Mathematics 308—Section 201—Spring Term 1996

Instructor: Bill Casselman
Office: Mathematics 215
Telephone: 822-4516
Office hours: Monday 3:30. Also by appointment.

Text: None. I will make up and hand out lecture notes from time to time. Since there is no text, it is important that you ask questions in class whenever you don't understand something.

Examinations: There will probably be two mid-term examinations and a few small (perhaps unannounced) quizzes, as well as a final examination. I do not know dates yet. *Examination grades will be counted proportionally to the length of time allotted to the examinations.* You are expected to use calculators in examinations.

Assignments: Homeworks will be due roughly every 2 weeks. They will not generally be accepted late, because usually answers will be discussed in class. The homework assignments are important. They will count about 20% of the total term grade, and examinations will be largely based on questions already asked in assignments. I do not object to your working together, nor to your finding the solutions to problems in books. But I ask that you tell me on the assignment that you have done so. *If I find evidence of unacknowledged collaboration, all parties involved will lose credit.*

In addition to the usual homework assignments, of which there will probably be 4 or 5, you will have to do a special project of some kind towards the end of the term. This will count another 10% of your grade. Details will come later.

Outline: The subject of the course is Euclidean geometry. More specifically we will range over these and related topics: Pythagoras' theorem, vector dot-products, linear and affine transformations in two and three dimensions, perspective, regular solids, spherical geometry (although not necessarily in that order).

But *the special feature of this course is that I will teach you how to apply linear algebra and geometry to draw figures in both two and three dimensions by computer, using the programming language* `PostScript`. For this purpose you will be given accounts in the Mathematics department undergraduate computer laboratory, and given an introduction to the system. You will be asked to write `PostScript` programs in assignments and examinations, but you will not have to memorize large chunks of the language, because as we go along we shall accumulate a dictionary of `PostScript` commands, and in examinations you will be allowed to refer to it. Nonetheless, you will have to become familiar with `PostScript` through assignments, because the 'official' dictionary will be only a brief summary. From past experience I would say that it is not necessary that you already be familiar with programming, although it will undoubtedly save you time if you are.

The main reason I am introducing you to `PostScript` is that it is a well designed programming language that forces you to think carefully about aspects of geometry that might otherwise seem pointless. (One of the inventors of `PostScript`, and one of the two co-founders of the Adobe Systems software company, was once a graduate student in mathematics at the University of Utah.) I expect that you will actually enjoy this part of the course more than some of the more purely mathematical parts, but you must keep in mind that the two go together.

Roughly speaking, I expect you to spend an average of about 2–3 hours week with a computer, but you should also keep in mind that drawing good pictures with a computer will often take some time calculating with just paper and pencil. It is not necessary that you use the Mathematics undergraduate laboratory. It will be possible for you to work at home, or indeed almost anywhere that computers are available, since you can get on your own floppy disk, at no cost, a copy of the same program you would run in the Mathematics department. There are some advantages to doing so, however, as you will see. For one thing, course handouts will be duplicated on the Internet, and Mathematics department machines are well connected. Also, the machines we have do an especially nice job of translating `PostScript` text into a picture on the screen.

The standard reference for `PostScript` is the *PostScript language tutorial and cookbook* (usually called simply the *blue book* to distinguish it from the red and green ones) published by Addison-Wesley. It is an excellent book, but you shouldn't need it.