



Math 136: Differential Geometry

FALL 2020
WEDNESDAYS & FRIDAYS
9:00AM – 10:15AM EST

1. ADMINISTRATIVE

Instructor: Chris Gerig

Email: cgerig@math.[our university].edu

Office Hours: W+F 10:20am – 11:20am EST

Course assistant: Philip LaPorte, philiplaporte@college.[our university].edu

Textbook: Wolfgang Kühnel's *Differential geometry: curves–surfaces–manifolds* (3rd Edition)

Prerequisites: A solid understanding of multivariable calculus and linear algebra

Homework: Weekly problem sets due on Mondays by 11:59pm EST (beginning with *September 14th*) and to be submitted on Canvas. The lowest homework score will be dropped. Late homework is accepted at my discretion. You are encouraged to work in groups on the homework, however you must write up your own solutions.

Exams: Projects for midterm and final, each of which consists of writing a lecture (to teach your classmates) on a specified topic related to this course. Collaboration and plagiarism is prohibited.

Grading: Homework 40%, Midterm 20%, Final 40%

Virtual classroom: If you have a question during lecture, you could either speak up (interruptions are encouraged!) or type “*I have a question*” in the Zoom chat window. There will be a separate Zoom link for: lectures, office hours (with the instructor), and open study sessions (without the instructor) for students to voluntarily study/work with each other.

Important dates: *September 4th* (first class), *October 14th* (circa midterm exam), *November 25th + 27th* (no class, Thanksgiving), *December 2nd* (first and last class after Thanksgiving break)

2. COURSE OUTLINE

- Local theory of space curves and Frenet equations
- Parametrized surfaces and first fundamental form
- Gauss map and curvature of surfaces
- Covariant derivatives on hypersurfaces
- Parallel transport and geodesics
- Gauss equation and “Theorema Egregium”
- Gauss–Bonnet theorem
- Differentiable manifolds
- Riemannian metrics, Levi–Civita connection, and curvature tensors