TEACHING STATEMENT

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As a teacher, my goal is enabling students to critically examine the subject material. The purpose is not just to facilitate knowledge transfer, but to provide a framework that enables future learning beyond the context of the classroom. This framework then creates a bridge between the student's existing frame of reference and the domain-specific knowledge base that is relevant to the course.

I was a Graduate Teaching Assistant at KU for three semesters; one semester of freshman programming, and and two semesters of a graduate course in high-performance networking. The high-performance networking class was particularly enjoyable because the sections I was assigned to primarily served continuing-education adult-learners. They brought a broad range of experience with them to the classroom which in many cases, either directly or indirectly, came to bear on the course material. Teaching at NPS has a similar feel to this experience in many respects, due to the non-traditional nature of our student body.

Teaching Process

My overall approach is to present a narrative to the student that connects the dots between where an idea came from and its current representation; leading them through the decisions or tradeoffs that were made along the way. This teaches them to critically evaluate not just the current state of the art, but also the process by which we have arrived at this point. Because every audience is unique and responds according to their specific background, this process requires establishing a dialogue with each student in order to present learning material in a context with which they identify. My intention is to prepare students leaving my class both with new understanding and with the appropriate background for that understanding, thus avoiding the chronic amnesia currently affecting much of today's technology development, where everything old is new again.

I believe that it is of the utmost importance to set clear expectations for coursework both in and out of the classroom, both because students deserve clear expectations, and because it encourages healthy interaction. I find that students, when they know what is expected of them and how it will be reflected in their grade, are much more willing to take an active role in the learning process. This applies equally to thesis advisees.

Teaching at NPS

I am in my third year of instructing at NPS and am comfortable teaching a range of courses offered in the computer science department, including core CS classes as well as advanced courses on networking topics. I have taught classes using and updating existing curricula, as well as fully developing new material as needed.

- **Computer Communications and Networks:** CS3502 is both foundational to the rest of the CS networking courses, and responsible for refreshing students on networking fundamentals they may not have reviewed for some time. As a core CS class it also tends to be relatively large each time it is offered. Teaching it requires a good bit of finesse to cover the broad range of required material, without leaving some students behind along the way. I introduce the students to topics from my research including mobile ad-hoc routing and network measurement techniques.

- **Network Modeling and Analysis:** Teaching CS4554 comes very naturally to me, given the extensive simulation efforts I've completed and mentored in my own graduate and post-graduate research. I am

currently the course coordinator and have developed a new curriculum for this class. We cover a range of network simulation and analysis questions, with the focus being on giving students the ability to determine when and where simulation techniques are beneficial and how to critically evaluate and analyze their results. Students are introduced to several simulation and emulation tools as exemplars. More importantly they are taught to understand the tradeoffs between simulation approaches and either choose the best approach for their own work, or critically evaluate the claims of others that are based in simulation. This course is especially beneficial as students begin to plan their thesis and many of the course projects have directly contributed to thesis results. In one case a student in the class decided he wanted me to advise his thesis based on his class project. He has since graduated and is continuing to collaborate with me on publishing part of his thesis work in an upcoming conference. On my teaching evaluation form for this class a student commented: "Prof Rohrer was very organized, approachable, and knowledgeable on the subject area."

- **Network Traffic Analysis:** CS4558 is one of the most advanced networks track courses we offer, covering bleeding-edge research in an area critical to network design, operations, and cyber security. Each time I teach it there is new material to incorporate into the readings, lectures, and lab material. As a seminar-style class I encourage interaction from the students as we discuss each of the readings, and teach them to critically evaluate the contributions of the research papers we discuss each class.

  Feedback from students indicates that they value this approach:

  - "Reading topics for the class were fun and interesting. I can't remember the last time I linked that many readings/presentations to people outside of class."
  - "Course was demanding but a good learning experience."
  - "Reading both classic and new, novel papers in networking topics was a great idea and a very positive way to spend class time."

Course Development

In addition to teaching existing CS courses, I have developed new curricula for existing and future courses.

- **Tactical Wireless Networks:** I've been developing the curriculum for a course on tactical wireless networking, based in large part on my past and present research in this area. The course focusses on advanced mechanisms for maintaining connectivity in challenged, degraded, and denied communications environments, and covers the spectrum of mobile ad-hoc, disruption-tolerant, and portable-infrastructure network models. Like CS4558 it will be an advanced seminar-style class, introducing students to current research directions as well as conveying an understanding of the unique criteria involved in evaluating such networks.

Another potential course I am interested in developing is one on Network Measurement and Monitoring. This would be a counterpart or precursor to CS4558 that would focus on applied methodology for enterprise network environments.

Research in the Classroom

My experience an NPS has strengthened the relationship between my teaching and research, and I believe this is beneficial to both domains. It is my responsibility to continue improving my professional abilities and teaching methodology, leading me to refine, clarify, and add relevance to my course material with

each iteration. I also believe that knowledge transfer via classroom interaction and thesis mentoring is as integral to academic research dissemination as conference and journal publication. Presenting research in the classroom requires the teacher to deconstruct the material to a level attainable by non domain-experts, through which process the teacher/researcher also gains a deeper understanding of the content than they may have previously held. Furthermore, the graduate classroom provides a venue for an ongoing dialog whereby advanced topics may be digested much more thoroughly by students than is the case when a conference proceeding is simply read or a brief talk at an academic conference is attended.

My research efforts have made a number of specific contributions to classroom material. I've incorporated material from my research on DTNs into both CS3502 (lectures on MANETS and episodically connected networks) and CS4554 (series of lectures on simulating MANET and DTN protocols, as well as emulating network disruptions). It has also been used as the foundation of several CS4554 labs giving hands-one experience simulating network disruptions and protocol reaction in military-relevant scenarios. In addition, I have been drawing on this work to compile a curriculum for a tactical networking class addressing delayed, denied, and degraded communication environments. My work on network mapping directly contributes to lectures on topology inference in the CS4558 (Network Measurement and Analysis) curriculum, which I teach on an annual basis. Simulation models that I have developed for vehicular networks serve as case studies in CS4554 (Network Modeling and Analysis) curriculum to introduce students to a range of modeling tools and approaches.

I believe that my fundamental approach of hands-on project-based learning, coupled with both provenance and practical application are an excellent fit for the NPS CS student body. I look forward to refining and evolving my application of these fundamentals, based on future feedback from both students and colleagues. I'll conclude with an excerpt from a student's written assessment, which reflects my commitment to education: "The instructor's mastery of networking [is] clear, and most notable is his interest in helping out a student in need which is readily apparent and never wavered all quarter."