# BSE and BeNa Lectures on Machine Learning: An Applied Econometric Approach

The Berlin School of Economics (BSE) and the Berlin Network of Labor Market Research (BeNA) with the support of Collaborative Research Center TRR 190 Rationality and Competition gladly announce that on **September 2-4 and 4-6, 2019, Jann Spiess**, Assistant Professor from Stanford Graduate School of Business, will give **two courses on Machine Learning: An Applied Econometric Approach.**

The two lecture series, **free of charges**, overlap significantly and are not designed to be taken together. If you want to participate in one (or both) courses, please write to Juliane Metzner jmetzner@diw.de by August 20, 2019 for registration. Participation will be confirmed on a *first come first served basis*.

Berliner Netzwerk Arbeitsmarktforschung

RATIONALITY & COMPETITION CRC TRR 190

## BSE Short Course 2-4 Sept. – Overview

Machine learning has created many engineering breakthroughs from real-time voice recognition to automatic categorization (and in some cases production) of news stories. What is particularly tantalizing though is that machine learning is, at its heart, an empirical tool. Given the similarity to tools we know, it is tempting to ask whether it is merely old (econometric) wine in a new (machine learning) bottle.

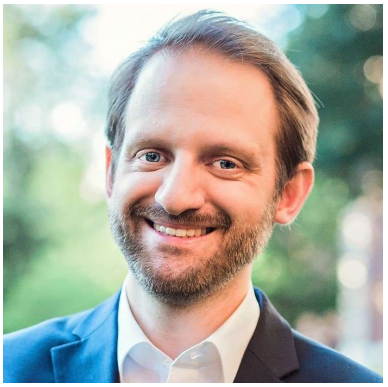
In this course, we will argue that it is not. Far from it, we will discuss how these tools can powerfully improve and expand on the kind of empirical work we tend to do. At the same time, we will discuss their limitations and how they fit into the "econometric toolbox". At a high level, this class will address these three questions:

**How does machine learning work? What can machine learning tools do that our current toolbox cannot? Where can machine learning be used to generate new research output?**

We will cover standard machine learning techniques with a focus on supervised learning (such as regularized regression and methods based on decision trees). Towards the end of the class, we will also briefly discuss some unsupervised learning techniques (e.g. clustering).

## Structure

1. The rise of machine learning
2. The secret sauce of ML
3. Prediction ($\hat{y}$) vs estimation ($\hat{\beta}$)
4. Applications in empirical work
5. Beyond supervised learning
6. Working with new data
7. Implications of the availability of machine learning
8. Transparency and fairness



## Jann Spiess

Jann Spiess is an Assistant Professor of Operations, Information & Technology at the Stanford Graduate School of Business. He received his PhD in Economics from Harvard University in 2018. His research focuses on applying machine learning in econometrics.

## BeNa Skills Camp 4-6 Sept. – Overview

The BeNa Skills Camp covers similar topics to the BSE Short Course, but it focuses more on applications of machine learning in applied microeconomics like labor, health, and education.

**Statistical packages make it trivial to implement machine learning in practice. But what makes them work? What statistical guarantees do they provide?**

**Further, where and how can machine learning be newly implemented in empirical microeconomics, specifically labor, health, and education?**

## Structure

1. Machine learning in practice
2. Theoretical guarantees of machine learning in statistical packages
3. Machine learning compared to existing tools (causal inference and regression methods)
4. Applications to health, labor and education economics
5. Computational tricks, statistical advances, and novel data sources in applied work

## Prerequisites

Graduate-level knowledge in econometrics. There will be examples and short exercises using R. If not with R, some familiarity with statistical programming (such as in Stata, Matlab, or Python) is helpful.

## Organizational Info

**Place:**
DIW Berlin
Mohrenstr. 58, 10117 Berlin

**Organizers:**
BERA
DIW Graduate Center

**Room:**
Anna J. Schwartz Room 5.2.010
5th floor

**Time:**
09:00-17:00 Exact time schedule tba

End of BSE Course: 2.30pm on Sept. 4
Start of BeNa Course: 3pm on Sept. 4

**Inquiry and Registration:**
Juliane Metzner: jmetzner@diw.de

**Inquiry on Scientific Program:**
BSE Course: Marica Valente
mvalente@diw.de

BeNa Course: Mathias Hübener
mhuebener@diw.de