

Microeconomics of AI

Rome Economics Doctorate and LUISS Ph.D. — 18h (2027)

Rome Economics Doctorate (RED) — LUISS University

This course studies how AI-powered algorithms change the microeconomics of markets. It draws on information economics, decision theory and the economics of learning to understand what these technologies do, and then asks how markets change when sellers, platforms and buyers delegate decisions to them. Although the perspective is that of microeconomic theory, most of the applications come from industrial organization and competition policy, the fields the instructor specializes in: pricing algorithms and collusion, recommender systems and platform power, AI agents shopping on behalf of consumers, and the industrial organization of foundation models. One or two sessions therefore offer a refresher of the partial equilibrium analysis of market power, oligopoly, platforms and vertical relations needed to follow the rest of the material.

Course Outline

1. What is AI? A microeconomic view
 - a. Definitions and views; machine learning as prediction
 - b. Reinforcement learning as sequential decision making
 - c. Foundation models as products
 - d. Economics in AI: strategic classification and incentives
 - e. Economics of AI: a research agenda for microeconomists
2. Partial equilibrium analysis: a refresher
 - a. Market power and oligopoly
 - b. Platforms and multi-sided markets
3. Reinforcement learning
 - a. The Markov decision process framework
 - b. Policies, values and the Bellman equation
 - c. Model-free methods and Q-learning
4. Foundation models / LLMs: an industry analysis
 - a. What is a foundation model / LLM? Distinctive product and industry characteristics
 - b. Scaling laws: compute, data and performance; implications for costs, entry and concentration
 - c. Competition in the vertical stack
 - d. AI partnerships: foreclosure, technology and talent pooling
5. Automate, assist or delegate? Designing human–AI collaboration
 - a. AI predictions as inputs to human decisions: automation, assistance and delegation policies; a sufficient-statistic approach (Agarwal, Moehring and Wolitzky)

- b. Evidence from a fact-checking experiment: under-response to AI predictions, overconfidence and effort crowd-out
- 6. Agentic marketplaces: agentic sellers
 - a. Pricing algorithms in markets: evidence from online retail
 - b. Theory: commitment and competition with algorithms (Brown and MacKay)
 - c. AI as better demand prediction (O'Connor and Wilson; Miklós-Thal and Tucker)
 - d. Q-learning and algorithmic collusion (Calvano, Calzolari, Denicolò, Pastorello)
 - e. Empirical evidence: German retail gasoline (Assad, Clark, Ershov, Xu); field experiment on Amazon
- 7. Agentic platforms: recommender systems
 - a. Why microeconomists care; do recommender systems have power? Evidence from Spotify playlists (Aguiar and Waldfogel)
 - b. Frictions as the source of platform power: search and information frictions; why intermediaries divert search (Hagiu and Jullien); the information design approach (Kamenica and Gentzkow) and its application to ride-hailing
 - c. Under the hood: model-based collaborative filtering and latent factor models
 - d. Steering and choice manipulation: inflated recommendations (Peitz and Sobolev); self-preferencing (Aridor and Gonçalves; Farronato, Fradkin and MacKay); playing it safe (Calvano and Jullien); steering as vertical foreclosure; competition in prices and commissions (Teh and Wright)
 - e. AI, algorithmic recommendations and competition: concentration, homogenization, prices, manipulation
 - f. Platforms as filters between senders and receivers: robust content moderation (Kominers and Shapiro)
- 8. Agentic buyers and data-driven incumbency
 - a. Delegating purchases to algorithms: demand, search and bargaining with AI agents
 - b. Data-enabled learning, network effects and competitive advantage (Hagiu and Wright)
 - c. Open questions and student presentations

References

Unstarred entries are covered in class and should be read before the corresponding session. Starred entries (*) are optional background reading or candidate papers for the student presentation session.

Agarwal, N., Moehring, A., & Wolitzky, A. (2025). Designing Human-AI Collaboration: A Sufficient-Statistic Approach. NBER Working Paper 33949.

Aggarwal, C. C. (2016). Recommender Systems: The Textbook. Springer. Chapters 2 and 3.

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