Math 868 — Fall 2007
Geometry and Topology 1

MWF 11:30 – 12:20,   C107 Wells Hall

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Class Webpage: www.math.msu.edu/˜parker/868

Goals: This course introduces the intuition and techniques used to study manifolds. Manifolds are the natural setting for calculus in its most appealing and flexible form. They are the primary objects in much of modern geometry and topology.

Topics will include differentiable manifolds and tangent spaces, vector bundles, transversality, calculus on manifolds, differential forms, tensor bundles, the Frobenius Theorem, the deRham Theorem and cohomology groups. If time permits, we will cover the Hodge Theorem and the beginnings of Riemannian geometry.

Background: The official prerequisites are a 400-level course on Abstract Algebra and one on Real Analysis. In reality, the main prerequisite is a solid knowledge of multi-variable calculus and linear algebra.

Text: *Introduction to Smooth Manifolds* by John M. Lee.

Other reference books:

Differential Topology by V. Guillemin and A. Pollack — Chapters 1-5 give an easy-to read introduction to manifolds.

Foundations of Differentiable Manifolds and Lie Groups by Frank Warner

Lectures on the Geometry of Manifolds by Liviu Nicolaescu

Expectations and Grades: Homework will be assigned regularly through the course. There will be a **Midterm Exam** given in class on Friday, Oct. 26 and a 2-hour **Final Exam** at a time to be arranged. The course grade will be the weighted average: 20% Midterm + 25% Final + 45% homework + 10% student seminar (see below). The exams will help you prepare for the Geometry/Topology qualifying exam.

Student Seminar: We will schedule an extra hour a week for a "student seminar". During this time you will give informal talks to each other on small topics related to the class material. There should be enough time for everyone in the class to give a talk. If you would prefer not to, you many arrange an alternative project. This will count 10% of the course grade.