Tychonoff theorem. **[7 Hours]**
Module 4: Countability Axioms: first countable spaces, second countable spaces, separable spaces, Lindeloff spaces. **[4 Hours]**
Module 5: Separation Axioms: Hausdorff, regular and normal spaces, Urysohn's lemma, Uryohn's Metrization theorem, Tietze extension theorem, partition of unity. **[6 Hours]**
Module 6: Connectedness: connectedness, path connectedness, connected subspaces of the real line, components and local connectedness. **[5 Hours]**
Module 7: Quotient topology: examples of quotient topology: construction of cylinder, cone, suspension, Mobius band, torus, topological groups, orbit spaces. **[5 Hours]**

Module 8: Algebraic Topology: homotopy, deformation retract, contractible spaces, path homotopy, fundamental group. **[3 Hours]**

Laboratory/practical/tutorial Modules:

3. Text books:

1. G. F. Simmons, *Topology and Modern Analysis*, Tata McGraw-Hill, 2004.
2. A. Hatcher, Algebraic Topology, Cambridge University Press, 2002.

4. References:

1. J. Dugundji, *Topology*, McGraw-Hill Inc., 1988. J. R. Munkres, *Topology:A First Course*, Prentice-Hall, 1975.
2. M. A. Armstrong, *Basic topology*, McGraw-Hill Book Co. (UK), Ltd., London-New York, 1979

5. Similarity with the existing courses:

(Similarity content is declared as per the number of lecture hours on similar topics)

S. No.		Course Code	Similarity Content	Approx. % of Content
1.	Real Analysis	MA-511	4 Hours	10%

6. Justification of new course proposal if cumulative similarity content is >30%: