
MODELLING FOR BUSINESS RESEARCH

Period: a.y. 2026/27 – II sem. I term

Class times: TBD.

Prof. Arnaldo Camuffo

Dept. of Mgmt. & Tech.

arnaldo.camuffo@unibocconi.it

Prof. Andrea Fosfuri

Dept. of Mgmt. & Tech. - Room 4-E1-03

andrea.fosfuri@unibocconi.it

Course description

This course trains first-year PhD students to formulate high-quality research questions and develop them into formal theoretical models and testable research designs.

Students learn to identify genuine puzzles behind management phenomena, for instance, empirical regularities that existing theories cannot fully explain, to generate and select candidate mechanisms, to transform verbal arguments into formal assumptions, to derive equilibrium predictions, and to design credible empirical tests.

The course integrates three complementary perspectives:

1. Formal modeling in management research: a working repertoire of canonical model families — decision making under uncertainty, market structure and competition, organization structure and incentives, and goals in organizations.
2. Cognitive methods for generating research ideas: recombination, analogical reasoning, categorical thinking, first principles, and abduction (inference to the best explanation).
3. AI-augmented research workflows: a disciplined, verification-first protocol for using frontier AI at every stage of the research pipeline, built on the leading available curricula (Korinek's Generative AI for Economic Research; the Rotman PhD Tech Stack; Horton's automated social science tools) and on an explicit AI-hygiene framework in which human verification — not AI generation — is treated as the binding constraint.

The course is organized around each student's own research: by the end of the term, every student delivers a full-fledged research idea and design (a Term Paper Proposal) developed incrementally through the course assignments and presented to faculty in the final session.

Learning objectives

- Modeling: solve and interpret baseline models; translate a verbal mechanism into primitives, timing, information and payoffs; derive equilibrium predictions and comparative statics; judge a model by the five essentials of a modeling paper (nontrivial, plausible, simple, anchored, clear).
- Ideation: construct a research puzzle dossier — verified stylized facts and known explanations annotated with contributions and residual gaps; generate candidate mechanisms with cognitive tools (recombination, analogy, categories, abduction) and with a structured AI-based inference-to-the-best-explanation (IBE) protocol; select among candidates with expert judgment and defend the selection.
- AI-augmented workflow: operate a reproducible research stack (versioned repository, AI-integrated editor, one-command replication); apply the course AI-hygiene protocol — acceptance criteria before prompting, canonicalized templates, verification of every AI output through independent channels; use AI for literature mapping with citation verification, derivation assistance with mathematical verification, adversarial refereeing of drafts, and synthetic piloting of research designs; document AI use transparently.
- Communication: write and present formal theory clearly in the style of leading management journals.

Prerequisites, tooling and onboarding

No prior modeling experience is assumed; comfort with calculus and basic probability is expected.

AI use and academic integrity

AI tools are not merely permitted but required, used under the course hygiene protocol: acceptance criteria are written before prompting; every AI output is verified before entering a deliverable; and a complete AI log (prompts, outputs, what was kept, rejected or corrected, and why) is kept and graded on evidence of critical judgment. The final exam is completed without AI. Undisclosed AI use in any deliverable is treated as a violation of academic integrity.

List of topics

The course is organized in 12 sessions of 3h.

Session leads: AF = Andrea Fosfuri; AC = Arnaldo Camuffo.

1. Introduction to the course (AF + AC)

Content: the research pipeline (puzzle → mechanism → model → hypotheses →

design); examples of research pipelines; the Term Paper Proposal as the course destination; Homework: scout three candidate phenomena of personal interest.

2. AI and modelling for research (AC)

Content: the logic of discovery (deduction, induction, abduction — and why the abductive jump remains the researcher's job); Korinek's capability map and use-case taxonomy; the AI-hygiene framework (verification as the binding constraint; canonicalization layers L1–L3).

3. Modelling decision making (AC)

Content: decision making under uncertainty and information; baseline models. Pipeline touchpoint: entrepreneurial decision making (learning under uncertainty).

4. Modelling market structure and competition I (AF)

Content: competition fundamentals (Cournot, Bertrand, static and dynamic models).

5. Modelling market structure and competition II (AF)

Content: differentiation and strategic interactions (Singh-Vives, Hotelling). Pipeline touchpoint: competition and licensing.

6. Modelling organization structure (AF)

Content: organization design fundamentals; mapping organizational phenomena to model primitives (applications to innovation and CSR).

7. Organization economics (AF)

Content: agency, incentives, information asymmetry. Pipeline touchpoint: venture capital contracting (principal-agent).

8. Modelling goals in organizations (AF)

Content: goals, aspiration levels, and behavioral elements in formal models; candidate anchor families for behavioral puzzles (including the Bowman risk-return paradox). Finalize the choice of one's own puzzle.

9. Cognitive tools for research idea generation (AC)

Content: recombination, analogy, categorical thinking, abduction; the anatomy of a research puzzle; the dossier method — verified stylized facts, known explanations annotated with contribution and residual gap, and quality tests; live demonstration on the Bowman paradox.

10. AI tools for economic research: the IBE protocol and formalization (AC)

Content: the inference-to-the-best-explanation protocol, steps 1–7 (independent generation runs → clustering and convergence → structured extraction → scorecard selection → defense); formalization of the selected mechanism into a model scaffold anchored in a canonical family; verification of AI-assisted mathematics (two-channel rule); the AI referee pass (five-essentials rubric).

11. Synthetic experiments and research design (AC)

Content: from propositions to hypotheses; the empirical-implications table and boundary conditions; forward-engineered research design; theory-grounded synthetic agents and why they generalize; synthetic interviews, surveys and

experiments for theory testing; integrity guardrails.

12. Final project presentations (AF + AC)

Content: individual Term Paper Proposal presentations (10 minutes plus 10 of discussion) before both instructors; rubric-based feedback; guidance for developing the term paper into a first-year paper proposal.

Course Material

1. A good textbook that covers a large repository of basic models to understand market interactions is: *Industrial Organization: Markets and Strategies*. Cambridge University Press. Paul Belleflamme and Martin Peitz. Second Edition.
2. Specific papers covered during the course will be made available to students a few weeks before the beginning of the term.
3. Modeling craft: Wibbens & Kretschmer (2026), “The Five Essentials of a Modeling Paper”, *Strategy Science* — used course-wide as the model-quality rubric.
4. AI for research infrastructure: Korinek, “Generative AI for Economic Research”, *Journal of Economic Literature*, with semi-annual updates at genaiforecon.org; Bryan, “Social Science PhD Tech Stack” (kevinbryanecon.com/techstack.html); Horton — Expected Parrot / EDSL (expectedparrot.com) and Manning & Horton (2026), “General Social Agents”, NBER Working Paper.
5. Epistemics and AI hygiene: Agrawal, Gans & Goldfarb (2026), NBER WP 34953; “LLMs Can’t Jump” (2026); Camuffo & Pandey (2026) “The Canonicalization Thesis” (working paper — basis of the course AI-hygiene protocol); Acemoglu, Kong & Ozdaglar (2026), NBER WP 34910; Novy-Marx & Velikov (2026); Lyttelton, Massenkoff & Wilmers (2026), *Anthropic*.

Assessment Methods.

Your final grade combines individual assignments, the Final Project (Term Paper Proposal), and a final exam.

Faculty Bio.

Arnaldo Camuffo is Professor of Management, Bocconi University, Milan, Italy. He holds an MBA from the Sloan School of Management at MIT (1989) and a PhD from the University of Venice (1990) and taught at the University of Venice and Padua. His research appeared, among others, in *Management Science*, *Organization Science*, *Academy of Management Journal*, *Strategic Management Journal*, *Strategy Science*, *Strategic Entrepreneurship Journal*, *Research Policy*, *Harvard Business Review*, *MIT Sloan Management Review*. He is in the Editorial Board of *Academy of Management Review*, *Strategy Science*, *Strategic Entrepreneurship Journal* and *International Journal of Operations and Production Management*.

Andrea Fosfuri is Professor of Management and Technology at Bocconi University since 2012. Andrea taught previously at University Carlos III (Madrid), Boston University and Carnegie Mellon University. He received his PhD in economics from Pompeu Fabra University (Barcelona). Andrea is currently an Associate Editor at Management Science (Strategy) and at Strategic Management Journal, and has published in journals like Management Science, Strategic Management Journal, Organization Science, Journal of International Economics, Journal of Industrial Economics, Research Policy, among others. Since 2019, he is the Dean of the PhD School.