MAT 541
ALGEBRAIC TOPOLOGY I

Instructor: Blaine Lawson
Office: 5-109.
Office Hours: Tu.-Thur. 11:30-1:00 or by appointment (just e-mail or speak to me).

References:
Algebraic Topology, by A. Hatcher
Algebraic Topology, a First Course (revised), by M. Greenberg and J. Harper
Lectures on Algebraic Topology, by A. Dold
Algebraic Topology, by E. Spanier
A Concise Course in Algebraic Topology, by J. P. May
Elements Of Algebraic Topology, by J. Munkres
Differential Forms in Algebraic Topology, by R. Bott and L. Tu
Algebraic Topology from a Homotopical Viewpoint, Aguilar, Gitler, and Prieto

Lectures Tues.-Thurs. 10:00-11:20 in Physics P122
Homework will be due every two weeks. Each time just hand in three of the problems that I have mentioned in class.

SYLLABUS

1. Some Basic Homotopy Theory:
   • Basic Concepts and Examples
   • Suspension and Loop Spaces
   • Higher Homotopy Groups and some properties
   • Relative Groups and the Long Exact Sequence
   • CW-Complexes
   • Fibrations and Fibre Bundles
   • The Long Exact Sequence for a Fibration

2. Homology:
   • Singular Homology Theory
   • Homotopy Invariance
   • The Exact Homology Sequence
   • Excision
   • Mayer-Vietoris Sequence
   • Cell Complexes
   • The Hurewicz Theorem
   • The Whitehead Theorem
• Axioms

3. Cohomology:
• Singular Cohomology and Cohomology with Compact Supports.
• The Universal Coefficient Theorem
• $K(\pi,n)$-Spaces

4. Products:
• The Cup Product
• The Cap Product

5. Dualities
• Poincaré Duality
• Alexander Duality
• Lefschetz Duality

6. (If there is time) Differential Characters or Cohomology Operations

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http://www.stonybrook.edu/uaa/academicjudiciary

Critical Incident Management: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, and/or inhibits students’ ability to learn.