

Math 551: Riemannian Geometry

Instructor: Andy Sanders

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- **Meeting:** MWF 11:00-11:50 AM in Taft Hall Room 301.
- **Office hours:** Monday and Wednesday from 12:00-12:50 PM in SEO 526.
- **Textbook:** Though there is not an assigned text book, most of the course material will be drawn from the following books.
 1. Manfredo do Carmo: "Riemannian Geometry."
 2. Gallot, Hulin, Lafontaine: "Riemannian Geometry."
 3. Peter Petersen: "Riemannian Geometry."

There is also a huge number of well written lecture notes easily accessible by a quick Google search. I highly recommend you consult a variety of sources in addition to the lecture notes to get familiar with the various notations which are commonly used, as this subject has a high variability regarding notation.

Course description: This course is an introduction to the study of Riemannian manifolds. The first half of the course will focus almost exclusively on chapters 1-5 in the textbook by do Carmo. This includes the study of Riemannian metrics, connections, geodesics, Jacobi fields and the Riemannian curvature tensor. From there, we will cover parts of chapter 6-9 of do Carmo, with topics being selected based on time considerations and student interest. Possible topics include: geometry of submanifolds, Hopf-Rinow theorem, Cartan-Hadamard theorem, classification of space forms and the variational theory of geodesics. If after this we still have some time remaining, we will prove some of the basic theorems in comparison geometry by studying the properties of geodesic triangles in spaces with curvature bounds.

Prerequisites: Math 442 and 549.

Homework: Exercises will be peppered throughout the lectures in class and then posted in a running list on my website. At three times during the semester

students will be asked to hand in a selection of 5 exercises from this list.

Exams and grading: There will be no exams in this course. Grades will be assigned based on the above mentioned homework assignments. If you are interested in learning this material, it is strongly recommended that you work as many of the exercises posted as possible.

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