Statement of Teaching Philosophy — Jason Blocklove

Introduction

I love teaching electrical and computer engineering, and over my academic career I have actively sought out teaching opportunities wherever possible. During my B.S./M.S. at RIT I was the TA for five courses and helped develop materials for some of the lab courses. At NYU I continued to TA additional courses and taught a graduate course as the instructor of record. My teaching is based in a ground-up philosophy with a focus on hands-on project-based learning and real-world applications. I also aim to keep my teaching "AI-Aware," reflecting my research goals, by ensuring students not only learn the fundamentals but also how to adapt to the rapid changes in our field.

Teaching Philosophy & Relevant Experience

I believe that the goal of teaching is to prepare students for their next steps, be that research or industry, by not only teaching fundamentals but also how to approach real problems in their fields.

I employ a ground-up approach in my teaching and course design, building upon fundamentals to guide students in designing more complex systems, usually through large projects spanning parts of or whole semesters. I have found this approach helpful for students to better grasp not only the lower-level concepts they need to master, but also the engineering design process as a whole. Large designs are not built in a single step, so by progressively scaffolding around a significant project it offers students opportunities to experience a more grounded design process. This project-based strategy enables students to explore different design aspects as the project develops, fostering their agency and problem solving as engineers, all while motivating them with a specific end goal. While at RIT I developed the lab work for a course where students built up a pipelined MIPS processor while learning digital hardware design principles, culminating in a finished programmable design.

I also use these large-scale projects as a means of contextualizing the course within the broader scope of industry and research. I have been running a competition for the past four years where student teams use generative AI to insert hardware Trojans and vulnerabilities into real open-source hardware designs. This provides a real-world context for the hardware security implications of AI while also further enabling student creativity in an engineering problem. I recently submitted an extended abstract to SIGCSE, the leading CS education conference, detailing this competition and its anticipated pedagogical merits. Projects like this also help build student portfolios, demonstrating a complete understanding of the material that can be translated to real-world applications.

I have also found success in encouraging collaboration between students. As a TA I would often review portions of lectures that students struggled with. During this, I asked students with a strong grasp of the topic to explain it to those struggling; reinforcing both the understanding of the explaining student and furthering that of their classmates. This was key for my understanding of teaching accessibly, aided by students teaching their peers through perspectives that were not my own. This practice often led students to work more collaboratively on difficult topics, while not explicitly requiring it.I also adopted a method I experienced from one of my mentors at RIT. During class he would tell us to "cheat off each other," encouraging students to work together and further enabling those who understood the problem to help their neighbors gain the same understanding. Using these techniques, I earned RIT's Computer Engineering department's **Distinguished Teaching Assistant** award on two semesters, selected by my students in a department-wide poll, and as the instructor of record for the graduate-level *Intro to Hardware Security* course at NYU I received positive reviews and an **overall course evaluation score of 4.40/5**.

AI-Aware Teaching

The last four years have made it clear that LLMs will be a part of students' lives both in and out of university and has raised numerous questions about how we teach. I believe that there is a benefit

to making *strategic* use of new tools as they become available. I seek to make a clear distinction between when LLMs may or may not be used, keeping in mind how this affects students' deeper understanding of the material. Too liberal use of generative AI can quickly become a hindrance to deeper understanding, but fully disallowing its use robs students of a potentially valuable tool for both their education and their engineering process. MIT recently released a report stating that courses must become "AI-aware" and acknowledge that it will be a tool that students will continue to be exposed to, an ideal I have targeted in my courses[1].

A strategy I have employed, informed by my related research, is asking students to pose problems from their assignments in class and labs to generative AI once they have finished the work. This gives them a solid example-driven understanding of the bounds of the models, while also giving them experience with more specific engineering-focused prompting, helping them learn how to use LLMs more effectively as a tool. I have also begun relying more on asking students to explain their work during labs to verify their understanding of the design before signing off on its completion, placing emphasis on understanding the process regardless of if an LLM helped created it or not.

Mentoring & Advising

As I've progressed through my career I've become more involved with mentoring individual or small groups of students. I have mentored both undergraduate students, through a summer research program, and early-career graduate students during my time at NYU. While mentoring the undergraduate students, two each year, I found success in providing an overarching research challenge and then working with them to decompose the problem into manageable chunks with weekly goals. At our weekly check-ins I would discuss their progress, provide insight into next steps, and offer reading material to further their exploration of the topic as a whole. Both years of undergraduate mentoring resulted in the students performing a significant literature review and formulating a research problem that they could continue to pursue during their senior capstone. My mentoring of graduate students begins much the same way, but I put a larger focus on the student's research autonomy—asking them to pose initial research questions and then providing feedback and literature to help them distill out a more concrete guiding idea. I have guided one student through her thesis project for the completion of her MS, and two additional MS students during summer research programs towards beginning the research that will lead into their theses.

Teaching Interests

I am interested in teaching both undergraduate and graduate students alike. I am prepared to teach courses on digital logic/digital design at all levels, embedded systems (including the basics of microcontroller programming, real-time operating systems, and interfacing with real-world peripherals), and cybersecurity and hardware security. I am extremely interested in the ways which generative AI are impacting the courses we teach and how both coursework and expectations need to be adjusted accordingly. I am also interested in designing and teaching courses with a focus on rapid prototyping and embedded design, covering systems from the circuit level up through PCB fabrication and testing, and even post-fabrication security.

Conclusion:

With the rapid proliferation of generative AI in both the education and engineering spaces, I believe that quality teaching in engineering is becoming even more important. The new generations of engineers will need to be prepared for a rapidly shifting landscape of technology and will be dealing with problems on a scale we've not seen before, and I am excited to play a role in that. I believe that we will need to place more emphasis on how to use AI responsibly and effectively, as well as on understanding, verifying, and securing the designs created by AI and I believe I am well positioned as an educator to help students navigate these problems.

[1] `https://aiandeducation.mit.edu/report/#31-adapt-educational-processes-for-an-aiaware-world`