

MATH 526: Differential Geometry II (Term 2, 2023)

Description: This course is centered on the notion of curvature. We will start with the general formulation of the curvature of a connection on a vector bundle, and then specialize to the Riemannian curvature tensor. These concepts are used in physics to formulate the Yang-Mills equation of particle physics and the Einstein field equations in general relativity.

Topics:

- Vector bundles
- Metrics on bundles
- Connections on bundles
- Levi-Civita connection
- Curvature of a connection
- Riemann curvature tensor
- Submanifold geometry
- Chern classes
- Yang-Mills functional
- Geodesics
- Completeness
- Jacobi fields
- Laplace comparison theorem

Prerequisites: MATH 525: Differential Geometry I.

Textbooks:

- T. Frankel, “The Geometry of Physics”
- J. Lee, “Introduction to Riemannian Manifolds”

Meeting Time:

- MWF 3-4pm in MATX-1118

Homework: Homework will be typed or scanned and submitted on the Canvas page MATH 526. You are encouraged to work in groups on the homework, however you must write up your own solutions.

Grading Scheme: Homework 100%

Course Policies:

- **Missing/late homework:** No late homework will be accepted. You can receive one concession during the term by submitting a Department of Mathematics self-declaration form (which can be found [here](#)). The weight of the missed homework/quiz with accepted concession form will be transferred to the other assignments. More information on UBC's policy for academic concessions can be found [here](#).