

Concerning Teaching ...

Teaching in its many forms— including classroom instruction, office hours, supervising projects and theses, preparing students for comprehensive exams— is an essential part of the scientific enterprise. In our research careers we explore the frontiers of mathematics, but it is in our contact with students that we must put these ideas in context and try to infect the young with our enthusiasm for doing science.

Most of our teaching is done in the classroom, to captive hordes of undergraduates. There the challenge is to turn their attention away from the more mundane aspects of testing and grades and towards the more interesting scientific questions. Here are some ideas which motivate my classroom preparation and demeanor:

- *Flexibility.* Every course and every group of students is treated as a new experiment. What was interesting (to me and to the students) last year may no longer be appropriate for the same course this year. What was an appropriate topic for science students may not be so interesting for engineering students.
- *Spontaneity.* During the semester some unforeseen detours may suggest themselves: a side topic which would be interesting to the students, or which connects naturally with the present one; an area where students' preparation is weak, which should be reviewed. I do not avoid such detours— this is where the role of the professor comes in, to introduce material which goes beyond what is in the text or in the syllabus, in order to connect the material to interesting applications or some other course which they have already taken. This is why *research* is essential to teaching: it gives the professor the depth and perspective to bring the subject to life.

The price for spontaneity is less organization, and I accept that price. I do not give detailed schedules of lecture material or homework assignments at the beginning of the course. The course is a dynamic process, work-in-progress which is created before their very eyes and not a dead subject to be read chapter-by-chapter from a textbook. This is the view which I would like students to have of science.

- *Enthusiasm.* If I enjoy what I'm teaching, so will the students enjoy learning it.
- *Awareness.* I try to keep up with students and their progress. Questions in class are encouraged, even in large lecture courses. I advertize my office hours nearly every day. I do lots and lots of examples, and important concepts are repeated many times in different terms. Examples and demonstrations which relate class material to everyday objects are usually appreciated. And I am always willing to spend more time on a topic if I feel there is a need.