

TEACHING PHILOSOPHY

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Statement of teaching interests for the position of Assistant Professor of Physics at Texas Tech University

I am strongly committed to teaching at both undergraduate and graduate levels, and believe that personal interaction between students and research faculty greatly enhances the process of teaching and learning.

At the *undergraduate* level, my teaching philosophy is informed by my experience of working in both the UK (Cambridge University) and the US (Georgia Tech). In the UK, a small-group approach where students interact closely with researchers is integral to the teaching culture of top-ranked universities. I taught an undergraduate course “*Electrons in Solids*” that explained the fundamentals of condensed-matter physics to students majoring in Chemistry. I used the small-group setting to encourage the students to reason through concepts that were often initially unfamiliar to them, and to think critically about the material. I was able to maintain the students’ interest by drawing links between key physics concepts and chemical behavior, such as the link between the molecular orbitals (tight-binding) model familiar to chemists and the nearly-free electron theory more familiar to physicists. My experience of small-group teaching will help me to support students during question-and-answer sessions, which I would encourage with an open-door policy.

During my postdoctoral position in the US, I became aware of techniques to encourage student participation during lectures and classes, such as the use of clickers and QR codes on students’ cellphones, which allow students to answer questions and receive individual feedback on their answers. I would be keen to use these approaches when teaching existing Texas Tech physics courses such as Quantum Mechanics, Statistical Physics, Solid-State Physics, and Computation for the Physical Sciences. I would identify key learning objectives for each lecture and regularly recap these. To improve the accessibility of lectures (e.g. for students for whom English is a second language), I would provide written lecture material and support recording the lectures. I would ask for student feedback during my lecture courses, and explain to the students how their feedback will be used to improve the course.

I aim to enthuse undergraduate students about research by providing summer projects in my research group. I am currently lead academic supervisor of a 4th-year undergraduate project student, whose project involves software development as well as a fully-funded three-month placement at the Institut Laue-Langevin, an international neutron-scattering facility in Grenoble, France. By providing wide-ranging undergraduate projects such as this, I would provide undergraduate students with a broad experience of cutting-edge research, to allow them to identify areas of research that most enthuse them.

At the *graduate* level, I have given lectures at workshops and summer schools, such as the “*Polarised Neutrons for Condensed-Matter Applications*” summer school at the UK’s Rutherford Appleton Laboratory, where I explained concepts of data analysis and scattering experiments to graduate students. I would be keen to develop a lecture course on magnetism and quantum materials that combines condensed-matter theory and modelling with a focus on real materials, reflecting the interdisciplinary focus of my research. I find it highly rewarding to help and support graduate students in their development into independent researchers. I have mentored two graduate students at Cambridge University, and previously mentored three graduate students at Georgia Tech, helping them to perform experiments, analyse data, and write proposals related to their theses. I would encourage students to attend conferences and would hold weekly group meetings where they would present their progress and critique published work, allowing them to develop their presentation skills.