Geometry and Topology I
MTH 868 – Fall 2014
Monday, Wednesday, Friday 15:00-15:50 in A201 Wells Hall

Instructor: Casim Abbas
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Grader: Akos Nagy
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The objective of this class is to provide the intuition and techniques necessary for the study of differentiable manifolds. We start with background material from point set topology and analysis in several real variables. We will discuss methods to construct differentiable manifolds. We then discuss vector fields, tangent and cotangent bundles, vector bundles, tensors and differential forms as well as integration. We will prove Stokes' theorem. Other topics include Lie Groups, DeRham Cohomology and Morse Homology.

Homework will be assigned and collected throughout the semester, and some of the problems will be graded. There will be a one hour per week recitation session lead by Akos Nagy where homework problems and supplemental material will be discussed.

There will be a one-hour midterm exam tentatively scheduled on Wednesday, October 22 during class, and there is a two-hour final exam Tuesday, December 9 from 3 p.m. to 5 p.m. The room for the final exam will be announced later. Your grade will be based on your performance on Homework and the two exams. You are encouraged to work in groups on the homework assignments, but you need to write it up and hand it in individually.

Literature list

- **John M. Lee, Introduction to Smooth Manifolds, 2nd edition (textbook)**
- D. Barden, C.B. Thomas, An Introduction to Differential Manifolds
- J. Munkres, Topology, 2nd edition (a great reference for point set topology)
- W.M. Boothby, An Introduction to Differentiable Manifolds and Riemannian Geometry
- M. Hirsch, Differential Topology
- V. Guillemin, A. Pollack, Differential Topology
- J.W. Milnor, Topology from the Differentiable Viewpoint
- M. Spivak, Calculus On Manifolds: A Modern Approach To Classical Theorems Of Advanced Calculus
- M. Spivak, A Comprehensive Introduction to Differential Geometry, Vol. 1, 3rd Edition
- F. Warner, Foundations of Differentiable Manifolds and Lie Groups