Mathematics 309 — Topics in geometry— Spring 2001

How to find me

Office	Mathematics 215
Telephone	822-4516
Email	`cass@math.ubc.ca`
Office hours	Tuesday 1030–12:30
Home page	`http://www.math.ubc.ca/people/faculty/cass/`

Email is by far the best way to communicate with me. I normally read it about 7 or 8 times a day, in the evenings as well as during working hours. If you want to see me, you can nearly always make an appointment at one day's notice in this way.

Text. There is no required text. The main source of information for this course will be the notes handed out in class. These will also be available on the Internet through the course home page

`http://www.math.ubc.ca/people/faculty/cass/courses/m309/`

This course comes in two rather different halves: (1) learning how to draw mathematical pictures and (2) learning what to draw mathematical pictures of. The first will involve learning how to use a computer to draw pictures in the language **PostScript**. As for the second, there will be no single theme, but will focus particularly on conic sections—ellipses, parabolas, hyperbolas, and related topics. This will involve some mathematical questions about art as well as elementary astronomy.

If you have previously learned PostScript, you will be required to extend your knowledge, primarily by working with 3D graphics. But if you have not, you will receive a complete introduction with no prerequisites.

Grading. There will be one or two mid-term examinations, and a final exam, as well as about 4-5 homework assignments.

But *the most important component of this course will be student projects*. You should choose your project as soon as possible, and indeed as the term progresses you should be constantly thinking about whether you are ready to start a project. You can work with others, or work by yourself. But in any event all projects should require about the same amount of work from each person. There are two basic options: (1) an internet project or (2) a class presentation. There isn't enough time for everybody to give class presentations, and therefore those who want to give them should book early. I expect to agree to about 5 of these. Both types of projects must be concerned with explaining something mathematical in graphic terms, and for sources of material I suggest mathematics books from the nineteenth century and earlier, particular Euclid, books V, XI and XIII; Apollonius; Descartes (on geometry and polyhedra); Kepler; Isaac Newton (planetary motion); and the topics of sundials; the relative motion of the Earth and sun throughout the year; and projective geometry. The Internet contains much good stuff, particularly on conic sections,a nd also a lot of junk. If you use the Interneta s a source, keep in mind that your projects must be *yours*; this is largely what I call 'originality' below—your project must originate with you.

Both types of project will be graded on the basis of (1) correctness, (2) mathematical content, (3) difficulty, (4) interest, and (5) clarity. The presentations will be judged also on (6a) overall effectiveness, and the others on (6b) originality. A presentation should be about fifty minutes long. I will explain later some principles you must follow when making one. Roughly speaking, class presentations will be assigned on a first-come-first-served basis, but it is in principle quite

possible that I shall discourage some when first proposed.

To summarize briefly: **This class will be as close as I can make it to one in which the students do most of the work.**