MATH 533 – DIFFERENTIAL GEOMETRY

Semester: Spring 2009
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Assistant:

Exams & Grading: 2 Midterms (100 pts each)
- **1st Midterm** — $\sim 5^{\text{th}}$ week
- **2nd Midterm** — $\sim 10^{\text{th}}$ week

Final exam (150 pts)
- **Final Exam** — Finals week

Homework ($\sim$ 50 pts)

Course Schedule:	Tuesday	13:40–15:30	Room SAZ-01
	Friday	13:40–14:30	Room SAZ-01
Office Hours:	Tuesday	10:40–11:30	
	Friday	10:40–11:30	

Textbook: Lecture notes
Supplementary: J. W. Milnor, *Morse Theory*. Princeton University Press (1963)

Tentative course contents

- Differentiable manifolds and maps, tangent vectors, tensors, differentials of maps
- Riemannian geometry: metric, connection/covariant derivative, curvature
- Geodesics: basic properties and completeness
- The energy function and Jacobi vector fields
- Morse theory: Morse functions, related lemmas, recovering the homotopy type of a manifold from a Morse function
- Applications of Morse theory: examples, Morse inequalities, Lefschetz hyperplane section theorem
- Finite dimensional approximations of the space of paths; applications of Morse theory to geodesics

Examples, generalizations, applications, and calculations will be considered whenever applicable. Familiarity with algebraic topology is assumed (basic understanding of the (co-)homology groups); however, a very brief introduction will be given if necessary.

The contents is subject to change without notice.