Teaching Statement

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Teaching an engineering course at a large research university serves the dual purposes of giving students the technical literacy necessary to contribute in industry while at the same time providing the preparation necessary to be successful in research. Thus the goal of teaching should be to introduce the student to established engineering concepts and practice as well as to prepare the student for solving problems not covered explicitly in the course material. While this approach applies equally well to graduate and undergraduate students, the application of these principles will differ. For undergraduate students, classes should contain material directly applicable in real-world situations and significant attention should be paid to motivation of important principles and placement of technical results within a larger perspective. For graduate-level courses, one can assume a more sophisticated and research-oriented audience where the emphasis can be placed on developing research potential through problems requiring significant creative insight and through independent research projects.

Approach to Course Content

The syllabus of any particular course typically will be chosen to describe the fundamental problems of the subject and what solutions have been proposed to address these problems. For example, a course section on Internet congestion control might begin by describing the Internet as it exists and the purposes it serves. The problem would then be abstracted by a discussion of mathematic modeling of the Internet. I would then explain how congestion control is an attempt to solve a distributed optimization problem. This would be followed by a discussion of how protocols are decentralized algorithms designed to converge to the solution of this optimization problem. Finally, I would conclude with a description of how protocols are implemented within the existing Internet framework. In this way, I move from case studies and specific problems to general solutions with broad applicability.

Mentorship

When preparing graduate students for independent research, it is critical to establish early on the habit of rigorous thought. In my own experience, this is best accomplished through extended discussions with and direct guidance of the student during the first and second years. Emphasis should be placed upon accuracy of communication, critical analysis and breadth of knowledge. After this time, it is necessary to alter the nature of involvement in the student's research in order to foster independent creativity and insight. Interaction during this period should emphasize preparation of papers and engagement with peers.

Teaching Experience

I have participated in teaching at a number of levels. For two years, I assisted incoming graduate students in preparation for the Aerospace Engineering PhD qualifying examinations. These exams are given orally in the second year of the PhD program. Because of the adaptive nature of the examination, this tutoring required me to continually revise and restructure my own questions and material in order to properly gauge the depth of the student's knowledge.

In addition to tutoring, I have had the opportunity to experiment with a number of different styles of instruction through a weekly presentation group comprised of members of our lab, our advisor Sanjay Lall, and occasional visiting scholars and guests. The purpose of this group was to present topics from standard references, current and classical results in the technical literature, and subjects from our own work in a variety of different formats. Talk times were fixed at anywhere from 30 minutes to 3 hours and presentations incorporated slides, chalk board presentations, powerpoint and LaTeX. This experience, extending over several years has been critical in defining my lecture style and improving the quality of my presentations.

Possible Course Topics

My interests are broad and I would welcome a diversity of teaching opportunities. In particular, I have specific expertise in control theory, optimization, and networks. Examples of classes I would enjoy teaching include a course in linear control theory for undergraduates requiring only exposure to linear algebra, a graduate and advanced undergraduate course on convex optimization and its applications, and a high-level graduate course on nonlinear or robust control theory.