Math 740: Riemannian Geometry
Fall 2011

Basic information

Class meets MWF 10:00 - 10:50 am in MTH 0403

Instructor: Karin Melnick
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Office hours (tentative) Thurs 2 - 3:30 pm

Web page for course `http://www.math.umd.edu/~karin/diffgeom11.html`
Course evaluations can be submitted Nov 29 - Dec 14 at `http://courseevalum.umd.edu`.

Material

All recommended texts will be on reserve in the EPSL Library.

Primary recommended texts:

- *Semi-Riemannian Geometry, with Applications to Relativity* by B. O'Neill
- *Differential Geometric Structures* by W. Poor

Additional recommended texts:

- *Foundations of Differential Geometry vols. I and II* by S. Kobayashi and K. Nomizu
- *Characteristic Classes* by J. Milnor and J. Stasheff

Course Outline:

- Foundations (weeks 1-4)
  - Manifolds, tangent vectors, differential, vector fields
  - Frobenius theorem and foliations
  - Lie groups and Lie algebras

- Connections and Curvature on Vector Bundles (weeks 5-7)
  - Covariant derivative on vector bundles, parallel transport
  - Holonomy and curvature of connections on vector bundles
- Riemannian Geometry (weeks 8-10)
  - Geodesics, exponential map
  - Length minimization, Gauss lemma, Hopf-Rinow theorem
- de Rham Cohomology and Characteristic Classes (weeks 11-15)
  - Stokes' Theorem, de Rham cohomology
  - Construction of characteristic classes from a connection
  - Applications, Chern-Gauss-Bonnet Theorem

Homework problems will be assigned during class and compiled on the web site. They will be due every two weeks in class on Friday.

Exam Not sure yet.

Policies

Collaboration: You are encouraged to work together on homework assignments, but the work you submit should be your own.

Classroom Etiquette: Please turn off all cell phones and other potentially disruptive electronic devices and keep them out of sight.