Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

FACULTY
OF BUSINESS ADMINISTRATION

PhD Course

Statistical Significance, Impact, and Relevance

LECTURER	Prof. Dr. Dr. h.c. Sönke Albers
TIME, PLACE	3 full days: 17-19Sep2024, 09h00 – 16h30 UHH, Moorweidenstr. 18, room 0029
CREDIT POINTS	5 credit points in the Graduate Program at the Faculty of Business Administration: in "methods".
REGISTRATION	directly by email to Soenke.albers@klu.org and via STiNE. For questions regarding course content, please contact soenke.albers@klu.org; phone: +49 151 52702547
REGISTRATION PROCEDURE	"Participants should register until July 1, 2024 and provide a ranking of their three most preferred topics for preparing a presentation. Please send this ranking to my email address. I will then assign participants to topics giving priority to those who registered early. After assignment, I want to provide in a short 1-to-1 Zoom meeting more specific information for the respective topic for a better understanding. A date for this Zoom meeting will be individually agreed upon by email. If not all of the 12 topics are assigned until July 15, I will accept later registrations on a first-come-first served basis. If there are less than 8 registrations until July 31, the course will not take place."
ASSESSMENT	* presentation (max. 45 min.) * Contributions in discussions * Two-page paper on how to make use of the course content.
NUMBER OF PARTICIPANTS	maximum of 12, one for each topic
COURSE LANGUAGE	English

OBJECTIVES

In this course participants will get a basic understanding of how different goals of empirical research are realized and what kind of results can be achieved. The course is interactive with participating doctoral students presenting certain topics that are discussed intensively afterwards.

REMARKS WITH RESPECT TO REFERENCES

The references mentioned below should serve as a starting point. As you will only submit slides (no text), please make sure that you clearly indicate on each slide to which reference you refer. Please provide the full information of each reference on each slide.

CONTENT

Day 1 = 17Sep2024:

09h00 – 10h30	1. What do we want to know (what is=facts; whether there is a relationship, why is there a relationship=theory; impact of relationship)
10h45 – 12h15	2. Inductive research (case study) versus deductive research (theory testing)
13h15 – 14h45	3. Experiments, pre-registration, difference-in-difference
15h00 – 16h30	4. What can be concluded from statistical significance?

Day 2 = 18Sep2024:

09h00 – 10h30	5. Threats of true results and robustness checks (e. g., sampling; control variables; nonlinearity)
10h45 – 12h15	6. Endogeneity
13h15 – 14h45	7. Specification curve
15h00 – 16h30	8. Impact Measures of Variables in Machine Learning

Day 3 = 19Sep2024:

09h00 – 10h30	9. Replications
10h45 – 12h15	10. Meta-analyses and effect size measures
13h15 – 14h45	11. Relevance for Science and Practice
15h00 – 16h30	12. Open Science

REQUIRED PRE-READINGS

1. What do we want to know
(what is=facts; whether there is a relationship, why is there a relationship=theory; impact of relationship)

- Eisend, Martin and Alfred Kuss (2019): *Research Methodology in Marketing. Theory Development, Empirical Approaches and Philosophy of Science Considerations*, Springer
- Golder, P. N., Dekimpe, M. G., An, J. T., van Heerde, H. J., Kim, D. S., & Alba, J. W. (2023). Learning from data: An empirics-first approach to relevant knowledge generation. *Journal of Marketing*, 87(3), 319-336.
- Glaser, Barney G., and Anselm L. Strauss (1967). "*The discovery of grounded theory: strategies for qualitative research (grounded theory)*." Taylor & Francis eBooks DRM Free Collection.
- Sutton, Robert I. and Barry M. Staw (1995): What theory is not, *Administrative Science Quarterly*, 40 (3): 371-384.
- Weick, Karl E. (1989): Theory Construction as Disciplined Imagination, *Academy of Management Review*, 14 (4): 516-531.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2013). *Applied multiple regression/correlation analysis for the behavioral sciences*. Routledge.

2. Inductive research (case study) **versus deductive research** (theory testing)

- Eisend, Martin and Alfred Kuss (2019): *Research Methodology in Marketing. Theory Development, Empirical Approaches and Philosophy of Science Considerations*, Springer
- Eisenhardt Kathleen M., Graebner Melissa E. (2007): Theory building from cases: opportunities and challenges, *Academy of Management Journal*, 50 (1): 25–32.
- Locke, E. A. (2007). The case for inductive theory building. Journal of Management, 33(6), 867-890.
- Tsang, Eric W. K. and John N. Williams (2012): Generalization and Induction: Misconceptions, Clarifications, and a Classification of Induction, *MIS Quarterly*, 36 (3): 729-748
- Colquitt, Jason A., and Cindy P. Zapata-Phelan (2007). "Trends in theory building and theory testing: A five-decade study of the Academy of Management Journal." *Academy of management journal* 50.6: 1281-1303.

3. Experiments, pre-registration, difference-in-difference

- Campbell, Donald T. and Julian C. Stanley (1963): *Experimental and Quasi-Experimental Experimentation in Research*, Houghton Mifflin, Boston et al.
- Cook, Thomas D., Donald Thomas Campbell, and William Shadish (2002): *Experimental and quasi-experimental designs for generalized causal inference*, Boston, MA: Houghton Mifflin
- **Gneezy, Ayelet (2017): Field experimentation in marketing research, *Journal of Marketing Research*, 54 (1): 140-143.

- Pearl, Judea (2009): Causal inference in statistics: An overview, *Statistics surveys* 3: 96-146.
- Winer, Russell S. (1999): Experimentation in the 21st Century: The Importance of External Validity, *Journal of the Academy of Marketing Science*, 27 (3): 349-358.
- *(Pre-registration)*
- Gonzales, Joseph E., and Corbin A. Cunningham (2015): The promise of pre-registration in psychological research, *Psychological Science Agenda*, 29 (8).
- van't Veer, Anna Elisabeth, and Roger Giner-Sorolla (2016): "Pre-registration in social psychology—A discussion and suggested template." *Journal of Experimental Social Psychology* 67 (2016): 2-12.
- https://aspredicted.org/
- http://www.cogsci.nl/blog/miscellaneous/215-the-pros-and-cons-of-pre-registration-in-fundamental-research
- Card, David and Alan B. Krueger (1994): Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania, *American Economic Review*, 84, (4), 772-793
- Roth, J., Sant'Anna, P. H., Bilinski, A., & Poe, J. (2023). What's trending in difference-in-differences? A synthesis of the recent econometrics literature. *Journal of Econometrics*, 235, 2218-2244.

4. What can be concluded from statistical significance?

- Amrhein, Valentin, Sander Greenland, Blake McShane (2019) and more than 800 signatories: Retire statistical significance, *Nature*, 567: 305-307.
- Sawyer, Alan G. and J. Paul Peter (1983): The Significance of Statistical Significance Tests in Marketing Research, *Journal of Marketing Research*, 20 (2): 122-133.
- Hubbard and Armstrong (2006) – Why We Don't Really Know What "Statistical Significance" Means: A Major Educational Failure, *Journal of Marketing Education*, 28 (2): 114-120.
- Hubbard, Raymond and R. Murray Lindsay (2013): The significant difference paradigm promotes bad science, *Journal of Business Research*, 66 (9): 1393-1397.
- Hubbard, Raymond and R. Murray Lindsay (2013): From significant difference to significant sameness: Proposing a paradigm shift in business research, *Journal of Business Research*, 66 (9): 1377-1388.
- Roberts, Seth, and Harold Pashler (2000): How persuasive is a good fit? A comment on theory testing, *Psychological Review*, 107: 358-367.
- McShane, B. B., Bradlow, E. T., Lynch, J. G., & Meyer, R. J. (2023): EXPRESS: "Statistical Significance" and Statistical Reporting: Moving Beyond Binary. *Journal of Marketing*, 00222429231216910.

5. Threats of true results and robustness checks (e.g., sampling; control variables; nonlinearity)

- Castle, Jennifer L., Jurgen A. Doornik, and David F. Hendry (2021). "Robust discovery of regression models." *Econometrics and Statistics* 26, 31-51.
- Papies, Dominik, Peter Ebbes, and Elea McDonnell Feit (2022). "Endogeneity and causal inference in marketing." Available at *SSRN* 4091717.
- Panzeri, Stefano, Cesare Magri, and Ludovico Carraro (2008). "Sampling bias." *Scholarpedia* 3.9: 4258.
- Li, Mingxiang (2021). "Uses and abuses of statistical control variables: Ruling out or creating alternative explanations?." *Journal of Business Research* 126: 472-488.
- Wooldridge, Jeffrey M. *Econometric analysis of cross section and panel data*. MIT press, 2010.

6. Endogeneity

- Rossi, Peter E. (2014). "Even the rich can make themselves poor: A critical examination of IV methods in marketing applications." *Marketing Science* 33.5: 655-672.
- Papies, Dominik, Peter Ebbes, and Elea McDonnell Feit (2022). "Endogeneity and causal inference in marketing." Available at *SSRN* 4091717.
- Ebbes, Peter, Dominik Papies, and Harald J. van Heerde (2021). "Dealing with endogeneity: A nontechnical guide for marketing researchers." *Handbook of market research*. Cham: Springer International Publishing, 181-217.

7. Specification Curve

- Leamer, E. E. (1983). Let's Take the Con Out of Econometrics. *American Economic Review*, 73(1), 31–43.
- Simmons, Joseph P., Leif D. Nelson, and Uri Simonsohn (2011): False-Positive Psychology: Undisclosed Flexibility in Data Collection and Analysis Allows Presenting Anything as Significant, *Psychological Science*, XX, 1-8
- Steegen, S., Tuerlinckx, F., Gelman, A., & Vanpaemel, W. (2016). Increasing Transparency Through a Multiverse Analysis. *Perspectives on Psychological Science*, 11(5), 702–712.
- Young, C., & Holsteen, K. (2017). Model Uncertainty and Robustness: A Computational Framework for Multimodel Analysis. *Sociological Methods & Research*, 46(1), 3–40.
- Simonsohn, Uri, Joseph P. Simmons, and Leif D. Nelson (2020). "Specification curve analysis." *Nature Human Behaviour*, 4.11, 1208-1214.

8. Impact Measures of Variables in Machine Learning

- Du, Mengnan, Ninghao Liu, and Xia Hu. "Techniques for interpretable machine learning." Communications of the ACM 63.1 (2019): 68-77.
- Carvalho, Diogo V., Eduardo M. Pereira, and Jaime S. Cardoso. "Machine learning interpretability: A survey on methods and metrics." Electronics 8.8 (2019): 832.

- Rudin, C., Chen, C., Chen, Z., Huang, H., Semenova, L., & Zhong, C. (2022). Interpretable machine learning: Fundamental principles and 10 grand challenges. Statistic Surveys, 16, 1-85.
- Molnar, Christoph, Giuseppe Casalicchio, and Bernd Bischl. "Interpretable machine learning–a brief history, state-of-the-art and challenges." Joint European conference on machine learning and knowledge discovery in databases. Cham: Springer International Publishing, 2020, also on ArXiv
- Murdoch, W. J., Singh, C., Kumbier, K., Abbasi-Asl, R., & Yu, B. (2019). Definitions, methods, and applications in interpretable machine learning. Proceedings of the National Academy of Sciences, 116(44), 22071-22080.
- Inglis, Alan, Andrew Parnell, and Catherine B. Hurley. "Visualizing variable importance and variable interaction effects in machine learning models." Journal of Computational and Graphical Statistics 31.3 (2022): 766-778.

9. Replications

- Bettis, Richard A., Helfat, Constance E., & Shaver, J. Myles (2016). The necessity, logic, and forms of replication. Strategic Management Journal, 37(11), 2193-2203.
- Evanschitzky, Heiner, Carsten Baumgarth, Raymond Hubbard, and J. Scott Armstrong (2007): Replication research's disturbing trend, *Journal of Business Research*, 60 (4), 411–415
- McCullough, B.D., Kerry Anne McGeary, and Teresa D. Harrison (2008): Do economics journal archives promote replicable research?, *Canadian Journal of Economics*, 41 (4), 1406-1420
- Aguinis, Herman, Wayne F. Cascio, and Ravi S. Ramani (2017): Science's reproducibility and replicability crisis: International business is not immune, *Journal of International Business Studies*, 48 (6), 653-663.

10. Meta-Analysis and effect-size measures

- Geyskens, Inge, Rekha Krishnan, Jan-Benedict E. M. Steenkamp and Paulo V. Cunha (2009): A Review and Evaluation of Meta-Analysis Practices in Management Research, *Journal of Management*, 35 (2): 393-419.
- Grewal, Dhruv, Nancy Puccinelli, and Kent B. Monroe (2018). "Meta-analysis: integrating accumulated knowledge." *Journal of the Academy of Marketing Science* 46: 9-30.
- Albers, Sönke, Murali K. Mantrala and Shrihari Sridhar (2010): A Meta-Analysis of Personal Selling Elasticities, *Journal of Marketing Research*, 47 (October): 840–853.
- Rosenthal, R. and M. R. DiMatteo (2001): META-ANALYSIS: Recent Developments in Quantitative Methods for Literature Reviews, *Annual Review of Psychology*, 52:59–82

11. Relevance for Science and Practice
(Rigor versus relevance)

- Reibstein, David J., George Day, and Jerry Wind (2009): Guest Editorial: Is Marketing Academia Losing Its Way?, *Journal of Marketing*, 73 (4): 1-3.

- Lehmann, Donald R., Leigh McAlister, and Richard Staelin (2011): Sophistication in Research in Marketing, *Journal of Marketing*, 75 (4): 155-65.
- Jaworski, Bernard J. (2011): On Managerial Relevance, *Journal of Marketing*, 75 (4): 211-24.
- Wolf, Joachim and Timo Rosenberg (2012): How Individual Scholars Can Reduce the Rigor-Relevance Gap in Management Research, *BuR - Business Research*, 5 (2): 178-196.
- Deighton, John A., Carl F. Mela, and Christine Moorman (2021). "Marketing thinking and doing." *Journal of Marketing* 85.1: 1-6.
- Varadarajan, Rajan (2020). "Relevance, rigor and impact of scholarly research in marketing, state of the discipline and outlook." *AMS Review* 10: 199-205.

12. Open Science

- Andreoli-Versbach, Patrick and Frank Mueller-Langer (2014): Open access to data: An ideal professed but not practised, *Research Policy*, 43 (9), 1621-33.
- Open Science Collaboration, Nosek, Brian A., Aarts, Alexander A., Anderson, Christopher J., Anderson, Joanna E. and Kappes, Heather Barry, (2015): Estimating the reproducibility of psychological science. Science, 349 (6251).
- Tatiana Perrino, George Howe, Anne Sperling, William Beardslee, Irwin Sandler, David Shern, Hilda Pantin, Sheila Kaupert, Nicole Cano, Gracelyn Cruden, Frank Bandiera, and C. Hendricks Brown (2013): Advancing Science Through Collaborative Data Sharing and Synthesis, *Perspectives on Psychological Science*, 8 (4): 433-444.
- Nosek, Brian A., George Alter, George C. Banks, Denny Borsboom, Sara D. Bowman, Steven J. Breckler, Stuart Buck et al. (2015): Promoting an open research culture. *Science* 348 (6242), 1422-1425.
- Armeni, Kristijan, Loek Brinkman, Rickard Carlsson, Anita Eerland, Rianne Fijten, Robin Fondberg, Vera E. Heininga et al. (2021): Towards wide-scale adoption of open science practices: The role of open science communities. *Science and Public Policy*, 48 (5), 605-611.
- Banks, George C., James G. Field, Frederick L. Oswald, Ernest H. O'Boyle, Ronald S. Landis, Deborah E. Rupp, and Steven G. Rogelberg (2019): Answers to 18 questions about open science practices. *Journal of Business and Psychology,* 34 (3): 257-270.
- Aguinis, H., Banks, G. C., Rogelberg, S. G., & Cascio, W. F. (2020). Actionable recommendations for narrowing the science-practice gap in open science. Organizational Behavior and Human Decision Processes, 158, 27-35.
- Langham-Putrow, Allison, Caitlin Bakker, and Amy Riegelman. "Is the open access citation advantage real? A systematic review of the citation of open access and subscription-based articles." PloS one 16.6 (2021): e0253129.
- Rosman, T., Bosnjak, M., Silber, H., Koßmann, J., & Heycke, T. (2022). Open science and public trust in science: Results from two studies. Public Understanding of Science, 31(8), 1046-1062.
- Moreau, David, and Beau Gamble. "Conducting a meta-analysis in the age of open science: Tools, tips, and practical recommendations." Psychological Methods 27.3 (2022): 426.