

MAT 566
DIFFERENTIAL TOPOLOGY

Instructor: Blaine Lawson

Office: 5-109.

Office Hours: Tu.-Thur. 1:00-2:30 or by appointment (just e-mail or speak to me).

References:

- Differential Topology*, by M. Hirsch
- Differential Topology*, by V. Guillemin and A. Pollack
- Differential Topology*, by C. T. C. Wall
- Morse Theory*, by J. Milnor
- Topology from the Differentiable Viewpoint*, by J. Milnor
- Differential Forms in Algebraic Topology*, by R. Bott and L. Tu
- Differentiable Manifolds*, by Georges de Rham
- Lectures on the H-Cobordism Theorem*, J. Milnor

Lectures Tues.-Thurs. 2:30 – 3:50 in Mathematics 4-130

SYLLABUS

1. Some Basic Concepts and Results:
 - Manifolds, Submanifolds, Maps, etc.
 - Regular Values and Sard's Theorem
 - Smooth Partitions of Unity
 - Embedding and Immersion into Euclidean Space
 - Weak and Strong Topologies; Approximation Results
 - Theorems on Flows
 - Riemannian Manifolds and the geodesic flow.
 - The Tubular Neighborhood Theorem
2. Transversality
 - Basic Notions
 - The Transversality Theorem for Families
 - Some First Consequences
3. Vector Bundles and K-Theory:
 - Basic Properties.
 - Classifying Spaces
 - K-Groups.

6. Characteristic Classes
 - Stiefel-Whitney Classes
 - Chern classes and Pontryagin classes.
 - Multiplicative Sequences.
 - Hirzebruch's Signature Theorem
 - Spin Manifolds and the \hat{A} -genus.
4. Degree Theory and applications.
5. Cobordism
 - Framed Cobordism and Homotopy Groups of Spheres.
 - The Thom Homomorphism
7. Morse Theory
8. The H-Cobordism Theorem or Differential Characters (time permitting).

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