

# Teaching Statement

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I have been fortunate in being able to teach a wide variety of courses to a wide range of students. Specifically, I have taught “International Finance” to both undergraduate business students and graduate students in an MBA program at The Ohio State University (average class size of 50 and average teacher rating of 4.4 out of 5), and I have designed and taught, along with my co-instructor Vincent Conitzer, a new computer science course entitled “Computation, Information and Learning in Market Design” for PhD students (class size of 27 and teacher rating of 4.98 out of 5). Moreover, I’ve had the privilege of leading a credited independent study in algorithmic mechanism design for an undergraduate student at UT-Austin and guiding both undergraduate and graduate research. In my experience, the fundamental aspects of a successful education experience can be distilled to three core areas: *applicability*, *accessibility*, and *availability*, or *Albert’s three “A”s*.

***Applicability:*** Students are engaged most heavily when the course material is directly applicable to the goal for which they are taking the course. However, what this looks like is context dependent. When I taught International Finance, I used a combination of case based assignments and traditional problem based homework assignments. The case work gave a concrete and memorable example of the usefulness and applicability of the course material, while the traditional homework introduced them to the skills necessary to construct good solutions to the problems put forth in the cases. Therefore, a larger, more broadly focused project, the cases, that has intrinsic meaning for business students gave meaning and interest to smaller more technical assignments, the homework. Similarly, when I taught the self-designed PhD course at Duke University, the focus was a semester long research project on a student chosen topic related to the course material. A research project intended to produce an original paper is quite different in scope than a case writeup, but the underlying effect is the same for course engagement. Specifically, the project allowed PhD students, who should be fundamentally motivated by the opportunity to explore original research questions, an ability to connect the in class material with their broader research agenda.

***Accessibility:*** While the goal is applicability, the method to reach that goal is quite dependent on the level of students in the class, and making the material accessible requires carefully observing and responding to realtime and offline feedback provided by the students. A good example of how this affected my previous teaching experience is the difference between teaching International Finance to undergraduates and MBA students. While for both classes, I used a primarily case based approach to presenting the material and evaluating their performance, for undergraduates, I also had graded homework assignments. I found that the undergraduates needed the additional practice and motivation that came from a more structured, closed-ended, graded assignment. Yet when I taught International Finance to MBA students, I used a nearly exclusively case based course, while providing more traditional homework assignments as resources, i.e. they were provided the questions and the solutions that they could refer to as needed. I found that this distinction was necessary since the MBA students, due to their extensive work experience, found more traditional homework assignments failed to keep their attention. However, they came into the class with the tools necessary to shore up their own understanding, if and when needed.

This same intuition carried over to my PhD course. However, the difficulty was within the same classroom instead of between classes. Specifically, while most students were in PhD programs, there were some advanced undergraduates and Masters students. Moreover, there was a wide range of backgrounds for the PhD students given the interdisciplinary nature of the course. This required careful balancing of providing background material to those that needed it, while concurrently mixing in new, course specific, topics to maintain engagement with students that had been exposed to the background material previously.

***Availability:*** Finally, no matter how applicable and accessible a course is for the average student, or even the student between the 5th-percentile and the 95th-percentile, no course structure will provide everything that all students need. Therefore, I have found being accessible and approachable to students to be essential in closing that final gap. For the students that find the material too challenging, an opportunity to ask questions and be presented the material in a new way, and in a setting where they do not face the judgement of their peers for lack of understanding, is an effective method to instill confidence and interest in the material. In practice, this has meant not just holding standard office hours but also being available at non-standard times, especially to accomodate students with work and family scheduling challenges. Additionally, I found that this time out of the classroom has been for more than helping struggling students, it has also provided an outlet for the really

engaged, excited students to go deeper with the material.

As a personal aside, I have found these interactions with students to be some of the most meaningful of my academic career. One particular instance was during the PhD course at Duke. There were two students working together on the course project that, while submitting a milestone halfway through the course, demonstrated that they did not understand some fundamental aspects about their project, and I was concerned about them passing the course. I invited them to come by my office and discuss the project. We began to meet regularly, and while the project was theirs alone, together we were able to sharpen the focus of the project to the point where they could make headway. The project ended up being one of the strongest in the class, and the students clearly felt a strong sense of accomplishment in their work.

## Teaching Interests and Proposed Courses

Another of the tangible benefits to my previous teaching experience is a comfort and excitement with teaching new material. My academic background did not include any international finance up to the point in which I was assigned the course. While I had a strong background in general economic principles from my PhD, and I was able to apply those to the course material, much of teaching International Finance was a learning experience for me as well. This required me to engage with new materials and to make extensive use of existing teaching resources, at least initially. However, I found that the opportunity to dive into the material with fresh eyes made me much more excited for the material, even as an instructor. When I taught the course, I was not just providing elementary principles to newcomers to the field, I was sharing my own process of discovery. Therefore, I am very open to teaching a wide range of courses, and indeed, I am eager to teach courses that may be outside of my specialty, and even my experience, for the opportunity to learn the topics myself.

Concretely, I would be very excited to teach courses on artificial intelligence, algorithms, and machine learning at both the undergraduate and graduate levels. I feel well equipped to teach both introductory courses in these topics as well as more specialized courses, such as a course on linear and convex optimization.

Additionally, I greatly enjoyed the opportunity to design and carry out a brand new course with material that was at the frontier of research. I would be excited to design and implement new courses at both the undergraduate and graduate level. Therefore, I provide proposed summaries for two new courses, one of which is based on the course I jointly designed at Duke:

- ***Computation, Information, and Learning in Mechanism Design*** This course will focus on incorporating data into the design of mechanisms. For example, suppose that an online advertising platform has data from previous bids submitted by a set of advertisers, how should the advertiser incorporate this data into future iterations of the mechanism in order to maximize revenue? The constraints considered will be both computational and informational, with a heavy focus on practical mechanism design procedures.
- ***Traffic Optimization Through Market Based Approaches*** This course will focus on optimizing the use of existing road networks through the application of tolls and other market based approaches. The coming introduction of fully autonomous vehicles will allow for fundamentally new forms of traffic optimization where the interaction between the vehicle and infrastructure leads to an ability to introduce new incentives to shift traffic either in time or space. The computational, informational, and political/social considerations of various market based approaches will be examined.