# Statement of Teaching Philosophy

Marshall D. Perrin
University of California, Berkeley

December 7, 2000

In teaching, as in any other endeavor, one must begin with the end in mind. Without first identifying *why* one is teaching, one cannot arrive at the best methods for teaching or indeed even at what material should be covered. Especially in teaching science to non-scientists, one should always keep in mind the motivations for doing so.

I believe in two major reasons for teaching astronomy. First, astronomy provides us with a view of our location in the universe, the cosmic context in which we find ourselves. As part of their general education, students should come to understand at least the broad outlines of what we have learned about where we live; astronomy can shed light on aspects of daily life and explain things students have probably always taken for granted. For instance, the phases of the moon, the generation of energy within the sun, and the origins of the universe in the Big Bang and subsequent nucleosynthesis within stars.

Secondly, astronomy is worthwhile to teach because of the perspective it can give on the scientific endeavor. The role of science and technology in our world today is greater than ever, and only likely to increase. Students should at a minimum be familiar with the tenets of the scientific method and with how it is applied to the study of the world. Both its successes and its limitations are important to note, so that as students go forward into adult life they are better capable of understanding scientific issues in the press and elsewhere. Thus it is important to teach both what we as astronomers know, the results of the discipline, and how we know it, the tools and methods we use to gain insight about the denizens of the deep sky. Of course, the practical implications of these two goals on one's teaching will be different for an introductory survey class and for an upper-level major class, but I believe they remain valid in both circumstances.

Teaching is a craft, and should be treated as one. Simply being a successful scientist does not make one a competent teacher; rather, constant efforts at improvement and pedagogical skills development are needed, drawing upon the education community's large body of knowledge. Lecture, while the traditional method of instruction in the sciences, is only so effective. The mere transmission of information from a lecturer to a classroom does not insure that students will learn that information, or indeed if they are even listening. Students learn best when they are actively involved, in group discussions, lab exercises, or merely one-on-one conversation with a professor or teaching assistant. I make a conscious effort for my teaching to be a two-way street, in which students must communicate what they have learned back to me and to other students on a regular basis. Only through this sort of engagement with the material, through being forced to find their own words in which to express what they have learned, can students best come to understand and to possess the material we present to them.

Astronomy is a living science. It can be taught in a classroom but cannot be taught *only* in a classroom. Laboratory exercises can be a critical part of any science course, and especially serve the goal of taking what is presented in class and relating it to the real world which students can see with their own eyes. The reaction when someone first sees the rings of Saturn firsthand through a telescope is invariably a gasp of surprise and excitement. Something which formerly belonged to the realm of books alone, which they read about and saw pictures of in texts, suddenly became a part of the real world, something which exists as absolutely and completely as indeed the Earth itself. I believe this sort of lab exercise is extremely valuable in teaching astronomy, for it will give students the sense that science is something which they themselves can do, rather than simply a tool forever beyond their own reach.

Teaching this past semester I have increasingly come to recognize the importance of how one evaluates students. Ideally, a teacher will motivate students through his own enthusiasm and enjoyment of the material; students will become excited about a topic if you show them that you are excited about it yourself. However, practically it is often the desire to do well on homework and examinations which is the primary motivator. Thus it is important to make sure that examinations test material which is truly important, and test for understanding of fundamental concepts and the ability to apply them, rather than simply the rote recall of facts. Furthermore, there is a narrow line to walk when it comes to difficulty: A class should not become watered-down, for lowered expectations can result in lowered results, but at the same time, assignments which are too difficult or which are harshly graded can hurt students' confidence and destroy their enjoyment of the material, hindering rather than helping learning. Lastly, homework and lab assignments should be closely related to the material which will be covered on examinations; the best way for students to master material is to practice it, to work through questions and confront problems ahead of time that will increase their familiarity with and ability to relate to the material.

In science, teaching and research must go hand in hand. Teaching should *not* be simply something one does to pay the bills, something one does because one has to even though it's a distraction from research. Rather, effectively communicating the facts and methods of science should be seen as just as integral a part of being a scientist as is performing observations and publishing papers. Any new discovery must be communicated to others, and so experience in teaching in the classroom can help make a scientist more effective in communicating his ideas to his peers in the research community as well. Furthermore, by communicating the excitement of science and the important and relevance of the process of discovery, a teacher can both promote the development of future scientists and educate the wider public to be better able to understand the scientific issues that are increasingly a part of public discourse. I believe in and I enjoy the process of teaching, and I hope to continue improving in my practice of the art as time goes on.