

Mathematics 526, Term II, 2014

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TOPICS:

- Riemannian metrics, affine and Riemannian connections, geodesics, cut-locus, Hopf-Rinow theorem
- Curvatures, Jacobi vector fields, 1st and 2nd variations of arc-length, conjugate points
- Curvature and topology: Myers' theorem, Cartan-Hadamard theorem, growth of the fundamental group
- Comparison theorems: Rauch comparison theorem, Bishop's volume comparison theorem, Laplacian and Hessian comparison theorems
- Submanifolds and their fundamental equations and the first and second variation formulas for area.

PREREQUISITES:

- The usual undergraduate training in analysis (for example, MATH 320), linear algebra, and basic ODE. Some familiarity with differentiable manifolds (such as MATH 525).

TEXT:

- Riemannian Geometry, by M.P. do Carmo, 2nd edition

EVALUATION:

- Homework assignments

REFERENCE:

- Riemannian Geometry, by S. Gallot, D. Hulin, J. Lafontaine
- Riemannian Geometry and Geometric Analysis, by J. Jost, 4th ed
- Riemannian Manifolds: An Introduction to Curvature, J. Lee
- Comparison Theorems in Riemannian Geometry, by J. Cheeger and D. Ebin