Teaching Statement

I am passionate about teaching physics and bring energy and enthusiasm to all of my teaching endeavors. I build my courses around evidence-based teaching practices, which I believe are essential to promoting student engagement and improving student learning. As a graduate student I served as an in-class facilitator for an introductory mechanics course for physics majors that was taught using Michaelsen's team-based-learning (TBL) curriculum. This highly-interactive setting helped make the course an inspirational teaching experience that shaped my teaching philosophy. I drew upon this experience as a graduate teaching fellow and structured my discussion sections around guided group problem-solving activities in an introductory course for engineering students. Through Duke's Preparing Future Faculty (PFF) program, I had the opportunity to work with Robert Beichner's Physics Education Research (PER) group at North Carolina State University where I learned about Beichner's innovative SCALE-UP curriculum. I also completed Duke's Certificate in College Teaching program, in which I took courses on teaching that covered a wide variety of topics including syllabus construction, visual design, classroom management, and teaching diverse audiences. As an undergraduate, I taught at a sixth-grade inquiry-based summer science camp where my students learned about energy conservation through hands-on activities.

At UH, I teach both traditional lecture and studio/inquiry-style courses, both of which heavily incorporate evidence-based teaching techniques. My lectures are built around students solving conceptual and computational clicker-style problems. Through the think-pair-share technique, these problems promote student engagement and prompt class discussions about each topic. Additionally, frequent clicker-style questions help to keep students focused, allow them to periodically check their understanding, and give me a sense of whether further coverage of a topic is needed to clear up confusion. After working example problems, I pose follow-up problems that range from completing an unfinished step in the worked example to calculating the result to a variation on the worked example. The time allocated to each problem is generally between 1 and 5 minutes, depending on the complexity of the example. During this time, TAs and I walk around the room to answer student questions and offer problem solving tips. Posing these problems allows students to ask more precise questions during class as they get stuck in various stages of a problem and helps them to pinpoint what topics they need to study more carefully. I administer in-class problems via TopHat, a software platform through which I present slides, pose a variety of question-types, and take attendance. TopHat also allows students to retry every in-class problem at home while reviewing slides and studying for exams.

My studio courses have a smaller enrollment of 72 students (compared to 200-250 students in lecture courses) and are taught in a three-hour once per week format in UH's Active Learning Classroom, a banquet-hall style room similar in design to SCALE-UP classrooms where monitors are mounted near each group of students. The three-hour format allows for most of the class to be spent on students working in groups on problem-solving tutorials and hands-on activities without as much lost transition time at the beginning and end of each class. The studio course also features five undergraduate/graduate in-class facilitators that work closely with each group of students to provide guidance on effective problem-solving skills. In addition to clicker-style questions, most of each class is dedicated to hands-on activities adapted from McDermott's *Physics by Inquiry* and tutorials that I have developed using a feature of TopHat that allows instructors to create electronic workbooks. These TopHat tutorials guide students through solving key problems and integrate text, images, video, and a wide variety of question formats that students answer both individually and in groups. Many of the tutorials incorporate interactive simulations such as those developed by the University of Colorado's PhET project. One example of these tutorials, entitled *Pressures, Depths, and Densities,* introduces students to the physics of fluids and features exercises on relevant jargon, derivations of key equations, and ultimately a calculation of the pressure of medication in a hanging IV bag. After completing these exercises, students are tasked with using PhET's *Under Pressure* simulation to determine the density of several mystery fluids and the gravitational acceleration on mystery planets provided in the simulation using the skills they developed through the tutorial.

Working with students in office hours is one of my favorite aspects of teaching. Offering highly flexible office hours throughout the week and encouraging students to reach out to me for help has allowed me to get to know many of my students and work with them in a more personal setting, which is often difficult in a large-enrollment course. Working with students in office hours has also helped me tailor course materials to better suit students' needs. For example, discussions with students moved me to add exercises to my TopHat tutorials that help students develop fluency with key physics language and ask them to reflect upon their use of problem-solving skills. Individual work with students has also taught me a great deal about their experience in the course. UH is one of the most most diverse universities in the nation. Over 40% of UH students are first-generation college students and many of my students work part-time/full-time jobs while enrolled in classes. College physics courses are often especially challenging for students with little to no high-school physics background. Many of my students have expressed to me a lack of confidence that they have the background to learn physics at the college level. Through office hours, tutorials, study-guides, and lecture, I strive to eliminate barriers to learning for students of any background. I emphasize that they should focus only on their own performance and maintain a growth mindset. I also ensure that my lectures in first-semester introductory courses never assume prior experience with physics or advanced mathematics.

When designing a curriculum, I use the backwards course design model of Wiggins and McTighe. In backwards course design, all course resources and assessments are developed to help students master a specific set of skills upon completion of the course. I am currently working with members of the undergraduate studies committee to retool the common syllabi used for the introductory course sequences at UH using backwards course design. Identifying a set of precise learning objectives will make assessments and instruction more focused and consistent from year to year. Making these learning objectives publicly available will also help make the expectations of the course clear to students which I believe is a key feature of any successful course that benefits both students and instructors. My courses incorporate a mix of conceptual questions, computational problems with simplified set-ups and context-rich problems. This allows students to practice the basics of a topic while also seeing important applications in, for example, biology and medicine. By promoting student engagement, providing numerous online resources, and emphasizing the development of problem-solving skills, I strive to establish a classroom culture that values positivity, inclusivity, and intellectual growth.

Beyond the classroom, I am also interested in communicating science with a broader audience. As an undergraduate, I co-founded an organization called Carolina Science Outreach that gave interactive science presentations to K-12 students across South Carolina. As a graduate student at Duke, I organized a series of national workshops on science communication for graduate students in STEM fields called ComSciCon in Cambridge, MA. I also co-founded ComSciCon-Triangle, a local version of the national ComSciCon workshop for graduate students in the North Carolina Research Triangle. I am still actively involved with ComSciCon at both the national level planning new events and at the local level with ComSciCon-Houston. These workshops aim to improve how science is communicated both amongst scientists and with the public and to improve the culture of STEM to be more open and inclusive. They also provide valuable professional development for graduate students.