Math 136: Differential Geometry

Instructor: Dori Bejleri

Fall 2021

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Office: Science Center 525
Office Hours: Thursday 2pm - 3pm on Zoom &
Friday 1:30pm - 2:30pm in SC525

Class Hours: WF 12-1:15 EST
Location: Science Center 507

Course Description

This course is an introduction to differential geometry with an emphasis on curves and surfaces where the fundamental notions can be visualized. Topics include:

- Local theory of space curves and Frenet equations
- Parametrized surfaces and the first fundamental form
- The Gauss map and curvature of surfaces
- The covariant derivative, parallel transport, and geodesics
- The Gauss equation and the Theorem Egregium
- The Gauss-Bonnet Theorem
- Differentiable manifolds
- Riemannian metrics
- The curvature tensor

Course Website

http://people.math.harvard.edu/~bejleri/teaching/math136fa21/

Text

Kühnel, *Differential Geometry: Curves-Surfaces-Manifolds*. Third Edition, 2015.
PDF version available under the Library Reserves tab in Canvas.

Prerequisites

Multivariable calculus and linear algebra.

Homework

There will be weekly problem sets due every **Friday**. Please upload your solutions on Canvas by **11:59am on Friday**. Late homework will be accepted only at the instructors discretion. The lowest homework grade will be dropped.

You are encouraged to collaborate on problem sets but you must write your own solutions in your own words. You may use other sources if you cite them but you must prove any statements that aren't covered in the course and **you may not copy solutions from online sources**.

Midterm

There will be a midterm project where you will write a paper on some topic related to the course.

Final

There will be a cumulative take home final exam. The exam will be open book but **no outside resources or collaboration is allowed**.

Grades

Homework 50%, midterm project 20%, final exam 30%.

Campus Health Guidance

Per University policy, face coverings are required for all classroom participants.