Teaching Statement

Stefan Weiergraeber

May 29, 2023

My teaching at Indiana University has focused on econometrics both at the undergraduate and the graduate level. I have been actively involved in student advising serving on 18 dissertation committees. The quality of my teaching was recognized twice by the Indiana University Trustees Teaching Award.

My approach to teaching is grounded in three principles: first, setting clear expectations regarding learning outcomes, second, integrating the discussion of abstract theoretical concepts with empirical exercises using real-world data and case studies, and third, providing regular feedback about a student's progress.

At the beginning of each semester, I make explicit the learning goals of a course. I encourage my students to think about their individual career goals, how they match with the topics of the course, and what they would like to take away from my class in order to reach their goals.

A key challenge for my undergraduate classes is that the core material is mostly abstract and mathematical. Fully understanding an econometric method typically requires several iterations of study, ideally from different perspectives. Therefore, I make sure that, whenever I discuss a topic from a formal mathematical perspective, students are able to verbalize the intuition behind the method. If we discuss a concept intuitively, I encourage interested students to formalize the idea, often in the form of extra credit assignments.

Most importantly, I am convinced that learning-by-doing is essential when studying econometrics. Therefore, empirical projects, in which students implement an econometric method using real-world data and statistical software, are an integral part of all of my courses. These assignments are based on topics that students can directly relate to. For example, I provide students with the opportunity to analyze data on consumers' shopping behavior at fast food restaurants, police shootings or pricing patterns in the used car market. Moreover, I always offer projects with heterogeneous levels of difficulty. This allows me to offer additional learning opportunities for the very best students without demotivating the weaker students.

Usually, I ask small groups of students to present their analysis in class, which often results in lively discussions not only with me but also with the students who are not actively presenting. During these presentations we also practice how to effectively communicate the essence of an empirical analysis to non-specialists, which students always appreciate as a useful skill for the job market.

Finally, I regularly take the time to check-in with my students to verify that it is clear how a specific discussion relates to the overall learning outcomes of the course and why I have them work on a certain assignment. Particularly for larger assignments, such as a semester-long empirical project, I help my students to break down seemingly daunting tasks into smaller milestones by making different parts of the project due earlier in the semester.

In my experience, this multi-faceted approach maximizes student engagement and allows me to cover most concepts multiple times and from several different angles. This provides students with the opportunity to digest the material in the way that fits their individual skill set best.

My teaching evaluations confirm that my methods are effective and most students appreciate the integrated approach that I take to teaching empirical economics. My evaluations have consistently been among the best in my department and have continuously improved over time. I was delighted to receive the *Indiana University Trustees Teaching Award* twice (in 2018 and 2022).

At the undergraduate level, I have taught courses on both classical econometrics and machine learning and data science. *Econometric Theory & Practice I (E471)* covers the mathematical foundations and applications of the linear regression model, as well as an introduction to asymptotic theory. It is targeted towards Economics majors with a strong analytical background and regularly attracts students from other departments, in particular, mathematics and statistics. Since Fall 2022, I teach a minor variation of this course as *Econometrics I (M504)*, an introductory Econometrics class for M.S. students in both Economics and Data Science.

In 2018, I co-developed the new class *Topics in Big Data (E392)*. This course combines practical coding lectures and hands-on data analysis with the study of machine learning methods, which are becoming increasingly important for the analysis of economic data.

My course is unique in that it continuously connects and compares the traditional econometrics approach, which stresses the importance of model interpretability and causal inference, to the machine learning approach, which is mostly concerned with prediction accuracy and treats the data generating process as a black box. Among others, my course design enables students to better evaluate the relative merits of either approach for a specific problem.

Moreover, I believe that integrating the discussion of machine learning methods with hands-on coding lessons is essential. In our computer lab sessions we not only implement empirical methods, but we also systematically tackle problems of data management, such as data organization, transformation, and visualization. These skills are almost never formally taught in economics classes, even though they are far from trivial and essential for conducting reliable empirical analyses.

A key goal of this class is to equip my students with the skills to work effectively in an interdisciplinary team with professional programmers, computer scientists, and management personnel to solve data analytics problems for businesses or public policy institutions.

Over the last years, I have received a lot of positive feedback about this course from both current and former students who attribute parts of their success in other projects or on the job market to material that they learned in this class. For example, a team of my former students placed within the top 5 in the 2021 *Econometrics Game*, a nation-wide competition organized by the University of Chicago for students who are interested in empirical economics.

Since Fall 2022, I offer this class also for M.S. students in both Economics and Data Science (E401 and M518). This more advanced version of the course allows me to cover additional meth-

ods that apply machine learning techniques to causal inference, for example, double/debiased machine learning, causal forests, and matrix completion methods.

At the graduate level, I regularly teach *Microeconometrics*, initiated the *Applied Micro Brownbag* seminar, and served on the dissertation committees of Ph.D. students from a variety of different fields. *Microeconometrics (E673)* is a second year Ph.D. level elective class, that I completely redesigned upon my arrival at Indiana University after it had not been offered for several years. My main goal for this class is not only to equip my students with an extensive toolkit of state-of-the-art empirical methods to analyze micro-level data, but also to provide them with a space to critically analyze recent empirical papers and to develop their own dissertation ideas.

The main topics that I cover in this class are modern methods for causal inference –for example, panel data, difference-in-differences, and regression discontinuity design– and discrete-choice models. In addition, I extensively discuss how these methods can be embedded into *structural economic modelling*. This approach stresses the importance of combining econometric techniques with economic theory models. Often, this allows us to learn much more about an economic process than what is possible with a *reduced form approach*, which relies only on data but little or no economic theory. In addition, the assignments for this class contain a significant empirical part so that students also have the opportunity to learn practical skills, such as programming and data management. Enrollment in this class has been consistently high with on average 17 students per semester.

In Spring 2019, I co-initiated an *Applied Micro Brownbag* seminar in my department. The goal of the weekly meetings is to give Ph.D. students who write their dissertation in the broad field of empirical microeconomics the opportunity to present their research progress at least once per semester, obtain feedback, and practice their presentation skills. Finally, I have served on 18 dissertation committees in diverse fields, such as industrial organization, trade, labor, and econometrics.