Math 241C
Course Outline and Information

Lecture: TF 9:00 - 10:15; SH 4519

Instructor: Guofang Wei, South Hall 6503
email: wei@math.ucsb.edu

Office hours: M 12:15-1:15 pm, WF 10-11am or by appointment

Homework: Each of you will be asked to give a presentation on some topics.

Mission: Study the Geometric Structures of Manifolds with Ricci Curvature Bounded from Below

Course outline:
A Ricci curvature bound is weaker than a sectional curvature bound but stronger than a scalar curvature bound. Ricci curvature is also special in that it occurs in the Einstein equation, in the Ricci flow, and in the optimal transportation. Manifolds with Ricci curvature bounded from below has many structures, we will discuss some of the following geometric properties:
Cheeger-Gromolls Splitting Theorem
Gradient Estimate of harmonic functions, heat kernel and the Green’s function of Laplacian (Colding’s recent work on monotonicity)
First Eigenvalue and Heat Kernel Comparison
First Nonzero Eigenvalue of Closed Manifolds
Dirichlet and Neumann Eigenvalue Comparison
Heat Kernel Comparison
Isoperimetric Inequality
Abresch-Gromolls Excess Estimate
Almost Splitting Theorem
We will start on the basic tool for Ricci curvature: Bochner formula and Bishop-Gromov volume comparison.

Math 241 Lecture Notes from Fall and Winter 2000-2001 (taken and typed by John Ennis)
G. Wei, X. Dai, *Comparison Geometry for Ricci Curvature*, Chapters I, II.