Microeconomics 4

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Office hours: Wednesday, after class, office C27.

Introduction to the course This course offers a rigorous introduction to information economics and mechanism design. The background knowledge in mathematics and game theory at the level of Mathematics 1 (Lomys), Mathematics 2 (Caruso and Ceparano), and Game Theory (Bizzarri) at the Naples School of Economics is required for the course. Taking notes in class, participating actively, and working through the problem sets are essential for understanding the material. At the end of the course, students should be familiar with important theoretical results in the literature and the relevant proof techniques.

Grading The grade is based on:

1. Exam, weighted by $2/3$.
2. Problem sets, weighted by $1/3$. Three to four problem sets will be distributed. One of your lowest scores is dropped and the remaining two are equally weighted.

Topics The course covers 3 main topics.

1. Screening;
2. Mechanism design;
3. Models of communication.

Tentative outline

1. Envelope Theorem for arbitrary choice sets (Milgrom–Segal), Revelation Principle, characterization of IC, pricing an indivisible good, nonlinear pricing, Taxation Principle, ironing; time permitting: the demand-profile approach to nonlinear pricing.

   [4-5 classes.]

2. Characterization of BIC, optimal auction, Bulow–Klemperer Theorem, Hartline–Roughgarden (2009), VCG and AGV mechanisms, Myerson–Satterthwaite Theorem, double auctions, Cremér–McLean full–surplus-extraction theorem, introduction to belief–determine-preferences conditions (Heifetz–Neeman 2006), introduction to dominant-strategy mechanism design: Green–Holmström–Laffont uniqueness, Green–Laffont impossibility; time permitting: BIC-DSIC equivalence.

   [6-7 classes.]

3. Cheap talk, Blackwell's theorem, Bayesian persuasion, cheap talk with transparent motives; time permitting: Bayes-correlated equilibrium.

   [4 classes]

Readings Most of the course is taught at the board. There are no required readings, but the suggested readings serve as a complement to your notes. The following readings may help you to put the material in perspective, suggested readings are marked by an asterisk.

- Screening:
  - * "Secrets and agents," in: *Economics Briefs: Six Big Ideas*, The Economist (https://www.economist.com/sites/default/files/econbriefs.pdf;) Harford's column, Financial Times, (https://www.nuffield.ox.ac.uk/teaching/Economics/Bargaining/pricediscriminationillustration.pdf;)
  - * Börgers (2015), Chapter 1, 2, 5 (main reading);
  - For alternative exposures of screening at approximately the same level as the course, see the relevant chapters Salanié (1997), and Fudenberg and Tirole (1991).
  - Classic articles: Mussa and Rosen (1978).
  - Extra reading: Carroll (2023).
- Mechanism design:
  - * Varian's "Designing the perfect auction" (https://dl.acm.org/doi/epdf/10.1145/1378704.1378708;)

  - * Börgers (2015): Chapter 3, 4, 6 (main reading).
  - Alternative textbook treatments: Jackson's notes (https://web.stanford.edu/~jacksonm/mechtheo.pdf), relevant chapters in MWG, Krishna (2002), Milgrom (2004), and Hartline's book (http://jasonhartline.com/MDnA/).
  - Classic articles: Myerson (1981), Hurwicz (1960).
  - Extra reading: Myerson and Satterthwaite (1983), Crémer and McLean (1988), Bulow and Roberts (1989), Wilson (2021).

- Communication:
  - * Kreps (2023): chapter 17;
  - Classic articles: Crawford and Sobel (1982), Kamenica and Gentzkow (2011);
  - Extra reading: excerpt from Ran Spiegler's *The Curious Culture of Economic Theory*, Gibbons, Matouschek, and Roberts (2013), de Oliveira (2018), Lipnowski and Ravid (2020), relevant chapters in Marschak and Radner (1972), Kamenica (2019), Bergemann and Morris (2019).

Graduate-level textbooks in microeconomic theory typically include chapters on screening and mechanism design, I recommend MWG. *Advanced Microeconomic Theory* by Jehle and Reny (1997) has a chapter on information economics written in game-theoretic language, which constitutes a complement to the mechanism-design treatment of screening in this course and deserves to be read carefully. *Game Theory: Analysis of Conflict* by Myerson (1991) is a superb textbook on game theory covering some topics of this course, I strongly recommend reading this book.

References

Bergemann, Dirk and Stephen Morris (2019), "Information Design: A Unified Perspective." *Journal of Economic Literature*, 57(1), 44–95.

Bulow, Jeremy and John Roberts (1989), "The simple economics of optimal auctions." *Journal of Political Economy*, 97(5), 1060–1090.

Börgers, Tilman (2015), *An Introduction to the Theory of Mechanism Design*. Oxford University Press.

Carroll, Gabriel (2023), "Contract theory." In *Online and Matching-Based Market Design* (Federico Echenique, Nicole Immorlica, and Vijay V. Vazirani, eds.), 614–634, Cambridge University Press.

Crawford, Vincent P. and Joel Sobel (1982), "Strategic information transmission." *Econometrica*, 50(6), 1431–1451.

Crémer, Jacques and Richard P. McLean (1988), "Full extraction of the surplus in bayesian and dominant strategy auctions." *Econometrica*, 56(6), 1247–1257.

de Oliveira, Henrique (2018), "Blackwell's informativeness theorem using diagrams." *Games and Economic Behavior*, 109, 126–131.

Fudenberg, Drew and Jean Tirole (1991), *Game Theory*. MIT Press.

Gibbons, Robert, Niko Matouschek, and John Roberts (2013), "Decisions in organizations." In *The Handbook of Organizational Economics*, 373–431, Princeton University Press.

Hurwicz, Leonid (1960), "Optimality and informational efficiency in resource allocation processes." In *Mathematical Methods in the Social Sciences: Proceedings of the First Stanford Symposium* (Kenneth J. Arrow, Samuel Karlin, and Patrick Suppes, eds.), 27–46, Stanford University Press, Stanford, California.

Jehle, Geoffrey A. and Philip J. Reny (1997), *Advanced Microeconomic Theory*. Addison-Wesley.

Kamenica, Emir (2019), "Bayesian Persuasion and Information Design." *Annual Review of Economics*, 11, 249–272.

Kamenica, Emir and Matthew Gentzkow (2011), "Bayesian Persuasion." *American Economic Review*, 101(6), 2590–2615.

Kreps, David M. (2023), *Microeconomic Foundations II: Imperfect Competition, Information, and Strategic Interaction*. Princeton University Press.

Krishna, Vijay (2002), *Auction Theory*. Academic Press.

Lipnowski, Elliot and Doron Ravid (2020), "Cheap talk with transparent motives." *Econometrica*, 88(4), 1631–1660.

Marschak, Jacob and Roy Radner (1972), "Economic theory of teams." In *CFM 22*, Cowles Foundation for Research in Economics.

Milgrom, Paul (2004), *Putting Auction Theory to Work*. Churchill Lectures in Economics, Cambridge University Press.

Mussa, Michael and Sherwin Rosen (1978), "Monopoly and product quality." *Journal of Economic Theory*, 18(2), 301–317.

Myerson, Roger B. (1981), "Optimal auction design." *Mathematics of Operations Research*, 6(1), 58–73.

Myerson, Roger B. (1991), *Game Theory: Analysis of Conflict*. Harvard University Press.

Myerson, Roger B. and Mark A. Satterthwaite (1983), "Efficient mechanisms for bilateral trading." *Journal of Economic Theory*, 29(2), 265–281.

Salanié, Bernard (1997), *The Economics of Contracts: A Primer*. MIT Press.

Wilson, Robert B. (2021), "Strategic analysis of auctions." *Econometrica*, 89(2), 555–561.