

MATH-UA 377, Spring 2018: Differential Geometry

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Basic information

- Instructor: Robert Young (ryoung@cims.nyu.edu)
- TA: Jiajun Tong (jiajun@cims.nyu.edu)
- Office: WWH 601
- Office hours: M 10--12
- Lectures: (check Albert for location) MW 2--3:15
- Recitations: (check Albert for location) M 8--9:15
- TA office hours: Th 4--5, WWH 524
- Textbook: Manfredo do Carmo, *Differential Geometry of Curves and Surfaces*

Grading scheme

Assignments 20%

Midterm 25%

Quizzes 20%

Final exam 35%

Exam dates

- Midterm: TBA (March)
- Final: TBA

About assignments

Assignments will usually be given on Wednesdays and handed in at class the next Wednesday. Collaboration is encouraged, but each student must write up and hand in their own solutions. If you work closely with someone else, please identify them on your assignment (e.g., "I worked with _____").

Late assignments will not be accepted except in the case of an emergency. If you expect to be absent on a day when an assignment is due, you can give your assignment to a classmate to turn in for you. At the end of the semester, your

two lowest assignment grades will be dropped from your average. This is meant to accommodate non-emergency absences, so try not to use this unless you have to.

Solving problems is important! Doing exercises and understanding the assignments is the best way to master the material.

Email

I will try to respond to emails in one business day. Because response times may be slow, please include all relevant details in your email and plan ahead before due dates and exams so that there is enough time for me to respond. In general, the best way to get help is to talk to me or the TA face-to-face, at office hours or after class.

How to do well in this class

- Come to class and recitation!
- Solve problems!
- Ask me questions: Feel free to ask me questions in class, after class, at office hours, or by email. Feel free to ask questions in recitation.
- Ask your classmates questions: Mathematics is about collaboration. Explaining something to someone else is one of the best ways to learn.
- **Read actively and study diligently!** The true goal of this course is to learn how to prove theorems and facts about groups, rings, and fields. So, as you read the textbook or review your notes, read actively. Check calculations and check each step of a proof. Fill in any gaps. Solve exercises. Try explaining the proof to someone else. Try proving theorems yourself before looking at the proof. Ask yourself questions like:
 - What new tricks and techniques does this proof use?
 - What if I tried another way to prove this?
 - What's a simple example of this definition?
 - What's a complicated example of this definition?

Problem sets

- [Problem Set 1 \(due Wednesday, January 31\)](#)
- [Problem Set 2 \(due Wednesday, February 7\)](#)
- [Problem Set 3 \(due Wednesday, February 14\)](#)
- [Problem Set 4 \(due Wednesday, February 21\)](#)
- [Problem Set 5 \(due Wednesday, February 28\)](#)

Figures

- [Frenet frames](#)

Course outline

1/22, 1/24 Parametrized curves

1/29, 1/31 Curvature and torsion

2/5, 2/7 Frenet formulas, isoperimetric inequality

2/12, 2/14 The Jacobian and the differential of a map. Regular surfaces

2/21 Regular surfaces

2/26, 2/28 Regular surfaces: smooth functions and tangent planes

3/5, 3/7 Regular surfaces: area and integration

3/12-3/18 Spring recess

3/19,3/21 Regular surfaces. Midterm

3/26,3/28 The Gauss map and the curvature of a surface

4/2,4/4 The Gauss map and the curvature of a surface

4/9,4/11 Gauss's theorem

4/16,4/18 Gauss's theorem

4/23,4/25 Geodesics

4/30,5/2 Selected topics

5/7 Selected topics
