

Teaching Statement

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As I think back to the influential instructors in my life a common thread emerges. The most effective instructors inspire young minds by drawing on personal experience and meaningful connections to everyday life or through sheer optimistic enthusiasm. I try to draw on this while working with students and postdocs at LLNL.

The fruits of my student mentorship can be seen in the number of recurring long term engagements and my influence on their Ph.D. thesis research directions. Multiple students have continuously worked in my group and selected thesis topics to align with my group's research direction. Dr. Keita Iwabuchi (formerly at Tokyo Tech) was my first long-term continuous student, funded by my group's projects and a Japanese NSF-equivalent fellowship. Dr Iwabuchi aligned his thesis to investigate data structures for dynamic graphs in persistent memory. Dr. Tahsin Reza (formerly at the University of British Columbia) interned in my group three times. Dr. Reza's thesis research investigated HPC-scale graph patterned matching, based on the HPC runtime I developed at LLNL; I was included on his thesis committee, advised by Prof. Matei Ripeanu at UBC. Dr. Benjamin Priest (formerly at Dartmouth) was a third student I mentored closely as a PhD student. I mentored Dr. Priest on techniques to scale graph sketching algorithms to a distributed streaming environment; I was included on his thesis committee, advised by Prof. George Cybenko at Dartmouth. All three, Drs. Iwabuchi, Reza, and Priest, became postdocs at LLNL working on projects with me; Drs. Iwabuchi and Priest are now staff in CASC/LLNL. Finally, I have twice received an *Outstanding Mentor Award* at LLNL that is nominated by students.

As a graduate student, I was a teaching assistant for Prof. Nancy Amato and Prof. Valerie Taylor, assisting in *Introduction to Computing, Data Structures and Algorithms* (honors), and *Parallel Algorithm Design and Analysis* (graduate). This was a rewarding experience, and I look forward to having the opportunity to have an instructor role again in the future. The expanded scale of the CSE department's honors program is impressive, and the opportunity to instruct and mentor *ACE Students* is particularly appealing. **Given the opportunity, I would enthusiastically teach ACE students, support activities such as seminars and poster sessions, and advise honors thesis research.** On a quick tangent about poster sessions, I believe poster presentations are an essential soft-skill that is often overlooked. Having spent now ten years 'on the other side' recruiting students and recent graduates, I value my time at poster sessions above any other technical portion of a conference or workshop. The majority of students I have recruited started with a conversation at a poster, and I advocate to develop such soft-skills in all students and postdocs I mentor.

In addition to the ACE students, I also have the desire to work with Corps/ROTC students at an early stage in their academic development to encourage them to invest in STEM by leveraging my experience and observations. At LLNL, I took the opportunity to mentor two TAMU ROTC Air Force graduates as they prepared for their EAD – [LLNL has a dedicated ROTC internship program](#) for cadets and newly commissioned officers awaiting their EAD. Encouraging these young service-minded students to invest in a STEM education is not only an opportunity, but of significant importance to our overall national security. The lack of clearable talent entering the workforce among the many national security mission spaces is a challenge, to say the least, for institutions just like LLNL. I have seen first-hand this shortage, and institutions like TAMU Corps can play a leading role in filling this gap.

Through my DoD interactions I have met many who attended graduate school while actively working for their respective branches or agencies. If I am fortunate enough to have a teaching role at TAMU, I would actively draw on these connections in an attempt to bring military and civilian DoD personnel to TAMU for additional graduate education. Areas of data science, artificial intelligence, cyber security, and HPC are of specific importance. Combined with the new facilities being installed at research park, TAMU could become a choice location for continuing education of DoD personnel.

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If given the opportunity to teach in the CSE department at TAMU, I would be happy to teach *all* core CSE undergraduate and graduate courses, and believe I am qualified to teach the following electives: *Analysis of Algorithms, Scientific Programming, Operating Systems, Cloud Computing, Problem Solving Design, Software Engineering, Parallel Computing, Distributed Objects Programming, Database Systems, Principles of Data Science, Artificial Intelligence, and Machine Learning*.

Finally, if given the opportunity, I would seek to initiate special topics courses in:

- (a) *Graph Analytics, Network Science & Applications*: This special topics course would cover algorithms beyond the typical textbook graph algorithms, including *clustering, ranking, temporal analysis, knowledge graph analysis, graph learning*, among other emerging topics in the network science literature.
- (b) *High Performance Computing for Data Science*: the so-called Cloud Computing environment has dominated the space of *Big Data*. However, graph analytics remain a key computation that is challenging “in the cloud”, due in large part to the interdependent nature of graph computations. This special topics course would cover data science applications that require HPC, including but not limited to graph analytics, with particular emphasis on how tightly-coupled HPC interconnects play a role in algorithm design and engineering.
- (c) *Computing for National Security*: Reaching back into my DOE and DoD research and applications network, I would design a seminar series to highlight opportunities for advanced computer science skill sets in the national security space. Covering topics beyond typical software engineering, many areas require Ph.D. skill sets. I believe exposing undergraduates to these areas may encourage them to consider investing in a graduate education. This course could be offered in an export-controlled setting if approved.

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