

API 109
Advanced Microeconomic Analysis I
Harvard University • Fall 2019

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Office: L-210 at Harvard Kennedy School

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Please include “API 109” in the subject line of all course-related e-mails.

Class Meetings: Monday & Wednesday 11.45–13.00 [W-436 at Harvard Kennedy School]

Review Sections: Friday 10.15–11.30 [L-280]; Friday 11.45–13.00 [L-280]

Website: <<https://canvas.harvard.edu/courses/62298>>

Overview

API 109 is the first semester of the two-semester sequence in advanced microeconomics for MPA/ID students. The goal of the course is to prepare students to analyze applied problems in international development using the tools of modern microeconomic theory. The course is a doctoral-level course in microeconomic theory with an eye toward policy applications in development economics.

Audience

This course is intended for first-year MPA/ID students. Students not in the MPA/ID program will be admitted only with the permission of the instructor and only under exceptional circumstances. Students interested in a similar advanced microeconomics course should consider API 111 / Econ 2020a / HBS 4010 instead.

Prerequisites

The main prerequisite for this course is an understanding of multivariate calculus. Familiarity with linear algebra, probability theory, and mathematical optimization is also helpful. The most important prerequisite, however, is a degree of “mathematical sophistication” and comfort with rigorous reasoning and arguments.

Requirements and Grading

The course requirements include the completion of several problem sets, a midterm exam, and a final exam. Your grades on these tasks will be weighted according to Scheme A and Scheme B.

Date: August 29, 2019.

	Scheme A	Scheme B
Problem Sets	15 %	15 %
Midterm Exam	25 %	0 %
Final Exam	60 %	85 %

Your final score will be computed according to the most favorable (for you) of the two weightings. Letter grades will be assigned based on your final weighted score. The distribution of course grades will correspond roughly to the Harvard Kennedy School's recommended grade distribution.

Exams

The midterm exam will be held in class. The final exam will be scheduled by the registrar during the final exam period. Exam dates and times are noted in the course calendar below.

Problem Sets

Problem sets are graded primarily for completion and only a “check+/check/check–/no credit” will be offered for feedback. Earning a “check–” or better gives you full credit for the problem set. Sloppy, half-hearted, or incomplete work is unlikely to receive credit. We will drop your lowest problem set grade in calculating your grade for this part of the class.

You are allowed to work in small groups (four or fewer students) on the problem sets, but you must hand in independently written-up solutions. If you choose to collaborate with others, please identify other group members on your write-up. It will be very difficult to do well on the exams unless you can independently complete problem-set-like questions.

Unless you make prior arrangements, you must submit completed problem sets in hardcopy to the MPA/ID assignment dropbox before the due date. Do not bring assignments to lecture. Late problem sets will not be accepted. There is no need to type-up your problem set solutions, but sloppy work will not receive credit.

Review Sections

The teaching fellow will hold weekly review sections. Formally, attendance at these sections is optional. However, most students will benefit greatly from attending one weekly review section.

Course Readings

There will be required readings from the following sources:

- *Microeconomic Theory* [MWG] by Andreu Mas-Colell, Michael D. Whinston, and Jerry R. Green.
- *Notes on Microeconomic Theory* [Miller] by Nolan H. Miller.
- Miscellaneous academic journals.

MWG is the standard textbook used in economics Ph.D. programs. We will also use a set of supplemental notes authored by Nolan Miller. These notes are freely available online. Readings from academic journals can be accessed online through the Harvard Library's website.

For some lectures there are optional readings from the following sources:

- *Lecture Notes in Microeconomic Theory* [Rubinstein] by Ariel Rubinstein.
- *Advanced Microeconomic Theory* [Jehle and Reny] by Geoffrey A. Jehle and Philip J. Reny.
- *Cooperative Microeconomics: A Game Theoretic Introduction* [Moulin] by Hervé Moulin.
- *Economics and Consumer Behavior* [Deaton and Muellbauer] by Angus Deaton and John Muellbauer.

For a different exposition of the course material and for more exercises, you may wish to consult *A Course in Microeconomic Theory* by David M. Kreps, *Microeconomic Foundations I: Choice and Competitive Markets* by David M. Kreps, or *Microeconomic Analysis* by Hal R. Varian. Students seeking a math supplement may wish to consult *Mathematics for Economists* by Carl P. Simon and Lawrence E. Blum or *Fundamental Methods of Mathematical Economics* by Alpha C. Chiang.

Optional Enrichment Lectures

This course touches many topics and regrettably some subjects cannot be covered in the depth that they ought to be. Some students may benefit from exposure to more advanced topics of particular interest. Thus, the following optional enrichment lectures are planned:

1. Inter-temporal Choice and Consumption
2. Discrete Exchange Economies and Assignment Markets
3. Existence of Walrasian Equilibrium

Optional enrichment lectures are optional. Any new concepts presented are not exam material. Consult the course calendar for details concerning these lectures.

Audio/Video Recordings

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

Advice

1. Exam questions will resemble problem set questions. Please seek out practice problems wherever you can. Look beyond the assigned problem sets! Many textbooks have extra exercises. The internet is another resource. The teaching fellow, course assistants, and I are more than happy to help you solve/learn relevant material that you encounter independently.
2. Read the assigned readings before lecture and again after lecture. The excellent notes by Nolan Miller parallel MWG and are less dense. You may wish to read them first.
3. If pressed for time, you are better off practicing solving problems rather than memorizing the details of an assigned text.
4. Please feel welcome to 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.
5. 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

This course draws on material that I was fortunate to encounter as a student, teaching assistant, and faculty. I am particularly indebted to David Ahn, Bob Anderson, Chris Avery, Ben Hermalin, Shachar Kariv, Botond Kőszegi, Nolan Miller, Matthew Rabin, Martin Rotemberg, Chris Shannon, and Richard Zeckhauser. I also thank former teaching assistants and students whose input has improved the class.

Important Dates

Exams are scheduled for the following dates:

- Midterm Exam: 11.45–13.00, October 7, 2019. The exam is held in class.
- Final Exam: 14.00–17.00, December 16, 2019. The location will be announced later.

Problem sets are due on the following dates:

Problem Set	Date Due
1	September 16
2	September 23
3	September 30
4	October 21
5	November 4
6	November 18
7	December 2

There is a regular lecture scheduled on Friday, September 6, 2019. It will be held at the regular class time and location.

The review sections on Friday, October 11, 2019, are cancelled.

There are no lectures on the following dates:

- Monday, October 14, 2019 (Columbus Day)
- Monday, November 11, 2019 (Veterans Day)
- Wednesday, November 27, 2019 (Thanksgiving Recess)

Course Calendar

The calendar will be adjusted depending on our progress. There are two types of readings. Required readings you should attempt before class and review after class. Optional readings may be assigned to facilitate discussion or to illustrate applications. Additional readings may be added based on class interest.

Key: ● = required reading. ◇ = optional/supplemental/recommended reading.

September 4

Lecture 0. Introduction.

- Gale, David, and Lloyd S. Shapley. 1962. College Admissions and the Stability of Marriage. *American Mathematical Monthly* 69(1):9–15.
- Varian, Hal R. 1989. What Use is Economic Theory? Mimeo. <http://people.ischool.berkeley.edu/~hal/Papers/theory.pdf>
- Banerjee, Abhijit V., and Esther Duflo. 2007. The Economic Lives of the Poor. *Journal of Economic Perspectives* 21(1):141–168.
- ◇ Boomtown Slum: A Day in the Economic Life of Africa’s Biggest Shanty-Town. *The Economist*, December 22, 2012.
- ◇ A Golden Age of Micro. *The Economist* Free Exchange Blog, October 19, 2012.
- ◇ Cornes, Richard, and Jose A. Rodrigues-Neto. 2013. Is Policy Too Important to be Left to Empiricists? Lessons of the 2012 Nobel Prize in Economics. *Agenda: A Journal of Policy Analysis and Reform* 20(2):61–76.
- ◇ Hylland, Aanund, and Richard Zeckhauser. 1979. The Efficient Allocation of Individuals to Positions. *Journal of Political Economy* 87(2):293–314.

September 6

Lecture 1. Consumer Theory 1: Preferences and Utility.

- MWG 1.A–1.B; 3.A–3.C.
- ◇ Jehle and Reny 1.1–1.2.
- ◇ Miller Chapter 1.
- ◇ Rubinstein Lecture 2.
- ◇ Deaton and Muellbauer Chapter 1, 2.1–2.2.

September 9

Lecture 2. Consumer Theory 2: Utility Maximization and Walrasian Demand.

- MWG 3.D.
- Miller 3.1–3.3.
- ◇ MWG Appendix M.K (Constrained Optimization).
- ◇ Jehle and Reny 1.3–1.4; Appendix A2.
- ◇ Rubinstein Lecture 4.

September 11

Lecture 3. Consumer Theory 3: Expenditure Minimization and Hicksian Demand.

- MWG 3.E.
- Miller 3.4.
- ◇ Jehle and Reny 1.4.
- ◇ Deaton and Muellbauer 2.3.

September 16

Lecture 4. Consumer Theory 4: Walrasian and Hicksian Demand / The Slutsky Equation.

- MWG 3.F–3.G.
- Miller 3.4.
- Jensen, Robert T., and Nolan H. Miller. 2008. Giffen Behavior and Subsistence Consumption. *American Economic Review* 98(4):1553–1577.
- ◇ Jehle and Reny 1.4–1.5.
- ◇ Deaton and Muellbauer 2.4–2.5.

September 18

Lecture 5. Consumer Theory 5: Welfare Analysis / Compensating and Equivalent Variation.

- MWG 3.I.
- Miller 3.4.
- ◇ Deaton and Muellbauer 7.4.
- ◇ Net Benefits. *The Economist*, March 9, 2013.
- ◇ Pennies From Heaven. *The Economist*, October 26, 2013.
- ◇ Hausman, Jerry. 1981. Exact Consumer's Surplus and Deadweight Loss. *American Economic Review* 71(4):662–676.

September 23

Lecture 6. Consumer Theory 6: Revealed Preference.

- MWG 2.F & 3.J.
- ◇ Rubinstein Lectures 3 & 5.
- ◇ Jehle and Reny 2.3.
- ◇ Deaton and Muellbauer 2.6.
- ◇ Kreps, David M. 1988. *Notes on the Theory of Choice*. Boulder, CO: Westview Press.
- ◇ Afriat, S. N. 1967. The Construction of Utility Functions from Expenditure Data. *International Economic Review* 8(1):67–77.
- ◇ Choi, Syngjoo, Shachar Kariv, Wieland Müller, and Dan Silverman. 2014. Who is (More) Rational? *American Economic Review* 104(6):1518–1550.

September 25

Lecture 7. Uncertainty and Risk 1.

- MWG Chapter 6.
- Miller Chapter 6.
- ◇ Rubinstein Lectures 7 & 8.
- ◇ Jehle and Reny 2.4.
- ◇ Deaton and Muellbauer Chapter 14.
- ◇ Machina, Mark J. 1987. Choice Under Uncertainty: Problems Solved and Unsolved. *Journal of Economic Perspectives* 1(1):121–154.
- ◇ Bernstein, Peter L. 1996. *Against the Gods: The Remarkable Story of Risk*. New York: John Wiley & Sons.

September 27

Optional Enrichment Lecture 1. Inter-temporal Choice and Consumption.

- ◇ Time & Location: TBA
- ◇ TBD

September 30

Lecture 8. Uncertainty and Risk 2.

- MWG Chapter 6.
- Miller Chapter 6.
- O'Donoghue, Ted, and Jason Somerville. 2018. Modeling Risk Aversion in Economics. *Journal of Economic Perspectives* 32(2):91–114.
- ◇ Jehle and Reny 2.4.
- ◇ Allais, Maurice. 1953. Le comportement de l'homme rationnel devant le risque: critique des postulats et axiomes de l'école Américaine. *Econometrica* 21(4):503–546.
- ◇ Ellsberg, Daniel. 1961. Risk, Ambiguity, and the Savage Axioms. *Quarterly Journal of Economics* 75(4):643–669.
- ◇ Camerer, Colin. 1995. Individual Decision Making. Chapter 8 in *The Handbook of Experimental Economics*, ed. John H. Kagel and Alvin E. Roth, 587–703.
- ◇ Rabin, Matthew, and Richard H. Thaler. 2001. Anomalies: Risk Aversion. *Journal of Economic Perspectives* 15(1):219–232.

October 2

Lecture 9. Uncertainty & Risk 3.

- ◇ Holt, Charles A., and Susan K. Laury. 2002. Risk Aversion and Incentive Effects. *American Economic Review* 92(5):1644–1655.

October 7

Midterm Exam.

- In class, closed-book exam.
- Covers all preceding lectures.
- No electronics; however, non-graphing and non-programmable calculators are allowed.

October 9

Lecture 10. Theory of Production 1.

- MWG 5.A–5.C.
- Miller 5.1–5.2.
- ◇ Jehle and Reny 3.1–3.2.
- ◇ Coase, R.H. 1937. The Nature of the Firm. *Economica* 4(16):386–405.
- ◇ Coase Call. *The Economist*, July 29, 2017.
- ◇ Alchian, Armen A., and Harold Demsetz. 1972. Production, Information Costs, and Economic Organization. *American Economic Review* 62(5):777–795.
- ◇ Hart, Oliver, and John Moore. 1990. Property Rights and the Nature of the Firm. *Journal of Political Economy* 98(6):1119–1158.

October 14

No Lecture (Columbus Day).

October 16

Lecture 11. Theory of Production 2.

- MWG 5.D.
- Miller 5.3–5.5.
- ◇ Jehle and Reny 3.3–3.5.

October 21

Lecture 12. Exchange Economies 1: Discrete Exchange Economies and the Core.

- The Royal Swedish Academy of Sciences. 2012. Scientific Background on the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2012: Stable Allocations and The Practice of Market Design.
<<https://www.nobelprize.org/uploads/2018/06/advanced-economicsciences2012.pdf>>
- Rees, M. A., et al. 2017. Kidney Exchange to Overcome Financial Barriers to Kidney Transplantation. *American Journal of Transplantation* 17(3):782–790.
- ◇ Moulin 3.2.
- ◇ Shapley, Lloyd S., and Herbert Scarf. 1974. On cores and indivisibility. *Journal of Mathematical Economics* 1(1):23–37.
- ◇ Roth, Alvin E., Tayfun Sönmez and M. Utku Ünver. 2004. Kidney exchange. *Quarterly Journal of Economics* 119(2):457–488.

- ◇ Sönmez, Tayfun, and M. Utku Ünver. 2011. Matching, allocation, and exchange of discrete resources. 2011. In *Handbook of Social Economics*, Volume 1A, edited by Jess Benhabib, Alberto Bisin, and Matthew O. Jackson. Amsterdam: Elsevier B.V.
- ◇ Balbuzanov, Ivan, and Maciej H. Kotowski. Forthcoming. Endowments, Exclusion, and Exchange. *Econometrica*.

October 23

Lecture 13. Exchange Economies 2: The Edgeworth Box and Walrasian Equilibrium.

- MWG 15.A–15.B.
- ◇ Jehle and Reny 5.1.
- ◇ Moulin 3.6.
- ◇ Debreu, Gerard. 1959. *Theory of Value*. New Haven: Yale University Press.

October 25

Optional Enrichment Lecture 2. Discrete Exchange Economies.

- ◇ Time & Location: TBA
- ◇ Abdulkadiroğlu, Atila, and Tayfun Sönmez. 1999. House Allocation with Existing Tenants. *Journal of Economic Theory* 88(2):233–260.
- ◇ Balbuzanov, Ivan, and Maciej H. Kotowski. Forthcoming. Endowments, Exclusion, and Exchange. *Econometrica*.

October 28

Lecture 14. Exchange Economies 3.

- MWG 15.A–15.B.
- ◇ Debreu, Gerard. 1959. *Theory of Value*. New Haven: Yale University Press.

October 30

Lecture 15. Production Economies 1: The Robinson Crusoe Economy.

- MWG 15.C.
- ◇ Jehle and Reny 5.3.
- ◇ Bardhan, Pranab, and Christopher Udry. 1999. Household Economics. Chapter 2 in *Development Microeconomics* by Pranab Bardhan and Christopher Udry, 7–19. Oxford: Oxford University Press.
- ◇ Defoe, Daniel. 1719. *Robinson Crusoe*.

November 4

Lecture 16. Production Economies 2.

- MWG 15.C.
- ◇ Jehle and Reny 5.3.

November 6

Lecture 17. First and Second Welfare Theorems 1.

- MWG 15.B, 16.A–16.C.
- ◇ Jehle and Reny 5.2.

November 11

No Lecture (Veterans Day).

November 13

Lecture 18. First and Second Welfare Theorems 2.

- MWG 15.B, 16.A–16.C.
- ◇ Jehle and Reny 5.2.

November 15

Optional Enrichment Lecture 3. Existence of Walrasian Equilibrium.

- ◇ Time & Location: TBA
- ◇ MWG 17.A–17.C.
- ◇ Jehle and Reny 5.1–5.2.
- ◇ Weintraub, E. Roy. 2011. Retrospectives: Lionel W. McKenzie and the Proof of the Existence of a Competitive Equilibrium. *Journal of Economic Perspectives* 25(2):199–215.
- ◇ McKenzie, Lionel W. 1954. On Equilibrium in Graham's Model of World Trade and Other Competitive Systems. *Econometrica* 22(2):147–61.
- ◇ Arrow, Kenneth J., and Gerard Debreu. 1954. Existence of an Equilibrium for a Competitive Economy. *Econometrica* 22(3):265–290.

November 18

Lecture 19. Uncertainty and Financial Markets.

- ◇ MWG 19.A–19.C.
- ◇ MWG 19.D–19.E.
- ◇ Jehle and Reny 5.4.
- ◇ Debreu, Gerard. 1959. *Theory of Value*. New Haven: Yale University Press.

November 20

Lecture 20. Externalities and Public Goods.

- MWG 11.A–11.C.
- Miller 8.1–8.3.
- Coase, Ronald. 1960. The Problem of Social Cost. *Journal of Law and Economics* 3:1–44.
- Coase, Ronald. 1974. The Lighthouse in Economics. *Journal of Law and Economics* 17(2):357–376.
- ◇ The lives of others. *The Economist*, August 17, 2017.

November 25

Lecture 21. Two-Sided Markets 1.

- Gale, David, and Lloyd S. Shapley. 1962. College Admissions and the Stability of Marriage. *American Mathematical Monthly* 69(1):9–15.
- ◇ Moulin 3.3.
- ◇ Roth, Alvin E., and Marilda A. Oliveira Sotomayor. 1990. *Two-Sided Matching: A Study of Game-Theoretic Modeling and Analysis*. Cambridge: Cambridge University Press.
- ◇ Roth, Alvin E. 2015. *Who Gets What—And Why: The New Economics of Matchmaking and Market Design*. New York: Houghton Mifflin Harcourt.

November 27

No Lecture (Thanksgiving Recess).

December 2

Lecture 22. Two-Sided Markets 2.

- Roth, Alvin E., and Elliott Peranson. 1999. The Redesign of the Matching Market for American Physicians: Some Engineering Aspects of Economic Design. *American Economic Review* 89(4):748–780.
- Abdulkadiroğlu, Atila, and Tayfun Sönmez. 2003. School Choice: A Mechanism Design Approach. *American Economic Review* 93(3):729–747.
- ◇ Roth, Alvin E. 1985. The College Admissions Problem is Not Equivalent to the Marriage Problem. *Journal of Economic Theory* 36(2):277–288.
- ◇ Roth, Alvin E. 1984. The Evolution of the Labor Market for Medical Interns and Residents: A Case Study in Game Theory. *Journal of Political Economy* 92(6):991–1016.
- ◇ Roth, Alvin E. 2007. “Market Failure and Market Design,” Google Tech Talks video, 1:07:21. <<http://www.youtube.com/watch?v=4td0Y-HHC7s>>

December 4

Lecture 23. Catch-up / Review and Conclusions.

- ◇ Banerjee, Abhijit V., and Esther Duflo. 2007. The Economic Lives of the Poor. *Journal of Economic Perspectives* 21(1):141–168.
- ◇ Varian, Hal R. 1989. What Use is Economic Theory? Mimeo. <<http://people.ischool.berkeley.edu/~hal/Papers/theory.pdf>>

December 16

Final Exam.

- Time: 14.00–17.00
- Location: TBA
- The exam is closed book and covers the entire course.
- Non-graphing and non-programmable calculators are allowed. Other electronics are not allowed.