Swiss Leading House
Economics of Education, Firm Behaviour and Training Policies

Co-Director
Prof. Dr. Uschi Backes-Gellner

Co-Director
Prof. Dr. Stefan C. Wolter

Spring Term 2021

Leading House PH.D. Course
"Randomized Experiments in Economics of Education"
- Syllabus -

INSTRUCTOR	**Prof. Eric P. Bettinger, Ph.D.,** Stanford University ebetting@stanford.edu
Workshop dates	June 21-25, 2021
Location	University of Zurich, Room tba
Preliminary Schedule	The lectures take place in the form of an intensive 5-day course. Monday, June 21: 14:00-18:00 Tuesday, June 22: 09:00-18:00 Wednesday, June 23: 09:00-18:00 Thursday, June 24: 09:00-18:00 Friday, June 25: 09:00-12:00
Module Number, ECTS	tba; 3 ECTS
Course Webpage	http://www.business.uzh.ch/professorships/emap/teaching.html

Course Description

The use of randomized experiments in education has become increasingly popular and prevalent in educational research. The US Department of Education has labeled randomized experiments as the "gold standard" in educational research. The World Bank often requires developing countries to use randomization in determining the assignment and use of new educational innovations.

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This course focuses on the methodology of randomization in educational research. We focus on questions surrounding the use of randomization. Why is randomization so compelling? What assumptions are inherent in randomized designs? What are the hidden challenges to randomization? Is randomization always the "best" empirical strategy? How does one design randomized experiments? Is clustering a problem to randomization?

The focus on the course is developing a framework for thinking about randomized experiments. This framework will form the base of subsequent methodology courses, which extend the concepts from the class. We also focus extensively on the statistical models and inherent assumptions underlying randomization. The goal is that individuals will be conversant about randomized experiments and have the basic tools to plan and to conduct randomized experiments.

READING ASSIGNMENTS

Unit 1. Framing Causal Questions and The Counterfactual

Topics:
Framework of potential outcomes and assignment mechanism
Historical Review
Are experiments the answer?

Key Readings:
Our lecture/discussion will be closely aligned with the following two articles

Morgan, Stephen L. and Christopher Winship. *Counterfactuals and Causal Inference*: *Methods and Principles for Social Research*. Chapters 1-2.

Murnane, Richard J. & Willett, John B. (2010). *Methods matter: Improving causal inference in educational and social science research:* Oxford University Press. Chapter 3.

Duflo, Esther, Rachel Glennerster and Michael Kremer (2007) "Using Randomization in Development Economics Research: A Toolkit." CEPR Working Paper 6059. http://econ-www.mit.edu/files/806 Sections 2.1 and 2.2.

Criticism of Randomized Experiments:
Deaton, Angus. "Instruments of Development: Randomization in the tropics, and the search for the elusive keys to economic development." January 2009. Princeton mimeo. We will discuss section 4.

Guido W. Imbens, 2010. "Better LATE Than Nothing: Some Comments on Deaton (2009) and Heckman and Urzua (2009)," Journal of Economic Literature, American Economic Association, vol. 48(2), pages 399-423, June.

The following papers are useful. They are somewhat repetitive with Morgan and Winship, but they are useful references that I would like you to review

Holland, P. (1986). Statistics and Causal Inference. *Journal of the American Statistical Association*, 81, 945-970. Available on JSTOR.

Rubin, D. B. (1974). Estimating Causal Effects of Treatments in Randomized and Non-randomized Studies. *Journal of Educational Psychology*, 66, 688-701.

These paper provide a useful Background on History of Random Experiment Research:
Neyman, J. (1923). On the Application of Probability Theory to Agricultural Experiments. Essay on Principles. Section 9, translated in *Statistical Science*, (with discussion), Vol 5, No 4, 465.480, 1990.

Rubin, D. B. (1990). Comment: Neyman (1923) and Causal Inference in Experiments and Observational Studies. *Statistical Science* 5, 472-480.

Cox, D. R. (1992). Causality: Some Statistical Aspects. *Journal of the Royal Statistical Society*, Series A, 155, part 2, 291.301.

Examples of Randomized Experiments:
Joshua Angrist & Eric Bettinger & Erik Bloom & Elizabeth King & Michael Kremer, 2002. "Vouchers for Private Schooling in Colombia: Evidence from a Randomized Natural Experiment," American Economic Review, American Economic Association, vol. 92(5), pages 1535-1558.

Lawrence J. Schweinhart, Jeanne Montie, Zongping Xiang, William S. Barnett, Clive R. Belfield, and Milagros Nores. *Lifetime effects: The High/Scope Perry Preschool study through age 40*. Ypsilanti: High/Scope Press, 2005.

Unit 2. The Basic Design and Inference

Topics:
What is a randomized experiment
Internal Validity
Unit of Randomization
Design Variation
Statistical Model
Verifying Randomization
Limits to Randomization

Key Readings:

Duflo, Esther, Rachel Glennerster and Michael Kremer (2007) "Using Randomization in Development Economics Research: A Toolkit." CEPR Working Paper 6059. http://econ-www.mit.edu/files/806 Section 4 and 5.

Cox, D. R. (1958). *Planning of Experiments*, New York: Wiley, chapters 1, 2 and 5. Chapter 1 will be discussed in the lecture

Meyer, Bruce. 1994 "Natural and Quasi-Experiments in Economics." NBER Working Paper: t170 (technical working paper series). An alternate version of this article is available at http://www.jstor.org/stable/1392369.

Murnane and Willett, Chapters 4 & 6.

Fisher, R. A. (1947). *The Design of Experiments*, 4th ed. New York: Hafner-Publishing.

Rubin, D. B. (1978). Bayesian inference for causal effects: The Role of Randomization. *Annals of Statistics*, 6, 34.58.

Examples of Randomized Experiments:
Miguel, Edward and Michael Kremer (2001) "Worms: Education and Health Externalities in Kenya," NBER Working Paper No. 8481.

Bettinger, Eric (2009) "Coshocton Incentive Program" Stanford U Mimeo.

Unit 3. Planning and Management

Topics:
Unit of Randomization
Blocking
Power Calculations
Attrition
Multiple-Sequential Treatment

Key Readings:
Angrist, Joshua. "Conditional Independence in Sample Selection Models," *Economics Letters*, February 1997.

Optimal Design Documentation by Spybrook et al.
http://www.wtgrantfoundation.org/resources/optimal-design
You can access both the software and documentation at this site.

Ludwig, Jens, Jeffrey R. Kling, and Sendhil Mullainathan. 2011. "Mechanism Experiments and Policy Evaluations." Journal of Economic Perspectives, 25(3): 17–38.

Murnane, Richard J. & Willett, John B. (2010). *Methods matter: Improving causal inference in educational and social science research:* Oxford University Press. Chapter 5.

Raudenbush, S. W. (2008). Designing Field Trials of Educational Innovations. In B. Schneider & S. K. McDonald (Eds.) *Scale Up in Education: Issues in Practice* 2, 23-41. New York, NY. Rowan & Littlefield.

Raudenbush, S.W., Martinez, A., & Spybrook J. (2007). Strategies for Improving Precision in Group-Randomized Experiments. *Educational Evaluation and Policy Analysis*, (29)1, 5-29.

Bloom, Howard S. "Randomizing Groups to Evaluate Place-Based Programs." In *Learning More from Social Experiments: Evolving Analytic Approaches*. Ed. Howard S. Bloom.

Scochet, Peter. "Guidlines for multiple testing in impact evaluations" http://ies.ed.gov/ncee/pdf/20084018.pdf

Examples of Randomized Experiments:
Report Cards: The Impact of Providing School and Child Test Scores on Educational Markets (with T. Andrabi, Pomona, and J.Das, DECRG World Bank). Submitted. July 2013. http://www.hks.harvard.edu/fs/akhwaja/papers/ReportCardsJuly31_2013.pdf

Krueger, Alan B., Zhu, Pei. (2004). Another Look at the New York City School Voucher Experiment. *Amercian Behavioral Scientist* 47, 658-698.

Howell, W.G., Peterson, P.E. (2004). Uses of Theory in Randomized Field Trials: Lessons from School Voucher Research on Disaggregation, Missing Data, and the Generalization of Findings. *American Behavioral Scientist* 47(5), 634-657.

Peterson, P.E., Howell, W.G. (2004). Efficiency, Bias, and Classification Schemes: A Response to Alan B. Krueger and Pei Zhu. *American Behavioral Scientist* 47(5), 699-717.

Unit 4. Interpretation of Treatment Effects

Topics:
Compliance
Treatment on the Treated
Average Treatment Effects
Intention to Treat
External Validity
Alternative Interpretations including General Equilibrium, Hawthorne and John Henry Effects
Inference
Heterogeneous Treatment Effects

Key Readings:

Morgan, Stephen L. and Christopher Winship. *Counterfactuals and Causal Inference*: *Methods and Principles for Social Research*. Chapter 2. SUTVA Discussion

Duflo, Esther, Rachel Glennerster and Michael Kremer (2007) "Using Randomization in Development Economics Research: A Toolkit." CEPR Working Paper 6059. http://econ-www.mit.edu/files/806 Sections 6 and 8.

Levitt, Steven and John List, " Was There Really a Hawthorne Effect at the Hawthorne Plant?" NBER working paper number 15016.

Heckman and Smith. Assessing the Case for Social Experiments. Journal of Economic Perspectives. Spring 1995.

Card, David, Stefano DellaVigna, and Ulrike Malmendier. 2011. "The Role of Theory in Field Experiments." Journal of Economic Perspectives, 25(3): 39–62. For discussion on 11/14

Heckman, James J., Randomization as an Instrumental Variable (September 1, 1995). NBER Working Paper No. T0184.

Examples of Randomized Experiments:

Alan B. Krueger, 2003. "**Economic Considerations and Class Size**," Economic Journal, Royal Economic Society, vol. 113(485), pages F34-F63, February

Weili Ding & Steven Lehrer, 2005. "Class Size and Student Achievement: Experimental Estimates of Who Benefits and Who Loses from Reductions," Working Papers 1046, Queen's University, Department of Economics.

Unit 5. Practical Considerations in Random Experiments

Topics:

Ethical Considerations
Political Considerations
Capacity for Error
Timing
Costs
"Bad" Randomization

Key Readings:

Bettinger, Eric. "Evaluating Educational Interventions in Developing Countries." In *Educating All Children: A Global Agenda*. On Course Website.

Kremer, Michael, "Expanding Educational Opportunity on a Budget." In *Educating All Children: A Global Agenda*. On Course Website.

Schulz, Kenneth, Iain Chalmers, Richard Hayes, Doug Altman, "Empirical Evidence of Bias Dimensions of Mehtodological Quality Associated with Estimates of Treatment Effects in Controlled Trials" *JAMA* 1995:273(5): 408-412.

Lumley, Judith and Hilda Bastian. "Competing or Complementary? Ethical Considerations and the Quality of Randomized Trials." *International Journal of Technology Assessment in Health Care* 1996.

Gueron, Judith, "The politics of random assignment: implementing studies and impacting policy." *Journal of Children's Services 3(*1): 14-26.

Banerjee, Abhijit V., and Esther Duflo. 2010. "Giving Credit Where It Is Due." Journal of Economic Perspectives, 24(3): 61–80. For discussion on 12/3.

Pritchett, Lant. "It pays to be Ignorant: A Simple Political Economy of Rigorous Program Evaluation." *Policy Reform 5*(4): 251-269.

Broman, Geoffrey D. , Robert E. Slavin, Alan Cheung, Anne M. Chamberlain, Nancy A. Madden, and Bette Chamber. "Success for All: First-Year Results From the National Randomized Field Trial"

Target audience and preconditions for participation

The course is particularly designed for doctoral students in the course programme on economics of education of the Swiss Leading House. Doctoral students in economics or business economics with a strong interest in randomized experiments are welcome as well. The seminar will take place en bloc in order to enable external Ph.D. students to attend.

Credit Requirements and Grading

1. Full course attendance. Students are expected to come prepared to class. It will facilitate discussion and improve overall learning.
2. Presentation in class
3. At the end of the course students will be asked to complete a take-home exam which is to be handed in 2 weeks after the end of the course. The work is to be done individually.

Application

The number of participants is limited. Please send your application including a short CV to Fabienne Kiener (fabienne.kiener@business.uzh.ch) at the latest by **April 23, 2021**. UZH students who need to know whether they are accepted for the course before the end of the official booking deadline have to apply until March 5, 2021. For further details and questions please contact Fabienne Kiener.

WWF Statutory Course Policies

According to WWF study regulations, all exam dates are final as published in the VVZ and syllabus. This means that the final exam date is not negotiable. It will not be possible to take any exams on different dates.
Academic dishonesty in any form will not be tolerated. Anyone caught cheating or engaging in unethical behavior will be reported to the Dean's office according to the guidelines on academic dishonesty set forth by the University of Zurich.
The information in this syllabus supports the official information in the electronic university registration tool (VVZ – Vorlesungsverzeichnis). In cases of doubt, the official information at the VVZ is decisive.
For UZH students: Don't forget to officially register using the registration tool of the University of Zurich.