

King Saud University
Department of Mathematics
Semester II: 1436-1437
COURSE OUTLINE FOR
MATH 5701: TOPOLOGY and GEOMETRY
4(3+1)credit-hours

Reference Books:

1. Topology by James R. Munkres
2. Calculus on Manifolds by M. Spivak
3. An Introduction to Differentiable Manifolds and Riemannian Geometry by W. M. Boothby

Prerequisite: Math 375: Introduction to Topology(3+1) credit-hours

A. TOPOLOGY

***REVIEW:(Munkres, Chapter 2; Sections: 2.1-2.10)**

1. Separation axioms: Hausdorff, regular and normal spaces
2. Quotient spaces (Munkres, Chapter 2, pp.134)
 - a) Quotient map, quotient topology
 - b) Quotient topology by equivalence relation; various examples, such as, Torus, Möbius strip, Klein bottle, n -dimensional real projective spaces \mathbf{RP}_n
3. Connectedness (Munkres, Chapter 3)
 - a) Connected spaces
 - b) Path connected spaces
 - c) Components, path components, relation between path *components* and *components*
 - d) Locally connected spaces, locally path connected spaces
4. Locally compact spaces, and the one-point compactification
5. Complete metric spaces and examples

B. DIFFERENTIABLE MANIFOLDS

Definition of smooth manifolds with related basic notions and various examples