



**MATH 6250I**  
**Riemannian Geometry**  
**2018-19 Fall**  
<https://canvas.ust.hk/courses/21429>

#### LECTURES

|                   |                                                  |
|-------------------|--------------------------------------------------|
| <b>Instructor</b> | <b>Prof. Frederick Tsz-Ho FONG</b>               |
| E-mail            | frederick.fong@ust.hk                            |
| Office            | Room 3488, Department of Mathematics             |
| <b>(t,x,y,z)</b>  | Wednesday and Friday 13:30-14:50 @ Room CYT G001 |

#### COURSE DESCRIPTION

**Course outline:** This is an introductory course on Riemannian Geometry for graduate students in pure/applied mathematics or physics, and advanced undergraduate students who are strongly interested in geometry and topology. The goal of the course is to equip students with essential knowledge on Riemannian Geometry for research or further studies in related fields such as Geometric Analysis, General Relativity, etc. Topics will include Gauss's Theorema Egregium, Riemannian manifolds, parallel transport and holonomy, geodesics, curvature tensors, Jacobi fields, etc. If time permits, contemporary topics such as geometric flows will be covered at the end of the course.

**Prerequisites:** MATH 4033 / MATH 5230 / instructor's approval. Students should have solid knowledge on differentiable manifolds and tensor calculus.

#### REFERENCES

##### Recommended References:

- (1) Instructor's Lecture Notes – available in the course website
- (2) *Riemannian Manifolds* by John M. Lee
- (3) *Riemannian Geometry* by S. Gallot, D. Hulin, and J. Lafontaine
- (4) *Riemannian Geometry* by Manfredo P. Do Carmo
- (5) *A Comprehensive Introduction to Differential Geometry, Vol. 1* by Michael Spivak

#### GRADING

There will be about 3 homework throughout the semester, and an optional individual presentation on an assigned journal paper (of about 15 pages) near the end of the semester. Students are expected to accomplish all/some of the following:

- |                 |                                                             |
|-----------------|-------------------------------------------------------------|
| $g_{ij}$        | Regular attendance of lectures                              |
| $\Gamma_{ij}^k$ | Good performance in homework                                |
| $R_{ijkl}$      | Excellent presentation and Q&A on an assigned journal paper |

| Accomplishment unlocked                     | Expected grade |
|---------------------------------------------|----------------|
| none of the above                           | B+ or below    |
| $g_{ij}$ or $\Gamma_{ij}^k$ only            | A-             |
| $g_{ij}$ and $\Gamma_{ij}^k$                | A              |
| $g_{ij}$ and $\Gamma_{ij}^k$ and $R_{ijkl}$ | A+             |