Microeconomic Theory II
ECON 60102 (Spring 2023)
Department of Economics • University of Notre Dame

Instructor: Maciej H. Kotowski ⟨mkotowsk@nd.edu⟩
Class Meetings: Tuesday & Thursday 14:00–16:00 [JNH B058]
Office Hours: Thursday 16:30–18:00 [JNH 3016 or Zoom; scheduled online]

Teaching Assistant: Jacob Hukill ⟨jhukill@nd.edu⟩
Tutorial Section: Wednesday 17:30–18:45 [DeBartolo Hall 336]

Course Website: ⟨https://canvas.nd.edu/courses/61484⟩

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1. Overview

The second half of a year-long sequence in microeconomic theory at the graduate level. Topics include game theory, the economics of information, and applications.

1.1. Audience

This course is suitable for doctoral students in economics and related disciplines. Other students with adequate preparation in mathematics and economics may enroll with the instructor's permission.

1.2. Prerequisites

The most important prerequisites for the course are a willingness for critical and creative thinking, imagination, and some grit.

Economics: Enrollment in the economics doctoral program. Other students with sufficient economics and mathematics preparation may enroll with the instructor's permission.

Mathematics: Algebra, calculus, and probability theory are used freely throughout the course. Skills in logical thinking and a willingness to follow proofs are essential.

2. Requirements and Grading

The course requirements include completion of a collection of problem sets, a written assignment, a midterm exam, and a final exam. Your grades on these tasks will be weighted as follows to determine your course grade.

Problem Sets	10 %
Written Assignment	10 %
Midterm Exam	40 %
Final Exam	40 %
Total	100 %

Letter grades will be assigned based on your final weighted score.

2.1. Problem Sets

Problem sets are graded primarily for completion and only a "✓± / no credit" will be offered for feedback. You are responsible for consulting the suggested solutions to verify your mastery of the material. Earning a "✓−" or better gives you full credit for the problem set. Sloppy, half-hearted, late, or incomplete work is unlikely to receive credit. Your lowest problem set grade will be dropped when calculating your course grade.

Unless noted otherwise, you may work in small groups (two or three students) on the problem sets. However, you must hand in independently written-up solutions. If you collaborate, identify other group members on your write-up. There is no need to type up your solutions, but sloppy work will not receive credit. Problem set due dates are the following:

Problem Set	Date Due	Problem Set	Date Due
1	February 2	5	March 30
2	February 9	6	April 13
3	February 16	7	April 27
4	February 23		

2.2. Written Assignment

You must complete a written assignment of approximately 800 words. The assignment involves summarizing a classic paper related to the topics of this course.

Instructions for the written assignment are provided in the handout "[1] Written Assignment Instructions," which is available on the course website.

The written assignment is due May 2, 2023.

2.3. Midterm Exam

There will be an in-class, closed-book midterm exam on March 2, 2023.

If you miss the midterm exam and your absence is excusable per university policy (e.g., a documented illness), a rescheduled exam will be arranged on a case-by-case basis. Unexcused absences will receive a grade of zero for this part of the course.

2.4. Final Exam

There will be a closed-book final exam. It has been provisionally scheduled by the Registrar's office for 10:30–12:30 on May 12, 2023. The location of the final exam will be announced when available.

If you miss the final exam and your absence is excusable per university policy (e.g., a documented illness), a rescheduled exam will be arranged on a case-by-case basis. Unexcused absences will receive a grade of zero for this part of the course.

3. Tutorial Sections

The teaching assistant will hold a weekly tutorial section. Most students will benefit greatly from attending the weekly review section.

4. Readings and Textbooks

This course does not rely on any specific textbook. However, it is essential that you read something in preparation for class. Many of the books below are close substitutes for the topics they cover.

For lectures on game theory, you should have access to and read at least one of the following books.

- *Game Theory for Applied Economists* by Robert Gibbons.
- *A Course in Game Theory* by Martin J. Osborne and Ariel Rubinstein.
- *Game Theory* by Drew Fudenberg and Jean Tirole.

For lectures on information economics, agency theory, and mechanism design, you should have access to and read at least one of the following books.

- *Contract Theory* by Patrick Bolton and Mathias Dewatripont.
- *The Theory of Incentives: The Principal-Agent Model* by Jean-Jacques Laffont and David Martimort.

- *The Economics of Contracts: A Primer* by Bernard Salinié.

Many general-purpose, graduate-level microeconomics textbooks cover parts of this course's material. Recommended textbooks include:

- *Microeconomic Theory* by Andreu Mas-Colell, Michael D. Whinston, and Jerry R. Green.
- *Advanced Microeconomic Theory* by Geoffrey A. Jehle and Philip J. Reny.

The syllabus includes some "classic" references. Some noteworthy books include:

- *The Theory of Games and Economic Behavior* by John von Neumann and Oskar Morgenstern.
- *Games and Decisions* by R. Duncan Luce and Howard Raiffa.
- *The Strategy of Conflict* by Thomas C. Schelling.

Classic readings are optional unless noted otherwise.

5. Audio/Video Recordings

I kindly ask you to not make personal audio or video recordings of the lectures.

6. Contingency Planning

I am committed to delivering the best possible learning experience. However, events beyond my control may affect the course. The following principles will guide this course's response and adaptation in such cases.

1. Please follow the University's health and safety guidance when on campus.
2. If in-person instruction is disrupted, be prepared to switch to dual-mode or remote instruction if mandated by the university. This will require computer and internet access.
3. You are expected to submit all coursework in hardcopy. In case of an absence, please contact the instructor to arrange for electronic submission.
4. In exceptional cases of a prolonged health-related absence or a disruption to in-person instruction, take-home exams may be substituted for in-class exams at the instructor's discretion.

7. Advice

1. Understand and follow the University's Academic Honor Code.
2. Exam questions will resemble problem set questions. Look beyond the assigned class material for more practice problems.
3. Scan or photocopy your problem set answers before submitting them.
4. Read the assigned readings twice—before *and* after lecture.
5. If pressed for time, practice solving problems in lieu of memorizing a text's details.
6. Please inform the instructor of typos and suspected mistakes in course materials.
7. Please ask questions in class. Illuminating digressions are exciting.
8. Please make use of office hours. Even if you have no specific questions about the course material, please feel welcome to visit, chat, ask questions, or simply say hello.

8. Credits and Acknowledgements

This course draws on material that I was fortunate to encounter as a student, teaching assistant, and faculty. I am particularly indebted to Ben Hermalin, Shachar Kariv, Botond Kőszegi, and Matthew Rabin. Many lectures build upon their game theory, contract theory, and information economics courses at the University of California, Berkeley (2006–9).

9. Course Calendar and Reading List

The calendar may be adjusted depending on our progress. You are expected to read essential readings. Recommended textbook readings are close substitutes; plan to read one per class. At bare minimum, read Mas-Colell, Whinston, and Green or Jehle and Reny and attempt as many practice problems as possible. Classic and supplemental readings are optional.

Key

- •• *essential reading* — something you must read, period.
- • *recommended textbook reading* — covers the lecture's main points.
- ○○ *classic reading* — read if you're keen.
- ○ *supplemental reading* — consult for more information.

[**1**] **January 17** / Course Introduction / Games in Extensive and Normal Form.

- • Fudenberg and Tirole, 1.1, 3.3.
- • Gibbons, 1.1.A, 2.4.
- • Osborne and Rubinstein, Chapter 1, 2.1, 6.1.
- ○ Luce and Raiffa, Chapters 1 and 3.
- ○ Mas-Colell, Whinston, and Green, Chapter 7.
- ○ Jehle and Reny, 7.1.

[**2**] **January 19** / Dominant Strategies / Rationalizability.

- • Fudenberg and Tirole, 1.1, 2.1.
- • Gibbons, Chapter 1.1.B.
- • Osborne and Rubinstein, Chapter 4.1.
- ○○ Bernheim, B. D. 1984. Rationalizable Strategic Behavior. *Econometrica* 52(4):1007–1028.
- ○○ Pearce, D. G. 1984. Rationalizable Strategic Behavior and the Problem of Perfection. *Econometrica* 52(4):1029–1050.
- ○ Mas-Colell, Whinston, and Green, 8.A–8.C.
- ○ Jehle and Reny, 7.2.1.

[3] **January 24** / Nash Equilibrium.

- Fudenberg and Tirole, 1.2–1.3.
- Gibbons, 1.1.C.
- Osborne and Rubinstein, 2.1–2.4.

○○ Nash, J. F. 1950. Equilibrium Points in N-Person Games. *Proceedings of the National Academy of Sciences of the United States of America* 36(1):48–49.

○○ Nash, J. 1951. Non-cooperative games. *Annals of Mathematics* 54(2):286–295.

○ Mas-Colell, Whinston, and Green, 8.D; Appendix to Chapter 8.

○ Jehle and Reny, 7.2.2.

[4] **January 26** / Nash Equilibrium (con't).

[5] **January 31** / Subgame Perfect Equilibrium.

- Gibbons, 2.4.
- Osborne and Rubinstein, Chapter 6.
- Fudenberg and Tirole, 3.5–3.6.

○○ Selten, R. 1965. Spieltheoretische Behandlung eines Oligopolmodells mit Nachfrageträgheit: Teil I: Bestimmung des dynamischen Preisgleichgewichts (in German). *Zeitschrift für die gesamte Staatswissenschaft* 121(2):301–324.

○ Mas-Colell, Whinston, and Green, 9.A–9.B.

○ Jehle and Reny, 7.3.1–7.3.6.

[6] **February 2** / Repeated Games.

- Gibbons, 2.3–2.4.
- Osborne and Rubinstein, Chapter 8.
- Fudenberg and Tirole, 5.1–5.3.

○ Fudenberg, D., and E. Maskin. 1986. The Folk Theorem in Repeated Games with Discounting or with Incomplete Information. *Econometrica* 54(3):533–554.

[**7**] **February 7** / (Weak) Perfect Bayesian Equilibrium / Sequential Equilibrium.

- Osborne and Rubinstein, Chapter 12.
- Fudenberg and Tirole, 8.1–8.3.

○○ Kreps, D. M., and R. Wilson. 1982. Sequential Equilibria. *Econometrica* 50(4):863–894.

○ Mas-Colell, Whinston, and Green, 9.C.

○ Jehle and Reny, 7.3.7.

[**8**] **February 9** / Static Bayesian Games / Bayesian Nash Equilibrium.

- Fudenberg and Tirole, 6.1–6.5.
- Gibbons, 3.1.
- Osborne and Rubinstein, 2.6.

○○ Harsanyi, J. C. 1967/8. Games with Incomplete Information Played by "Bayesian" Players: Parts I–III. *Management Science* 14.

○ Myerson, R. B. 2004. Comments on "Games with Incomplete Information Played by 'Bayesian' Players, I–III": Harsanyi's Games with Incomplete Information. *Management Science* 50(12S):1818–1824.

○ Mas-Colell, Whinston, and Green, 8.E.

○ Jehle and Reny, 7.2.3.

[**9**] **February 14** / Dynamic Bayesian Games / Signaling Games.

- Fudenberg and Tirole, 8.1–8.2.
- Gibbons, Chapter 4.
- Osborne and Rubinstein, 12.1–12.4.

○ Mas-Colell, Whinston, and Green, 9.C.

[**10**] **February 16** / Dynamic Bayesian Games / Equilibrium Refinements / Applications.

- Fudenberg and Tirole, 8.3–8.4.
- Osborne and Rubinstein, 12.1–12.4.

○ Cho, I.-K., and D. M. Kreps. 1987. Signaling Games and Stable Equilibria. *Quarterly Journal of Economics* 102(2):179–221.

[11] **February 21** / Cooperative Games / Basic Concepts.

- Osborne and Rubinstein, Chapter 13.

•• Gale, D., and L. S. Shapley. 1962. College Admissions and the Stability of Marriage. *The American Mathematical Monthly* 69(1):9–15.

○○ Bondareva, O. N. 1963. Several Applications of Linear Programming to the Theory of Cooperative Games (in Russian). *Problemy Kibernetiki* 10:119–139.

○○ Shapley, L. S. 1965. On Balanced Sets and Cores. RAND Corporation Research Memorandum RM-4601-PR.

○ Shapley, L. S. 1953. A value for N-person games. In *Contributions to the Theory of Games* (vol. 2) H. W. Kuhn and A. W. Tucker. Princeton: Princeton University Press.

○ Mas-Colell, Whinston, and Green, Appendix A to Chapter 18; 22.F.

○ Moulin, Harvé. 1995. *Cooperative Microeconomics: A Game-Theoretic Introduction.* Princeton: Princeton University Press. Chapter 7.

[12] **February 23** / Cooperative & Non-Cooperative Games / Bargaining.

- Osborne and Rubinstein, Chapters 7 & 15.

•• Nash, J. F. 1950. The Bargaining Problem. *Econometrica* 18(2):155–162.

○○ Rubinstein, A. 1982. Perfect Equilibrium in a Bargaining Model. *Econometrica* 50(1):97–109.

○ Roth, A. E. 1979. *Axiomatic Models of Bargaining.* Springer-Verlag.

○ Mas-Colell, Whinston, and Green, Appendix A to Chapter 18; 22.E.

○ Luce and Raiffa, 6.5–6.6.

[13] **February 28** / Catch-up / Bonus Lecture on a Surprise Topic.

[14] **March 2** / Midterm Exam.

[15] **March 7** / Competitive Markets & Adverse Selection.

- Bolton and Dewatripont, 13.1.

•• Akerlof, G. A. 1970. The Market for "Lemons": Quality Uncertainty and the Market Mechanism. *Quarterly Journal of Economics* 84(3):488–500.

○ Mas-Colell, Whinston, and Green, 13.A–13.B.

- ○ Jehle and Reny, 8.1.1.

[**16**] **March 9** / Competitive Markets & Signaling.

- • Bolton and Dewatripont, Chapter 3.
- • Salinié, 4.1–4.2.
- •• Spence, M. 1973. Job Market Signaling. *Quarterly Journal of Economics* 87(3):355–374.
- ○ Mas-Colell, Whinston, and Green, 13.C.
- ○ Jehle and Reny, 8.1.2.

March 14 / No Lecture (Spring Break).

March 16 / No Lecture (Spring Break).

[**17**] **March 21** / Competitive Markets & Screening.

- • Bolton and Dewatripont, 13.1.
- •• Rothschild, M., and J. Stiglitz. 1976. Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information. *Quarterly Journal of Economics* 90(4):629–649.
- ○ Mas-Colell, Whinston, and Green, 13.D.
- ○ Jehle and Reny, 8.1.3.

[**18**] **March 23** / The Principal-Agent Model / Moral Hazard.

- • Bolton and Dewatripont, Chapter 4.
- • Laffont and Martimort, Chapter 4.
- • Salinié, Chapter 5.
- ○○ Holmström, B. 1979. Moral Hazard and Observability. *The Bell Journal of Economics* 10(1):74–91.
- ○ Grossman, S. J., and O. D. Hart. 1983. An Analysis of the Principal-Agent Problem. *Econometrica* 51(1):7–45.
- ○ Rogerson, W. P. 1985. The First-Order Approach to Principal-Agent Problems. *Econometrica* 53(6):1357–1367.

- ○ Mas-Colell, Whinston, and Green, 14.B.
- ○ Jehle and Reny, 8.2.

[**19**] **March 28** / The Principal-Agent Model / Moral Hazard (con't).

[**20**] **March 30** / The Principal-Agent Model / Monopolistic Screening.

- • Laffont and Martimort, Chapters 2 & 3.
- • Bolton and Dewatripont, Chapter 2.
- • Salinié, Chapters 2 & 3.
- ○○ Baron, D. P., and R. B. Myerson. 1982. Regulating a Monopolist with Unknown Costs. *Econometrica* 50(4):911–930.
- ○○ Mirrlees, J. 1971. An Exploration in the Theory of Optimum Income Taxation. *Review of Economic Studies* 38(2):175–208.
- ○○ Mussa, M., and S. Rosen. 1978. Monopoly and Product Quality. *Journal of Economic Theory* 18(2):301–317.
- ○ Maskin, E., and J. Riley. 1984. Monopoly with Incomplete Information. *RAND Journal of Economics* 15(2):171–196.
- ○ Mas-Colell, Whinston, and Green, 14.C.

[**21**] **April 4** / The Principal-Agent Model / Monopolistic Screening (con't).

[**22**] **April 6** / Mechanism Design / The Revelation Principle.

- • Fudenberg and Tirole, 7.2–7.3.
- ○ Mas-Colell, Whinston, and Green, 23.A–23.D.

[**23**] **April 11** / Mechanism Design / Efficient Mechanisms.

- • Fudenberg and Tirole, 7.4.
- • Bolton and Dewatripont, 7.2.
- ○○ Myerson, R. B., and M. A. Satterthwaite. 1983. Efficient Mechanisms for Bilateral Trading. *Journal of Economic Theory* 29(2):265–281.
- ○ Mas-Colell, Whinston, and Green, 23.E.
- ○ Jehle and Reny, 9.5.

[24] April 13 / Mechanism Design / Efficient Mechanisms (con't).

[25] April 18 / Mechanism Design / Revenue Equivalence and Optimal Auctions.

- Bolton and Dewatripont, 7.3.
- ○○ Vickrey, W. 1961. Counterspeculation, auctions, and competitive sealed tenders. *Journal of Finance* 16(1):8–37.
- ○○ Myerson, R. B. 1981. Optimal Auction Design. *Mathematics of Operations Research* 6(1):58–73.
- ○ Mas-Colell, Whinston, and Green, 23.F.
- ○ Jehle and Reny, 9.4.

[26] April 20 / Mechanism Design / Revenue Equivalence and Optimal Auctions (con't).

[27] April 25 / Catch-up / Bonus Lecture on a Surprise Topic.

[28] April 27 / Catch-up / Bonus Lecture on a Surprise Topic.

[29] May 2 / Microeconomic Theory, Applied / Course Wrap-Up.

- Readings and topic TBA.

May 12 / Final Exam.

- The university Registrar has provisionally scheduled the final exam for 10:30–12:30 on May 12, 2023. The exam's location will be announced when available.