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TEACHING STATEMENT

I have a deep interest in undergraduate and graduate education and pedagogy, with a focus on practical skills such as programming and data analysis that are invaluable but not often taught as part of a traditional science curriculum. As coding is a central component of quantitative research today, I feel strongly about providing students from all backgrounds with practical, hands-on experience and skills they need to achieve their goals.

My teaching philosophy is comprised of three central tenets:

1. **CONCEPTUAL MASTERY**: Students should gain a strong understanding of the underlying themes and concepts of the course. This enables students to build intuition as well as transfer skills and knowledge gained from the course to other areas throughout their careers.
2. **EXPERIENTIAL LEARNING**: The most effective ways to learn always involve "hands-on" experience. Students should have a variety of opportunities to directly apply the material and skills they are learning to relevant and informative problems and discuss these experiences with their peers.
3. **ACCESSIBILITY, EQUITY, AND INCLUSION**: Students should have the ability to access, pursue, and learn from these opportunities regardless of their background. The course should be structured so that students feel their unique backgrounds and identities strengthen, rather than weaken, their connection to the material. The instructor must ensure all students can work in a supportive classroom environment, can engage with the material and the instructor at multiple levels, and have access to the resources they need to succeed.

To accomplish these goals, I focus on teaching methods that foster **student engagement** with material building on a "flipped classroom" setting where students discuss and complete interactive exercises with peers. This presents a valuable framework for building frequent and "low-risk" student engagement, encouraging students to ask questions, and helping to remove possible barriers for seeking help. Frequent discussion also gives valuable opportunities for peer collaboration, which has been shown to be one of the most effective methods to learn new material. This setting also provides students with the flexibility to engage with material at different speeds and in different ways.

In many traditional courses, students are often stressed trying to complete tasks in pursuit of good grades and worried about appearing ignorant or unqualified in front of their peers and their instructor. My focus on student engagement and interactive teaching methods help to instead establish a learning environment where **students are not afraid to fail**. Activities such as small in-class group discussions, peer review of assignments, and learning games help to lower the stigma of appearing to be wrong in person. By offering clear, structured opportunities to improve assignments, projects, and other work for better grades, I also aim to reward students for reviewing material rather than discouraging them based on their past performance.

These initiatives are also important to ensure the **mental health** and wellbeing of students, especially in these turbulent times. There is a clear connection between mental health and academic success, and as an instructor my responsibility is to foster an environment where students can achieve both. Accomplishing this requires breaking down communication barriers between students and instructors. To establish a more empathetic relationship with my students, I actively emphasize my own history of struggle, failure, and eventual success related to course materials and build connections with students beyond the scope of the course. I also maintain an open-door policy and provide students with multiple options to contact me and actively encourage all other members of the teaching staff to do the same.

A central theme connecting all these initiatives together is one of **diversity, equity, and inclusion**. Courses should be explicitly designed to reward, rather than penalize, the diverse backgrounds that students bring with them to establish a positive learning environment where all students can thrive. In addition to offering a broad set of activities for students to engage with material, I also try to offer at least one longer-term project where students are given substantial autonomy to decide their project's focus. Ensuring they have the resources and support they need to pursue their interests and make these projects a success is crucial to affirming their identity both within and outside the scientific community.

As part of my teaching, I also contribute directly to pedagogy-oriented texts, open-source software packages, and online resources. In addition to being valuable learning resources for students, these also provide alternative ways to engage with students, educators, and researchers at all levels. They also help to directly build intuition around and encourage the use of responsible data analysis practices in scientific research. I aim to continue developing these resources as part of every course that I teach.

As an educator, I am always looking to learn and grow. All interactions start with believing in the students that I am privileged to work with and recognizing that they will always have a lot to teach me about being a better instructor. Living up to their expectations as well as my own will require continually tailoring my instruction to best fit their needs and working on areas where I fail to do so.

PAST EXPERIENCE

UNIVERSITY OF TORONTO

During my time as a Banting-Dunlap Postdoctoral Fellow at the University of Toronto, I have begun the process of creating several half-credit (12 instruction hours) "mini-courses" (with faculty sponsor Gwen Eadie) focusing on the interdisciplinary field of astrostatistics within the David A. Dunlap Department of Astronomy & Astrophysics (DADDAA). These will tentatively be offered beginning in the Summer 2021 term. Preliminary student feedback indicates at least 14/65 students in the DADDAA (20%) are interested in at least one of the planned course offerings.

ISEE PDP

I was selected to participate in the 2020 iteration of the Institute for Scientist & Engineer Educators (ISEE) Professional Development Program (PDP) as part of the Center for Astrophysics | Harvard & Smithsonian (CfA) team. The goal of our team during the PDP was to develop and co-lead an interactive, week-long course as part of the Astronomy Research Experience for Undergraduates (REU) program. While all in-person activities were cancelled due to the coronavirus pandemic, I was able to participate in several supplementary online programs including a workshop on "Supporting STEM Identity" as well as a reading group discussing the educational resource "Understanding by Design". These experiences improved my ability to develop interactive and inclusive curricula and understand better what actions are most important to help support students in STEM from underrepresented backgrounds.

HARVARD UNIVERSITY

During my graduate studies at Harvard from Fall 2016 to Spring 2020, I took an active leadership role in undergraduate education following these strategies. I was a Teaching Fellow (TF) for five courses during this time, including introductory and advanced undergraduate courses for astronomy majors as well as general education courses for non-majors. As part of these courses, I have gained experience leading "flipped classroom" exercises, facilitating discussions on the intersection of science, society, and social inequities, developing interactive programming exercises and data analysis workshops, helping to mentor and supervise independent student projects, and working with online tools to facilitate remote instruction.

Students have given me **overwhelmingly positive course reviews**: I have received Q-scores above 4.7 (out of 5) for all these courses.[1] My efforts have also been recognized by Harvard University with 3 **Certificates of Distinction in Teaching** from the Bok Center as well as a **Teaching Award** from the Department of Astronomy.

[1] Individual reviews for TFs were not collected in Spring 2020 due to the abrupt transition to remote instruction.

BANNEKER INSTITUTE

In addition to work inside the classroom, **I have also taught programming and statistics to undergraduates from underrepresented minorities** in Astronomy as part of the Banneker Institute over the Summer of 2017, 2018, and 2019. As part of this work, I developed a two-week intensive curriculum, designed interactive coding exercises, and (co-)led classrooms to help give students the confidence and tools they need to tackle programming in their own research. This work allowed me to become involved with efforts to improve access and outcomes for students from all backgrounds. I aim to continue involvement in similar initiatives in the future.

COURSES

TORONTO: Course Instructor

AST 3103H: An Introduction to Hierarchical Inference	*Expected Fall 2021*
AST 3102H: An Introduction to Model Selection	*Expected Summer 2021*
AST 3101H: An Introduction to Sampling Methods	*Expected Summer 2021*

HARVARD: Teaching Fellow

ASTRON 22: The Unity of Science: From the Big Bang to the Brontosaurus and Beyond	*Spring 2020*
ASTRON 191: Astrophysics Laboratory	*Spring 2019*
ASTRON 17: Galactic and Extragalactic Astronomy	*Fall 2018*
ASTRON 130: Cosmology	*Spring 2018*
ASTRON 16: Stellar and Planetary Astronomy	*Spring 2017*

BANNEKER INSTITUTE: Course Instructor (2 weeks)

Introduction to Programming in Python	*Summer 2017, 18, 19*