

GEOMETRY FOR ELEMENTARY SCHOOL TEACHERS
22m:81, Spring, 1999

Instructor: Fred Goodman
Office: 325G McLean Hall
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Office Hours: To be arranged.

Intended audience: This course is intended for students preparing to teach elementary school mathematics. If you are not enrolled in the elementary education program, you will need the instructor's permission (and a compelling reason) to participate in this course.

Course goals: The goals of this course are to enrich your knowledge of geometry and of the spirit and methods of mathematics; to enhance your skills at figuring out slightly unfamiliar mathematical situations; and to increase your ability to write, read, discuss, and present mathematics.

This is a course about mathematical *content* and methods of *doing* and *communicating* mathematics. It is not a course about pedagogy for the elementary school classroom. (I will attempt, of course, to offer a good example of pedagogy appropriate for college students.)

Textbooks:

S. Lang and G. Murrow, *Geometry*, Springer Verlag.
J. Stillwell, *Numbers and Geometry*, Springer Verlag.

Computer tools: We will use *Geometers Sketchpad* for drawing geometric figures and studying Euclidean constructions. This is a widely used tool in the schools. This program is available for your use in a North Lindquist computer room. We may also use *Mathematica* from time to time.

Course plan: We will begin by looking at Chapter 1 of Stillwell, which is about arithmetic (!), as a warmup for dealing with proofs. At the same time, we will go through some handouts on logic and sets.

We will then proceed to study plane geometry, using the text of Lang and Murrow as an outline or framework. However, especially at the beginning, we will view this text somewhat critically. (We will find that some important assumptions about geometry are unspoken and unexamined in Lang and Murrow; we would like to make these explicit. On the other hand, some axioms are redundant, and easily obtained as theorems.) To aid this process, I will provide a list of axioms for plane geometry, and we will try to verify all statements about geometry on the basis of these axioms.

Eventually, I hope we will do some additional topics from Stillwell or from other sources.

Homework: There will be weekly homework assignments which will require *lots and lots* of time. You may collaborate on homework (discussing mathematics with your peers is an important skill), but you must write your own solutions.

In general your homework solutions should be literate; the point is to explain your method, not just to obtain an answer. A good criterion for an adequate explanation is the following: a person who knows about as much as you do, but who has not thought about the problem, should be able to understand the solution by looking at your paper. That is, the person should be able to understand, without looking elsewhere, what is the problem, what is the idea behind your approach, and what are the details of your solution.

What you hand in should be an edited and clarified version of your work. Do your preliminary work on scratch paper, then rewrite an organized and easy to follow version for your colleagues and teachers. Please don't give me a stream of consciousness report with two pages of dead ends followed by "Oh, now I see how to do it...." Likewise, please don't try the smokescreen technique,

with a lengthy, meandering discussion, followed by the sudden appearance of the desired conclusion, without justification.

Exams and grading: There will be one or two midterm exams on dates to be arranged. There will be a comprehensive final exam. Grades will take into account both homework and exams. I will weigh most heavily what you do best, but the homework will receive substantial weight.

Course information on the web: Course information, including assignments, will be regularly posted on my web page at www.math.uiowa.edu/~goodman.

Attendance and absences: Regular attendance will be expected. However, if you must miss class, you will still be responsible for the material discussed in class. You are responsible for announcements made in class, which may concern changes in the assignments, syllabus, exams, etc. Absence from exams will require a compelling reason, and must be arranged in advance.

Complaint procedure: I hope and expect that you will have a good time, work a lot and learn a lot in this course. However, if you have concerns or complaints about any aspect of the course, you are welcome to discuss these with me. If you feel that you have not received satisfaction from me, you may contact the Chair of the Department of Mathematics. If the matter is still not resolved at that level, you may pursue complaint procedures at the Collegiate level.

Accommodations for students with special needs. Students with disabilities are entitled to special arrangements. There is a procedure for arranging such accommodations which involves the office of Student Disability Services. Please contact me if you would like to take advantage of such arrangements.