Discipline: Quantitative Methods/Innovation/Entrepreneurship

1. Language / Sprache

English

2. Title / Titel

Designing quantitative Innovation & Entrepreneurship Research

3. Lecturer / Referent

Prof. Dr. Tim Schweisfurth (Hamburg University of Technology)

4. Date and Location / Zeitraum und Veranstaltungsort

Di 16.02.27 – Fr 19.02.27

Digital Hub Logistics & Commerce
Am Sandtorkai 32
20457 Hamburg

5. Course Description / Kursbeschreibung

5.1 Abstract and Learning Objectives / Zusammenfassung und Lernziele

This course provides doctoral students with a structured introduction to designing and conducting quantitative research in innovation and entrepreneurship (I&E). Innovation and entrepreneurship phenomena—such as digital innovation, new venture creation, technology commercialization, and idea generation—are dynamic, complex, and often difficult to measure. As a result, rigorous empirical designs are essential but uniquely challenging.

The course equips participants with theoretical, methodological, and practical tools to develop high-quality quantitative research projects in these domains. Participants learn how to move from an early-stage research idea to a coherent research design, how to operationalize key constructs in I&E contexts, and how to select appropriate empirical strategies. Special emphasis is placed on understanding methodological standards in leading innovation, management, and entrepreneurship journals.

Through lectures, discussions, and hands-on exercises, participants deepen their understanding of how to design robust empirical studies, identify credible sources of variation, handle common empirical challenges, and critically evaluate existing quantitative I&E research.

After completing this course, participants will be able to:

- Develop theoretically grounded research questions in innovation and entrepreneurship and articulate why they matter for academic and practical relevance.

- Translate conceptual ideas into testable hypotheses and structure them within a coherent quantitative research design.
- Select and justify appropriate empirical methods commonly used in innovation and entrepreneurship research (e.g., surveys, experiments, archival data, mixed data sources).
- Operationalize key constructs in I&E contexts and understand the challenges of measurement, construct validity, and data quality.
- Identify credible identification strategies and evaluate potential threats to causal inference in entrepreneurial or innovation-driven settings.
- Critically assess empirical I&E studies, including theory development, research design, data, and analytical strategy.
- Develop and present a refined empirical research proposal, aligned with their doctoral project and meeting the standards of leading journals in the field.

5.2 Content / Kursinhalt

- Foundations of quantitative inquiry
- Theory development, reasoning, and research questions
- Causal reasoning and research design choices
- Measurement, model logic, and key identification strategies
- Transparency, robustness, and best research practices
- Integrity, writing, and publication in quantitative I&E research

5.3 Schedule (including start and end time / Zeitplan (inkl. Start- und Endzeit)

Day 1 – Foundations of Quantitative Inquiry (10:00–17:00)
10:00–11:30 Session 1: What is Quantitative Research?
Nature and scope of quantitative I&E research; epistemological assumptions underlying statistical inference; modes of scientific reasoning (deductive, inductive, abductive); singular vs. general statements.
11:30–11:45 Coffee break
11:45–13:00 Session 2: Research Designs
Unit of analysis (individuals, groups, organizations, interactions, social artifacts); micro vs. macro-level research and their different assumptions; cross-sectional vs. longitudinal designs and implications for causal inference.
13:00–14:00 Lunch break
14:00–15:30 Session 3: Theory Building
What a theory is and what it is not; laws, models, propositions, and hypotheses; components of a theory; criteria for formulating and judging scientific hypotheses; non-falsifiable hypotheses and tautologies.
15:30–15:45 Coffee break
15:45–17:00 Session 4: Research Questions and Contributions
From a research idea to a testable model; types of empirical contributions in quantitative I&E research; formulating strong research questions; brief round of participant research idea introductions (2–3 min each).

Day 2 – Causality, Moderation, Mediation & DAGs (09:00–17:00)
09:00–10:30 Session 1: Correlation and Causation
What distinguishes causation from correlation; three conditions for establishing causality (association, direction, non-spuriousness); spurious correlations; reverse causality.
10:30–10:45 Coffee break
10:45–12:00 Session 2: Moderation and Mediation
Roles of variables in models and theories; formulating and graphically interpreting moderated and mediated hypotheses; non-linear interactions; mediated moderation; boxes-and-arrows diagrams and their regression equivalents.
12:00–13:00 Lunch break
13:00–14:30 Session 3: DAGs I
Introduction to Directed Acyclic Graphs; representing causal assumptions visually; confounders, mediators, and colliders; the backdoor criterion; diagnosing endogeneity with DAGs.
14:30–14:45 Coffee break
14:45–16:00 Session 4: DAGs II and Research Design Options
Using DAGs to select and justify identification strategies; overview of research design options in I&E — field data, natural experiments, lab and online experiments, quasi-experiments; trade-offs between internal and external validity.
16:00–17:00 Session 5: Endogeneity and Identification
Data-generating process thinking; sources of endogeneity (selection bias, omitted variable bias, reverse causality); preview of identification strategies to be presented on Day 3.

Day 3 – Measurement, Empirical Strategies & Participant Presentations (09:00–17:00)
09:00–10:30 Session 1: Measurement and Scaling
Levels of measurement; formative vs. reflective constructs; reliability; types of validity.
10:30–10:45 Coffee break
10:45–12:00 Session 2: Experiments and Common Method Bias
Lab vs. field experiments; internal and external validity; dealing with confounding variables; common method bias — sources and remedies (unmeasured latent factor, marker variable technique).
12:00–13:00 Lunch break
13:00–14:30 Session 3: Participant Presentations – Identification Strategies I
Fixed Effects and Instrumental Variables. Each assigned participant presents their method; instructor deepens and critically discusses real I&E applications after each presentation.
14:30–14:45 Coffee break
14:45–16:00 Session 4: Participant Presentations – Identification Strategies II
Difference-in-Differences, Regression Discontinuity Design, Matching, and Synthetic Control. Each assigned participant presents their method; instructor deepens and critically discusses after each presentation.
16:00–17:00 Session 5: Research Design Pitches – Part I
First half of participants present their own quantitative research design (research question, constructs, DAG, causal assumptions, and planned identification strategy); structured peer and instructor feedback.

Day 4 – Integrity, Writing, Publication & Pitches (09:00–16:00)
09:00–10:30 Session 1: Research Integrity and Transparency
Research ethics and integrity; transparency, pre-registration, and reproducibility; questionable research practices and how to avoid them; open science standards; the importance of documentation across the research process.

10:30–10:45 Coffee break
10:45–12:00 Session 2: Writing and Positioning Quantitative Papers
Structure and argumentation of empirical papers; framing contribution claims; anatomy of deductive, inductive, and abductive papers; writing for reviewers and editors; what top I&E journals currently value.
12:00–13:00 Lunch break
13:00–13:45 Session 3: Publication Strategies
Publication landscape in leading I&E journals; trends in quantitative methods; navigating the review process; evaluating and strengthening contribution claims; recommended books and resources.
13:45–14:00 Coffee break
14:00–16:00 Session 4: Research Design Pitches – Part II
Second half of participants present their own quantitative research design; structured peer and instructor feedback; closing reflections on individual projects and next steps.

5.4 Course format / Kursformat

The course is highly interactive and combines short lectures, guided discussions, and hands-on methodological exercises. Throughout the sessions, the instructor draws on experience as an author, reviewer, and editor in quantitative innovation and entrepreneurship research to illustrate how rigorous empirical studies are designed, executed, and published. Participants are expected to engage actively in discussions, bring in their own research ideas, and critically reflect on methodological choices. Several sessions include practical activities—such as developing research questions, assessing identification strategies, or evaluating exemplary studies—to support the direct application of course concepts. Dedicated time is provided for participants to present their emerging research designs, receive feedback, and discuss challenges related to empirical rigor, transparency, and publication.

6. Preparation and Literature / Vorbereitung und Literaturhinweise

6.1 Prerequisites / Voraussetzungen

Participants should have a strong interest in conducting rigorous quantitative research in innovation and entrepreneurship, and ideally have an emerging research idea or early-stage project they want to develop. The course is aimed at doctoral students who are at the beginning or in the middle of their PhD studies and who wish to strengthen their methodological foundation and empirical research design skills.

6.2 Essential Reading Material / Pflichtlektüre

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6.3 Additional Reading Material / zusätzliche Lektüre

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6.4 To prepare / Vorarbeiten

- Read the essential methodological and empirical materials assigned for the course.
- Prepare your Presentation of a Causal Inference Method (see 7.2).
- Prepare your research design pitch (see 7.2).

7. Administration

7.1 Max. number of participants / Maximale Teilnehmerzahl

20 participants / 20 Teilnehmer*innen

7.2 Assignments / Aufgaben

To successfully complete this course, participants must fulfill all of the following components:

- Active Participation: Participants are expected to actively contribute to discussions, group work, methodological exercises, and feedback sessions throughout the course. Continuous engagement with course materials and constructive participation are required.
- Prepared Presentation of a Causal Inference Method: Each participant prepares and delivers a short presentation on one causal inference method relevant for quantitative innovation and entrepreneurship research. Methods include, for example: IV, DiD, RDD, Matching, Synthetic Control, etc.. Assignments will be communicated before the course.
- Research Design Pitch: Instead of a written proposal, participants prepare a short pitch-style presentation outlining their own quantitative research design. This will be discussed in class.

7.3 Exam / Prüfungsleistung

The exam consists of the graded components described in Section 7.2. The final grade is calculated based on:

- Active Participation – 30%
- Presentation of a Causal Inference Method – 30%
- Research Design Pitch – 40%

All components must be completed to pass the course. The exam format emphasizes practical methodological competence, critical reflection on empirical strategies, and the ability to design and communicate a rigorous quantitative research project.

7.4 Credits / Punkte

Der Kurs entspricht einem Umfang von 6 LP/ECTS / The course corresponds to a scope of 6 LP/ECTS

8. Arbeitszeitaufwand / Working Hours

Aufteilung der Arbeitsstunden / Working Hours	Stunden
Essential reading and preparation of course materials: 40 h	40
Preparation of causal inference method presentation: 30 h	30
Preparation of research design pitch: 80 h	80
Active participation in course sessions (lectures, discussions, peer feedback): 30 h	30
SUMME	**180 h**