

**MATH 18.965. Geometry of Manifolds I**  
**Tuesday, Thursday 9:30 - 11:00 AM**  
**Room 2-135**

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**Instructor:** Tristan Collins, Room 2-273

**Office Hours:** 1:15-2:15 PM, Tuesdays and Thursdays, or by appointment.

**Textbooks:**

- (required) Riemannian Geometry, by Manfredo P. do Carmo
- (supplementary) Riemannian Geometry, by Peter Petersen
- (supplementary) Comparison Theorems in Riemannian Geometry, by J. Cheeger, and D. Ebin
- (supplementary) Lectures on Differential Geometry, by R. Schoen, and S.-T. Yau
- (supplementary) Differential Geometry, by C. H. Taubes

**Course Outline:**

*Comparison Geometry*

- Definition and basic properties of manifolds
- Riemannian metrics, geodesics and curvature
- Vector bundles and connections
- Submanifolds, Gauss-Codazzi equations, minimal surfaces
- Spaces of constant curvature
- Comparison geometry, Laplace comparison, theorems of Rauch, and Bishop-Gromov
- Harmonic functions and the Laplacian on a Riemannian manifold.

**Prerequisites:** 18.101, 18.950, or 18.952

**Homework:** There will be bi-weekly assignments, posted on Tuesday, which are to be turned in two weeks later on Tuesday at 5:00 pm. The homeworks will be parallel the class, and will either expand on ideas developed in class, or develop some new ideas which I won't have time to cover in class. In the latter case, the homeworks will serve as a sort of directed self-study. Please staple or paper clip your homework, and remember to write your name on it!

**Grading:** The final grade will be computed in the following way: Homework: 100%.

**Collaboration:** I encourage you to collaborate on your homework. However, it is absolutely essential that you write up your own solutions.

**Student Support Services:** If you are dealing with a personal or medical issue that is impacting your ability to attend class, complete work, or take an exam, please discuss this with student support services ( $S^3$ ). The deans in  $S^3$  will verify your situation, and then discuss with you how to address the missed work. Students will not be excused from coursework without verification from  $S^3$ . You may consult with Student Support Services in 5-104, or at (617) 253-4861.

**Student Disability Services:** MIT is committed to the principle of equal access. Students who need disability accommodations are encouraged to speak with Kathleen Monagle, Associate Dean, prior to or early in the semester so that accommodation requests can be evaluated and addressed in a timely fashion. Even if you are not planning to use accommodations, it is recommended that you meet with SDS staff to familiarize yourself with the services and resources of the office. You may also consult with Student Disability Services in 5-104, or at 617-253-1674. If you have already been approved for accommodations, please contact me early in the semester so that we can work together to get your accommodation logistics in place.

**Important Dates:**

Student Holiday .....	Friday, September 20
University Holiday .....	Monday, October 14
University Holiday .....	Tuesday, October 15
University Holiday .....	Monday, November 11
Drop Date .....	Wednesday, November 20
University Holiday .....	Thursday, November 28
University Holiday .....	Friday, November 29
Last Day of Classes .....	Wednesday, December 11