Teaching Statement

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Motivation

One of my primary reasons for returning to academia was the opportunity to directly educate and mentor students. While I expect to make strong and highly impactful contributions in my research activities, I believe that teaching and mentorship is the avenue through which we as faculty may actually have the broadest impacts on the world. By putting our students in the best position to achieve *their individual goals*, we have the opportunity to create future leaders in academia, industry, and other professions who can all influence the world in their own unique ways. Our students are our future, and I am truly excited for the opportunity to continue supporting their growth through education and mentorship.

Teaching Philosophy

My current approach to teaching is structured around four principles. I discuss these principles in more detail below, with examples from the "AE199: Aerospace Computing" course I recently designed and taught. While these principles guide my teaching, I am constantly looking for new pedagogical strategies and tools to incorporate in my courses through discussions with other faculty and educational communities like AE3 and CITL.

Excite students by linking concepts with real-world engineering applications: I have found that engineering students are often attracted to their field because of an interest in a real-world application, such as aircraft or space flight. As such, I aim to connect theoretical concepts with real-world applications that implement those concepts. For example, my AE199 course was a project-based course designed around three real-world aerospace problems that required the use of code to solve. This structure motivated aerospace students to learn how to code, something they often do not expect they will need to learn, by putting it within the context of something they are excited about. It also demonstrated that coding is often required to solve real-world aerospace problems.

Provide multiple learning settings that emphasize interaction and independent thinking: Students are all unique - as such, they often thrive in different types of learning settings. I aim to incorporate multiple learning settings in my courses, with an emphasis on interactive learning and independent thinking. These settings include, for example, traditional note-taking lectures and group discussions, individual and group assignments, structured and open-ended exams, and reports and presentations. In my AE199 course, I used two meeting formats (lectures and labs) and four types of assignments that mixed individual and group efforts. Roughly half the lectures introduced coding concepts using Jupyter notebook presentations, which allowed me to include live code sessions where students helped me implement various concepts. Others introduced engineering concepts needed for projects in a more traditional note-taking format with group brainstorming activities and polls used to promote student interaction and independent thinking.

Provide early and personalized feedback: Many students, particularly underrepresented minorities or first generation college students, struggle with confidence in their abilities early in their academic careers. One way I hope to help with this challenge is to provide early and personalized feedback in my courses. For example, coding is a topic many engineering students are either uncomfortable with or indifferent about. My AE199 course therefore used early and personalized feedback to help

students build confidence that coding is something they can, and should, do. Each lab included multiple peer review activities that gave students early feedback on their code and helped to keep them from falling behind. Project submissions also included peer review activities, giving students a chance to learn from others and identify key areas for improvement.

Introduce skills and tools that have real-world value: Finally, I aim to supplement important theoretical concepts with practical skills and tools that will support my students throughout their careers, even if they leave engineering. I emphasize communication and teamwork in nearly all my courses, for example through short current event discussions, project presentations, written reports, and group assignments. I also introduce industry-relevant tools when possible - my AE199 course taught Git, GitHub, Conda, and Python, which are all common software development tools used in industry. The open-source nature of these tools also ensured equal access for our students.

Teaching Experience

I have taught a range of undergraduate courses at the University of Illinois at Urbana-Champaign: AE199 Aerospace Computing (developed new course), AE202 Aerospace Flight Mechanics, AE370 Numerical Methods for Aerospace Engineers (incorporated new computing labs), Aerospace AE442 Aerospace Systems Design I, AE443 Aerospace Systems Design II, AE498 Computational Systems Engineering (developed new course).

I made the "List of Teachers Ranked as Excellant" for teaching AE498 in 2017 and advised the 1st place team in the AIAA 2017/2018 Undergraduate Team Aircraft Design Competition.

Courses I am interested in teaching include: AE352 Aerospace Dynamical Systems, AE353 Aerospace Control Systems, AE370 Aerospace Numerical Methods, AE483 Aerospace Decision Algorithms, and AE598 Reinforcement Learning. I would also like to design a new graduate course on "Learning with Inductive Biases for Autonomy," which would cover advanced topics related to my research such as graph neural networks and hierarchical reinforcement learning.

Mentoring

I take great pleasure in mentoring and helping students achieve their career goals, whatever those goals may be. I am currently advising two Ph.D. and three M.S. thesis students. I have advised or co-advised five M.S. thesis and two M.S. non-thesis students to graduation with all seven receiving jobs after graduation. I have also advised many undergraduates through academic advising and undergraduate research, including several underrepresented minority and ROTC students through on campus programs like the Researchers Initiative Program and ALERT. I strive for my mentorship to adjust to the student and their goals as they progress through their academic career. For example, I aim to balance my own research goals with those of the student and gradually increase the expected level of independent thinking as the student progresses. Ultimately, I feel that my role as a mentor is to do what is in the best interest of the student. I was a recipient of the Engineering Council Outstanding Advisor Award in 2020, which gives me hope that I am fulfulling this role.