I am excited by the opportunity to guide students as they explore the wealth of applications of theory to practice, to serve as a mentor in aiding them to find their way, and to watch them grow to fulfill their professional and personal potential. I feel personally invested in the successes of my past mentees and students, and the possibility to fulfill that role on a more significant scale is one of the main draws of academia to me. To prepare for such a role, I have served in multiple capacities as a teacher and mentor, have actively participated in teaching and mentoring workshops, and have observed educators to understand the practices that would position my students for success – this document is a synthesis of these experiences.

As a teacher, **rapid feedback, self-directed learning, stories,** and **clear communication** are my 4 key tools in creating a successful learning environment. To maintain such a positive atmosphere requires **continuous reinvention and retooling** on the part of the educator.

I believe in **continuous evaluation** of the instructor and the course, as well as that of students. As a student, high-volume low-consequence evaluation has been a key indicator of courses I both liked and learned from. For example, I was greatly aided in teaching Digital Signal Processing at Penn and Cornell by having taken an intensive course on the topic at Sharif, where the course grade was a combination of around 40 exams, quizzes, homework, and simulation projects. I was surprised that even though I had not used the concepts in 5 years, I remembered the core material at a deep level, because I had internalized the concepts as an outcome of the coursework volume and consistent evaluation of my work. More empirically, the benefits of frequent assessment have been shown in multiple studies[1]. Thus, frequent low-stakes multi-method testing is key to my pedagogic approach, because it allows students with different learning styles to succeed on their own terms (e.g., through picking a marking regime suited to their strengths). Active learning[2] advocates even more rapid feedback to calibrate course materials and classroom teaching. I have observed better outcomes in my students and peers from blackboard-based and experiential teaching as compared to slides, even at the expense of covering fewer topics, as a necessary pre-requisite for feedback is engagement. I strive to measure student engagement through frequent questions, as well as voting mechanisms for more general feedback (e.g., using clickers).

A particularly successful method I encountered as a student that I have co-opted, is testing course material before and after it is taught in class to incentivize **self-directed** reading of course material. This is a necessary skill for real-world application, as students will have to interface with primary technical documents daily. Collaborative homework projects also serve the same purpose; simulating real-world collaboration that is a reality to all engineering projects. Long-term projects also give students exposure to team-work, conflict resolution, and leadership, while simultaneously fostering deeper learning and longer-term retention of course material. As with assessments, term-long projects may need milestones and intermediate deadlines set by the instructor, because many students will not yet have the tools to deal with large projects, and it is part of the educator's mission to prepare them for such responsibilities later in their career. The role of classroom teaching, in my opinion, is to augment such processes for deeper learning, and not to replace them.

It is no secret that the effect of classroom teaching in imparting long-term knowledge can be limited. In my experience, **stories and narratives** have been very helpful in contextualizing knowledge and providing an on-ramp for recall. Having been both a student of and an assistant for Santosh Venkatesh at Penn helped me understand the power of a good story – e.g., Laplace's sunrise problem ("what are the odds that the sun will rise tomorrow, given that it has risen for all of recorded history?") is still one of the first examples of the use of conditional probability that come to my mind. The effect of stories is amplified when they are simple; or in Santosh's words, they propose "the simplest question we don't yet know the answer to." This enduring recall is what I aim for students to take away from my classes, serving as an entry point to the process of relearning specific topics that they may require, but will have forgotten, later in their career. The historical narrative behind the development of technical concepts also humanizes research, illustrating the incremental growth of knowledge

[1] e.g., McDaniel *et al., "Test-Enhanced Learning", Journal of Educational Psychology, 2011*
[2] Prince, M., *"Does active learning work? A review of the research," Journal of engineering education,* 2004

and providing opportunities for engaging the intellectual curiosity of students who may not yet be as experienced or as interested in mathematics.

Clear and continued communication is key to a positive educational experience. I have observed that aligning expectations early removes ambiguity and prevents conflict, a point that was critical, for example, in my time at NEC Labs, where my high-risk high-reward approach was only possible by maintaining frequent communication with my supervisor and aligning my short-term goals with his and our department head's goals. In the classroom context, standards of conduct expected from the instructor and the students should be explained in detail early on. In my experience as a teaching assistant, time spent articulating standards of acceptable behavior and collaboration, and especially the philosophy behind them at the start of a class can help prevent future misunderstandings. This was driven home in a Master's course I TA-ed at Penn, where the diverse backgrounds of students led to disagreements around plagiarism and standards of conduct expected of students, which could have been resolved through clear explanation of expectations. Clear communication channels also allow the instructor to obtain one-on-one feedback from students and to provide targeted assistance.

My teaching philosophy follows the dynamic approach of **reinvention and retooling,** an inevitability for the demands of an academic career in the coming decades. In building course material, I have observed a "zero-based" curriculum approach (as employed in a Fourier Analysis course I TA-ed), which evaluates topics for inclusion based on their current relevance and core importance, to be a useful tool in adapting to a world with rapid obsolescence of technologies, changing paradigms, and a proliferation of teaching material. However, an instructor should also strive to remain up-to-date with the latest pedagogical research, as well as honing additional complementary skills to grow as a teacher and mentor. To this end, during my PhD at Penn, I completed a 3-month college teaching workshop[3], where I cultivated skills based on the latest research in active learning and classroom participation methods, while also being evaluated in a real classroom scenario. This workshop gave me the vocabulary to describe the differences that I had perceived in the methods of my teachers and the outcomes of my own TA-ships. At Cornell, I noticed how teaching extends beyond the classroom, and how a good instructor should also be a capable mentor. For that purpose, I completed a 6-week workshop on mentoring[4], where I learned to align goals and maintain a supportive relationship with mentees, and developed the skills to have frank, difficult conversations when necessary. Finally, to improve my communication skills, I completed a 6-week workshop on science communication at Yale[5] with Bob Bazell, former chief scientific correspondent for NBC News, where we focused on communication styles, on the use of verbal and physical cues to keep audiences engaged, and on thinking deeply about the audience and their understanding when preparing material, culminating in a 10-minute TED Talk for a lay audience. These workshops are a counterpoint to my hands-on experience as a teacher, teaching assistant, and lab assistant.

I would be delighted to teach courses on control systems, mathematical modeling, communication networks, and digital signal processing. In keeping with my research thrusts around network data science I aim to develop a curriculum for a course on control of networked systems, focusing on centralized and decentralized control methods applied to the control of epidemic processes on networks along with an overview of spectral graph theory, as well as a more technical course PhD-level course focused on optimal control and Markov decision processes and a multidisciplinary course around the spread of information, pulling together threads from economics (social learning), network science, and psychology.

In sum, as an instructor I will employ stories to put knowledge into context, frequent testing to adapt course material to student understanding, and nudges to incentivize self-directed learning, while maintaining clear communication channels and seeking to adapt to changing student needs.

[3] https://www.ctl.upenn.edu/ctl-mini-courses-college-teaching
[4] http://gradschool.cornell.edu/cu-cirtl/mentoring-program
[5] http://ctl.yale.edu/event/expressing-your-enthusiasm-oral-communication-workshop-stem-graduate-students-and-postdocs