Mathematics 526, Term II, 2019-2020

Instructor:

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Prerequisites

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

Textbook

- Introduction to Riemannian Manifolds, by John M. Lee, GTM, Springer 2nd Ed.

Topics

- Riemannian metrics, affine and Riemannian connections, geodesics, cut-locus, Hopf-Rinow theorem
- Curvatures, Jocabi 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 1st and 2nd variation formulas for area.

Evaluation

- Homework assignments

Reference

- Riemannian Geometry, by M.P. do Carmo, 2nd Ed.
- Comparison Theorems in Riemannian Geometry, by J. Cheeger and D. Ebin