Microeconomic Theory II
ECON 60102 (Spring 2021)
Department of Economics • University of Notre Dame

Instructor: Maciej H. Kotowski ⟨maciej.h.kotowski@nd.edu⟩
Office Hours: Wednesdays 16.00–18.00 [Zoom; scheduled online]
Class Meetings: Mondays & Wednesdays 09.00–11.00 [DeBartolo Hall 217]
Tutorial Section: Wednesdays 19.05–20.20 [Jenkins and Nanovic Hall B071]
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Course Website: ⟨https://sakai.nd.edu⟩

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.

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.

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.

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.

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 17	5	April 12
2	March 3	6	April 26
3	March 10	7	May 10
4	March 17		

Written Assignment

You must complete a written assignment of approximately 750 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 10, 2021.

Midterm Exam

A take-home midterm exam will be distributed on Monday, March 22, 2021. You will have 24 hours to complete the exam. You must complete the exam independently without aid from others.

If you do not complete the exam and your failure to do so is excusable per university policy, a rescheduled exam will be arranged on a case-by-case basis. Unexcused incomplete exams will receive a grade of zero.

Final Exam

A take-home final exam will be distributed on Friday, May 14, 2021. You will have 24 hours to complete the exam. You must complete the exam independently without aid from others.

If you do not complete the exam and your failure to do so is excusable per university policy, a rescheduled exam will be arranged on a case-by-case basis. Unexcused incomplete exams will receive a grade of zero.

Tutorial Sections

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

Readings and Textbooks

This course does not rely on any specific textbook. However, it is essential that you read something in preparation for class. You *do not* need to buy or read all of the books below.

For lectures on game theory, you should have access to 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 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 many "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.

Audio/Video Recordings

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

COVID-19 Accommodation and Response

The ongoing public health situation presents a challenge for university operation. *I am nevertheless committed to delivering the best possible learning experience.* Please help me in this endeavor and together we can have a rewarding class.

The following policies will apply this term:

- If you cannot attend a lecture in person due to health concerns (e.g., illness, quarantine order, etc.), please participate in class via Zoom video conference during its regularly-scheduled time. A link will be available on the course website.

  Remote lectures are not a perfect substitute for in-class instruction. Therefore, I ask you to attend class in person whenever possible.

- All assignments are to be submitted online. This will require you to upload a `*.pdf` file with your answers. It is your responsibility to become familiar with the online system and how to make readable `*.pdf` files of your completed assignments.

- All office hour meetings will be conducted via Zoom video conference. A link will be available on the course website for automatic appointment scheduling.

Advice

1. Understand and follow the University's Academic Honor Code.

2. Exam questions will resemble problem set questions. Seek out further practice problems, especially in textbooks or online.

3. Read the assigned readings twice—before and after lecture.

4. If pressed for time, practice solving problems in lieu of memorizing a textbook reading.

5. Paraphrasing advice I've received from Richard Zeckhauser: When you are having trouble getting your thinking straight about a new problem,

   - go to the simplest case;
   - go to an extreme case;
   - try plugging-in simple numbers.

   Remember, appropriate simplification is the great art of economic modeling.

6. Please inform the instructor of typos and suspected mistakes in course materials. Your classmates and this course's future students will be grateful.

7. Please ask questions in class. Illuminating digressions are exciting. However, I may defer your question to a later date or to office hours if it will get us too far off track.

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.

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).

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.

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[1] February 3 / 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] February 8 / 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] February 10 / 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] February 15 / Nash Equilibrium (con't).

[5] February 17 / 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 22 / 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 24 / (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] March 1 / Static Bayesian Games / Bayesian Nash Equilibrium.

- Gibbons, 3.1.

- Osborne and Rubinstein, 2.6.

- Fudenberg and Tirole, 6.1–6.5.

∘∘ 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] March 3 / Dynamic Bayesian Games / Signaling Games.

- Gibbons, Chapter 4.

- Osborne and Rubinstein, 12.1–12.4.

- Fudenberg and Tirole, 8.1–8.2.

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

[10] March 8 / 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] March 10 / Cooperative Games / Basic Concepts.

- Osborne and Rubinstein, Chapter 13.

○ 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.

○○ 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.

○ Mas-Colell, Whinston, and Green, Chapter 18 (App. A), 22.F.

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

[12] March 15 / 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, Chapter 18 (Appendix A), 22.E.

○ Luce and Raiffa, 6.5–6.6.

[13] March 17 / Catch-up or a Bonus Lecture on a Surprise Topic.

[14] March 22 / Midterm Exam / No Class Meeting.

- The exam will be posted online at 9:00 am (U.S. Eastern Daylight Time). You must submit your answers online within 24 hours, i.e., by 9:00 am (EDT) March 23, 2021.

[15] March 24 / 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 29 / 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.

[17] March 31 / 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] April 5 / 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] April 7 / The Principal-Agent Model / Moral Hazard (con't).

[20] April 12 / 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, James. 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 14 / The Principal-Agent Model / Monopolistic Screening (con't).

[22] April 19 / Mechanism Design / The Revelation Principle.

- Fudenberg and Tirole, 7.2–7.3.

∘ Mas-Colell, Whinston, and Green, 23.A–23.D.

[23] April 26 / Mechanism Design / Efficient Mechanisms.

- Fudenberg and Tirole, 7.4.

- Bolton and Dewatripont, 7.2.

∘∘ Myerson, R. B., and Mark 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 28 / Mechanism Design / Efficient Mechanisms (con't).

[25] May 3 / 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] May 5 / Mechanism Design / Revenue Equivalence and Optimal Auctions (con't).

[27] May 10 / Microeconomic Theory, Applied / Course Wrap-Up.

∘ Milgrom, P., and I. Segal. 2020. Clock Auctions and Radio Spectrum Reallocation. *Journal of Political Economy* 128(1):1–31.

May 14 / Final Exam.

- The final exam will be posted online at 9:00 am (U.S. Eastern Daylight Time). You must submit your answers online within 24 hours, i.e., by 9:00 am (EDT) May 15, 2021.