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**Email:** [scunning@gmail.com](mailto:scunning@gmail.com)

**Substack:** <https://causalinf.substack.com>

**Textbook**: <https://mixtape.scunning.com>

**Twitter**: @causalinf

**Github repo:**

<https://github.com/scunning1975/CodeChella_DiD>

**Key programs (DiD – this will continue to expand):**

./programs/baker.do

./programs/baker\_cs.R

./programs/castle\_cs.R

./programs/five\_estimators\_examples.do

./programs/stacking\_castle.do

**Key subdirectory (synthetic control)**

./Texas

**Slides**

./Slides/codechella.pdf

**Assignments**

./Assignments

**Website with DiD programs in R and Stata**

<https://asjadnaqvi.github.io/DiD/>

**About the instructor:**

Scott Cunningham is a professor of economics at Baylor University in Waco Texas. He has published in top economics outlets such as *The Review of Economic Studies, Journal of Urban Economics, Journal of Human Resources, Journal of Public Economics, Journal of Development Economics* and more. He is the author of Causal Inference: the Mixtape published by Yale University Press in 2021 and co-editor of The Handbook on the Economics of Prostitution (with Manisha Shah) published by Oxford University Press in 2016. His research focus covers a range of applied topics in health and labor, including sex work, abortion, drug policy and mental healthcare. He has taught dozens of in-person and online workshops on causal inference and difference-in-differences to universities and firms across the world including Facebook, HP, University of Oxford, London School of Economics, University of Pennsylvania and many more.

**Workshop description:**

When researchers are not be able to field randomized experiments to study the causal effects of large social programs due to their size, associated costs, feasibility and ethical constraints, they often rely on natural experiments such as law changes or natural disasters. The most popular research designs for estimating the causal effects using such natural experiments are the difference-in-differences design and synthetic control estimation. Both difference-in-differences and synthetic control have evolved considerably over the last several years, both in terms of econometric theory and software implementation. This workshop will review this emerging work covering both the intuition behind the statistical models and the technical details of the models themselves using lectures, discussion and group exercises using R and/or Stata.

**Daily Structure**

This is a 3-day workshop. The goal of the workshop is for students to gain enough knowledge from the lectures and experience from the programming activities that they become confident and capable enough to implement and interpret these methods in their own work, as well as continue to learn this new material on their own after the workshop concludes. Each day lasts 8 hours with 4 hours of lecturing, 2 separate 75 minute “coding together” sessions, and the remainder are breaks and lunch. We will be strict about holding the 2.5 hours of coding and therefore may sacrifice on breaks if we are running behind.

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| **DAY ONE (8 hours total)** | | |
| 60 min | Potential outcomes review; two by two without covariates | Mixtape chapter on potential outcomes and DiD |
| 60 min | Two by two with covariates | Abadie (2005); Sant’Anna and Zhao (2020) |
| 75 min | Coding Lab | Assignment 1: NSW |
| 60 min | Bias of TWFE under differential timing | Goodman-Bacon (2021); simulation |
| 60 min | Weighted group-time aggregation: CS | Callaway and Sant’Anna (2020); |
| 75 min | Coding Lab | Assignment 2: Apply TWFE and CS to Lott and Mustard (1997) |
| 90 min | Lunch and breaks | Interspersed |

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| **DAY TWO (8 hours total)** | | |
| 60 min | Weighted group-time ATT: event studies: SA | Sun and Abraham (2020) simulation |
| 60min | Turning on and off: dCdH | De Chaisemartin and D’haultfœille (2020) |
| 75 min | Coding Lab | Assignment 3: Apply SA and DcDH to Lott and Mustard (1997) |
| 60 min | Robust efficient imputation estimators: BJS | Borusyak, et al. (2021) |
| 60 min | Stacking | Cengiz, et al. (2019); Clemens and Strain (2021) |
| 75 min | Coding Lab | Assignment 4: Apply stacking and efficient imputation to Lott and Mustard (1997) followed by presentations of differences on plotted coefficients |
| 90 min | Lunch and breaks |  |

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| **DAY THREE – Advanced synthetic control (8 hours total)** | | |
| 60 min | Synthetic control | Abadie, Diamond and Hainmueller (2010) |
| 60 min | Matrix completion with nuclear norm regularization | Athey, et al. (2021) |
| 75 min | Coding Lab | Assignment 5: Apply synthetic control to smoking and castle doctrine datasets |
| 60 min | Synthetic difference-in-differences | Athey, et al. (2021) |
| 60 min | Augmented synthetic control with staggered rollout | Rothstein et al. |
| 75 min | Coding Lab | Assignment 6: Apply MCNN, synthetic DiD and augmented synthetic control to Lott and Mustard (1997) |
| 90 min | Breaks | Interspersed |