

My teaching philosophy integrates my research background in astronomy and statistics with a commitment to student-centred, active learning. My approach prioritises ‘hands-on learning’ to foster long-term retention of concepts. This means encouraging students to engage with real-world data, solve complex problems, and interpret results rather than just mastering technical aspects. While technical skills are a crucial foundation, my experience has shown me that students often find abstract concepts and interpreting data more challenging. Therefore, my teaching philosophy focuses on developing these abilities, providing them with a well-rounded understanding of astronomy and data science.

Student projects provide unique opportunities for ‘hands-on learning,’ enabling students to apply their classroom knowledge to real problems. My research background will help me as a project supervisor since I have extensive experience using observational data in tandem with a wide range of modern statistical and machine-learning methods to answer scientific questions. In addition, I can leverage my networks of collaborators from statistics, the Cosmostatistics-Initiative, and colleagues in PAM, and especially CoDIR, to find compelling projects. I know that differences in student personalities and initial ability levels can strongly affect the course of these projects. For this reason, I will tailor projects to individual students, discussing with them at the outset the programme’s requirements and what they want to get out of them.

Recognising the evolving nature of pedagogy, I am committed to staying informed about the latest teaching methodologies, especially strategies suitable for larger classes. This will ensure that all students, regardless of class size, will have stimulating learning experiences. I took the ‘Course in College Teaching’ at Penn State University to develop my abilities in this area. Given that Penn State Astronomy was tasked with teaching large numbers of students (occasionally hundreds in introductory sections), teaching strategies were often designed to be applicable even in large classes. I plan to take the CPAD teaching training at UH at the next availability.

Techniques I have been trained in include group work and peer assessment, which can be implemented even in large classroom settings. Group work encourages active learning and fosters soft skills like communication and leadership. It also nurtures creativity and enhances problem-solving abilities by blending diverse perspectives. Peer assessments allow students to critically evaluate and learn from others’ work, giving them practice with critical thinking and seeing other perspectives. These interactions can motivate students and improve their learning. Additional strategies included best practices for assessments (e.g., avoiding tricky wording on multiple-choice questions), adapting to mid-term student feedback, and having students use technology to answer questions during a lecture, keeping them engaged and allowing the lecturer to keep track of learning. I would be interested in working with other teaching staff to implement these in the modules I teach.

1 Classroom Teaching Experience

My most recent classroom teaching experiences include data science and statistics instruction. This past spring, I was a tutor for two tutorial sections of Data Handling and Visualisation (DHV) at UH, including an in-person section and a remote Zoom section with students from Singapore. My activities in these sessions included giving a refresher on the Python content from the week, assisting the students with the problems, and end-of-semester marking. I brought in occasional examples from my research during the tutorials, which was generally well received by the students.

In 2017 and 2018, I was invited to be a lecturer at the La Serena School for Data Science in Chile, a program organised by Caltech and several Chilean institutions, to provide PhD students and advanced undergraduates with statistics and data-science foundations for astronomy. I

taught statistical modelling, including mixture models and Gaussian processes, introduced the *R* programming language, and supervised student projects.

As a PhD student, I taught the introductory astronomy lab (Astro 11) during the 2007–2008 academic year (2 sections per semester). Teaching this module included writing the syllabus, providing short introductory lectures at the beginning of each session, supervising student work in the lab, marking, and reporting final grades. I had teaching duties during the 2008–2009 academic year (and occasionally during the rest of my time at Penn State), including marking, assisting with module logistics, and giving several guest lectures.

I also have experience with public lectures, including several public talks on astronomy at Caltech for audiences ranging from primary school children to adults. I have included audience participation in these events and tend to receive enthusiastic feedback. I also gave public talks at the UH Bayfordbury open evenings earlier this year.

2 Research Supervision Experience

I supervised three undergraduate students in research projects during the summers of 2019–2021 in Caltech’s Freshman Summer Research Institute (FSRI). FSRI is a program introducing underrepresented and underserved incoming first-year Caltech students to scientific research. In all cases, the projects begun by the students have produced papers with the student as co-author. The most recent of these students continued to work with me on this project for Caltech course credit (Ay 142) during the 2021–2022 academic year, allowing him to play a significant role in bringing this paper to fruition, including revisions during the peer-review process.

I have assisted with supervising and mentoring PhD students at the Universidad de Valparaíso and Caltech. At Caltech, I guided one student during the beginning of his project to develop a model for spectra of disks of FU Ori-type stars. I also organised the ‘Star Formation Reading Group,’ which facilitated discussions of the literature between students and more senior astronomers. At Valparaíso, I used my statistics expertise to advise a PhD student on the classification of light curves of YSOs. Recently, Phil Lucas invited me to join the supervisory team for a UH PhD student working on eruptive accretion outbursts from YSOs.