

## Mathematics 309 — Spring 2003 — Projects

The last assignment in this course will be your project. It will count about 20% of your grade in total. The project should be not be as difficult or as long as the first assignment.

The basic idea of a project is for you to **explain something involving mathematics that pertains to optics or light**. A short essay, in effect. It must involve some pictures, and should be capable of being posted on the Internet without substantial change.

A good project will tell a story, as complete and self-contained as possible.

People may collaborate.

Your project will be graded according to

- mathematical content (how much mathematics is involved? how relevant to the course material?)
- clarity (arguments will ideally be transparent, and context explained; graphics must be easy to read, aimed at mathematics; well designed to convey ideas rather than distract)
- correctness (no serious mathematical errors)
- difficulty (how much work involved, and how much technical knowledge?)
- interest (as interesting as possible, given the topic)
- originality (how many of the ideas and how much of the execution are yours?)
- skill (are ideas presented graphically where possible? text well written?)

These count equally. I say again that a good project can consist of either pictures alone, or a combination of pictures and text. The pictures will normally be in PostScript, but formats such as JPEG or GIF are also OK.

The same rules regarding web pages apply here as for the first assignment. If you put the text in .html, it should be in a form readable by any Internet browser. I will not accept .html put together by a web editing program; you must make up your .html by hand. If you do make up text in .html, it will be a good idea to put some pictures right on the page, so the pictures can be read right along with the text. These will normally be either .jpg or .gif files. If you build them from PostScript files, then they must hide links to your original PostScript pictures which can be accessed by clicking on them.

I will count only scientific material towards the grade. Historical material should be included only if it pertains to the science directly—explains who first discovered what, or why he didn't discover this or that.

All projects will be eventually posted on the course Web site.

Perhaps the most difficult part of your project will be to decide what it will be about. There are unlimited possibilities, but my basic criterion for the worth of a project is how it explains optical phenomena in mathematical terms. In the last weeks of the course I'll cover briefly a number of possibilities.

One natural way to choose a topic is to browse through elementary physics texts. You can also get ideas by browsing on the Internet. I have no objection to your redoing pictures you find there, as long as you don't copy stuff without doing your own work. **All images in your project must be produced by you.** This is to avoid copyright violation, among other things. Again, there should be mathematics involved.

A more delicate matter is that in any event you must tell me your sources. *All text must be in your own words, except possible for short quotations.* I will not count at all any project that fails to observe this rule.

**Before you launch yourself irreversibly on a project, you must tell me what you are going to do, and I have to agree with your plan.** In effect, you will negotiate with me about what you are going to submit, so as to avoid misunderstanding later on. Think of your initial proposal as a kind of contract.

I will be happy to help you out on specific items as you work along, but I will usually offer only informal advice on parts of your project; I will not actually grade projects, even in my own mind, until they are handed in. You cannot produce a project incrementally, by having me tell you how to improve successive versions. *Suggestions by me do not constitute approval of things I haven't commented on.*