

# Tutorials in Teaching Physics (Physics 501, 502, 503)

## Department of Physics

### University of Washington

Prof. Lillian C. McDermott, C208, 685-2046

Prof. Peter S. Shaffer, C218, 543-6705

*Tutorials in Teaching Physics* (Physics 501-2-3) is a course that forms the foundation of a program to help prepare graduate students and junior faculty for their role as physics instructors. The primary goals are to help participants: refresh their understanding of basic physics; become aware of difficulties that students encounter in their study of physics; and become familiar with instructional strategies that have been shown to be effective in helping students learn physics. At the same time, Physics 501-2-3 is part of a program that helps undergraduate students improve their understanding of physics.

Participants attend a meeting each Monday of the academic quarter as well as teach in the *tutorials* associated with the introductory calculus-based physics course. Although the context is the tutorials, the Physics 501-2-3 sequence provides important background for teaching assignments in the introductory laboratories and in the Physics Study Center, as well as for future lecture courses.

The program is tightly linked to the introductory calculus-based physics course (Physics 121-2-3). This is a three-quarter sequence: Mechanics, Electricity and Magnetism, and Waves and Optics, each of which is taught every quarter. At any given time, there are more than 800 students in seven or eight sections with different lecturers. There are three related components: three 1-hour lectures, one 3-hour laboratory, and one 1-hour tutorial session. Laboratory and tutorial sections (about forty-five of each every quarter) are taught by teaching assistants.

The tutorials are designed to promote active learning. They target critical ideas and skills that are known through research and teaching experience to present difficulty to students. The emphasis is on constructing concepts, developing reasoning ability, and relating physics formalism to the real world.

Physics 501-2-3 is required of all first-time TA's in the Physics Department. Other participants include all graduate students, undergraduates, and volunteers (post-docs and junior faculty) who teach in the tutorials. The structure of the weekly meetings resembles the instructional sequence followed by students in the introductory course. Participants take the same pretests and work through the same worksheets that their students will be using in the tutorial sessions later that week. Experienced teaching assistants model the approach of teaching by questioning that is used in the tutorials.

Discussions and readings on research on the learning and teaching of physics provide further background on student difficulties and illustrate the interactive process through which research can be used to guide curriculum development. Occasional sessions are devoted to issues related to the grading of homework and examinations.

Participation in the weekly meeting and in one tutorial session each week is required. Participants who miss more than one week may not receive credit. Each participant will be assigned to a tutorial that does not conflict with his or her other courses and TA duties.