

MATH 231 - TOPICS IN GEOMETRY

Spring 2008

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Course Text: *Geometry*, 7th Edition, by David A. Brannan, Matthew F. Esplen, Jeremy J. Gray, Cambridge University Press

Course Overview: The subject of geometry was first treated formally and axiomatically by Euclid around 300 B.C. He listed five postulates as starting points. Assuming these five statements, Euclid showed that almost every fact we know and love about geometry in a plane was a direct consequence. Four of these postulates are very natural, but the fifth one, Euclid's parallel postulate, was disputed. It states that given a line and a point not on the line, there exists a unique line through the point that is parallel to the first line. For over 2000 years, mathematicians tried unsuccessfully to show that this parallel postulate was a consequence of the first four.

In the 1800s, two mathematicians, Bolyai and Lobachevsky, staged a geometric coup; they showed the first 4 Euclidean postulates could hold while the parallel postulate was false and constructed non-Euclidean geometry, a rich and fascinating subject with great philosophical implications.

This course will discuss the modern foundations of *Euclidean Geometry* with its various generalizations: affine, projective and inversive geometry. For the last part of the course we will take a short journey into the *non-Euclidean Geometry*.

Grading Policy The grading will be assigned on a 10-point scale:

A: 90 – 100, **B:** 80 – 89, **C:** 70 – 79, **D:** 60 – 69, **F:** below 60

Any curving, and in particular the cutoffs for the +/- grades are determined at the end of the semester. Your final grade in this course will be determined by marks earned on the final exam, three midterm tests and the assigned homework. The weighting of these components are as follows:

• **Homework** = 25% • **Two midterm tests** = 25% each • **Final Exam** = 25%

Homework: *Homework will be assigned approximately every week and will be due in one week.* I will not accept late homework except in very unusual circumstances. I will, however, drop 10% of the lowest homework grades.

The homework is an important part of the course. Most of your learning will take place while doing it. I have no objection in principle to collaboration on the homework, provided that it is done in a way that maximizes the benefit of the homework to all people involved. You will get maximum benefit from a homework problem if you work hard on it alone before combining your ideas with someone else's. In any case, the paper that you turn in with your name on it should represent your own solutions, written in your own words, regardless of whether you arrived at some of those solutions in collaboration with others.

Midterm tests: There will be two midterm tests scheduled for February 27, and April 9. If you have a conflict with the exam dates, please speak to me as soon as possible. If you miss a midterm test without a verifiable and valid reason there will be no make-up exam offered.

Final Exam: There will be a regularly scheduled comprehensive 3-hour final exam. The date, time and location of the final exam will be announced by the registrar later in the semester. Do not make any travel plans before the date of the final exam is announced.

Please feel welcome to talk to me before or after class, during my office hours, or at any other time that is convenient for both of us. Good luck!