Statement of Teaching Experience, Goals, and Philosophy – *Tarbiyah & Ta'leem*

Ta'leem is the Arabic word used for teaching, referencing the act of leaving an impression, or mark, on something or someone. *Tarbiyah*, meaning to nurture or foster, is typically used in conjunction with *Ta'leem*. Thus, fostering students' learning entails educating by example and virtue. I grew up hearing stories from my parents, both high school teachers, about their joys of leaving positive impressions on their students, despite the challenges involved. I learned that teaching effectively depends on three factors: a comprehension of the subject; choosing the appropriate method to communicate knowledge; and the nurturing of upright values to apply knowledge properly for the public good. A teacher needs to gauge the level of understanding that students have and choose the right pedagogy to communicate ideas and knowledge. Above all, a teacher has to lead by example to leave an impression on students' learning.

I recognize that good teachers have the skill of motivating their students to pursue research with passion, commitment to truth, and integrity. Professors who foster the most nurturing research environment in their group have a way of identifying the level of hands-on management needed to keep their students motivated. In working with students in my group, I aim to foster their confidence to succeed in their academic or industry careers.

Contexts of teaching are important to account for. One needs to distinguish between teaching large classes, guiding students in a research group, and teaching on a one-on-one basis. One also needs to consider the socio-cultural aspects of students when engaging in teaching. In what follows I share my teaching experience in three different areas: teaching large tutorials, organizing weekly seminars, and student supervision and leading research projects

1. Teaching large chemistry tutorials at UWaterloo: Fostering rapport and positive learning

During my master's degree, I was one of a few graduate students teaching super-tutorials for first-year chemistry courses at the University of Waterloo with Prof. Bissonnette. These tutorials were held in a large auditorium, with up to 300 students attending a single tutorial. This required rigorous preparations to revisit the concepts introduced in the class, followed by a question and answer session.

This experience proved rewarding and exposed me to the responsibilities of a professor's teaching roles. Teaching scientific concepts to a large number of undergraduate students is a unique experience. It requires a distinct style that can evolve over time. Leading a large class allowed me to think about the most effective ways to deliver scientific materials with clarity. In one instance, I demonstrated the ideal gas law with balloons and liquid nitrogen and followed this by solving problems involving the ideal gas law. Later, I received feedback from students that the demonstration helped them understand the mathematical equation. In these tutorials my interaction with the students was crucial in several respects: It enabled me to understand students' challenges and to provide useful feedback to the professor leading the course. They also allowed me to build up pedagogic skills needed for leaving an impression on students in large groups.

2. Organizing weekly seminars at UBC: Supporting students from equity groups

In the summer/spring terms of 2020 and 2021, several undergraduate students joined the Quantum Matter Institute at University of British Columbia as part of the Quantum Pathways program. This program aims to give students from visible minority (equity) groups a chance to join a research group for a few months. To support these students engagement with research, I organized weekly seminars on crystallography and X-ray diffraction.

These seminars included six to eight students with a mixed chemistry/physics background. This small number allowed me to tailor my teaching in meaningful ways to the students' own background and past experiences. In these seminars, I found that demonstrating the symmetry of a crystal structure with pictures delivered the idea to students from a chemistry background, while matrix representations of symmetries worked best for students with a physics background. I asked the students to prepare presentations explaining the crystal structures related to

inorganic materials they worked with over the summer with the aim of connecting scientific concepts with reality. This teaching experience was rewarding and filled the gap between working with large classrooms and teaching students one-on-one. For small groups of students and one-on-one communication, developing a culture of dialogue where any questions are welcome facilitates the progression of scientific ideas in the entire group.

3. Student supervision and leading research projects

During my Ph.D. program at Kyoto University, I initiated a new project to build up new apparatuses in the group. This required me to bring in chemistry knowledge and integrate this chemistry expertise into a physics group. I was leading students from various cultural and scientific backgrounds working with me towards producing high-quality samples and understanding the physics of a material class, antiperovskite oxides. My time in Japan forced me to reflect on differences in research cultures and teaching methodologies between different countries. Throughout my academic career, I have spent time in various universities and research institutes globally with various cultures. Being aware of cultural and social differences will enable me to successfully leading an international team of researchers and students, which will help me build a world-class lab at the University of Texas that can connect with people across a wide range of cultures.

At the University of Waterloo I supervised students who continued my master's project. At the Max Planck Institute in Stuttgart I guided one physics student working on crystal growth, and helped him understand chemistry of flux growth. At University of British Columbia, I have supervised many undergraduate and graduate students working on synthesis and transport measurements, and taught synthesis techniques to many researchers at the institute outside of our group. These supervisory relationships at various universities provided me with an opportunity to guide students in the formulation of their own projects, and helped them successfully synthesize crystals, measure their physical properties, and develop a deeper understanding of the physics and chemistry of materials.

Teaching at University of California, Santa Barbara (UCSB)

At UCSB, I am already well-equipped to teach first-year undergraduate physics, chemistry, and materials. As well as, higher-level courses related to solid-state physics, thermodynamics, material science, and crystallography.

For first-year undergraduate level courses, it is important to utilize active learning strategies like flipped classrooms, group discussions, or hands-on projects to develop students' critical thinking. For higher-level courses, the focus shifts more towards project-based methods that push students to engage scientific publications. For undergraduate labs, an instructor can carefully develop activities that will help the students engage with the science and push them to think critically about scientific concepts and participate in experiments related to contemporary academic research. I plan to utilize my broad experience from different cultures to adapt to classes with different sizes and academic backgrounds. In addition, using feedback forms and in-person communication at various stages during the term can help bridge the gap between expectations of the instructors and students. For all of these courses, it is a good idea to talk with colleagues who taught these courses in the past to gauge the responsibilities and manage expectations.

In addition to teaching established courses, I am interested in developing an undergraduate course that bridges solid-state chemistry and solid-state physics that fits my unique experience doing research from chemistry and physics perspectives. Teaching offers an opportunity for growth. I will continue to explore advances in contemporary pedagogy to refine my teaching methods. Engaging students' questions broadens the scope of how we think about the subject. My goal is to support a culture among students in my group in ways that promote engaging with scientific questions at a deep level of learning. This approach informs and fosters students' experimental work towards understanding new physics in transformative ways. I approach teaching in a way that builds a nurturing environment and leaves a strong impression on students, whether in large lectures, in small groups, or when interacting with individual students. I am ready to engage in both *Tarbiyah* and *Ta'leem*.