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ECONOMICS 113 - MATHEMATICAL ECONOMICS: GENERAL EQUILIBRIUM THEORY

Revised April 16, 2011

Requirements: There will be weekly problem sets, two midterms, a take-home portion of midterm 2 and a take-home final exam. Feel free to co-operate with friends and classmates on problem sets.

All examinations are open-book, open-notes. Confidentiality is required during examinations. Please strictly observe academic integrity. Examinations should be your own personal work. During examinations, other people (classmates, friends, professors -- - except the TA and Prof. Starr) are CLOSED; do not discuss examination materials until after the exam has been collected.

Examination Schedule:

Midterm 1 (covers syllabus sections 1 to 5). In Class, Friday, April 15.

Midterm 2 (covers syllabus sections 1 to TBA). There will be a brief take-home midterm on the web, Monday May 16, due Wednesday May 18. There will be an in-class midterm on Wednesday May 18.

Final Exam: The final exam will be take-home only. Available on the web, Wednesday June 1, due Friday June 3.

Grading: Problem sets, 5%; midterm 1, 15%; midterm 2, 30%; final exam, 50%. Additional credit for class participation.

Prerequisites: A year of calculus and a year of upper division microeconomic theory (at UCSD these courses are Math 20 A-B-C, and Economics 100A-B or 170A-B). The prerequisites may be taken concurrently. Students with very strong mathematics preparation (typically including one quarter of real analysis, UCSD Math 140A or 142A) may enroll without economics prerequisites.

Text: R. Starr's *General Equilibrium Theory: An Introduction*, Draft Second Edition available without charge on the web.

Reserve Materials: The following items have been requested on reserve:

Arrow, K. J. and F. H. Hahn, *General Competitive Analysis*

Arrow, Kenneth J., "A Difficulty in the concept of social welfare", *Journal of Political Economy*, 58 (1950), pp. 328 - 346. Reprinted in Arrow and Scitovsky, eds., *Readings in Welfare Economics*, 1969.

Bartle, R., *The Elements of Real Analysis*, 1st edition, 1964

- Bartle, R. and D. R. Sherbert, *Introduction to Real Analysis*, 2nd edition, 1992 and 3rd edition, 2000
- Carter, Michael, *Foundations of Mathematical Economics*, 2001
- Cornwall, R. R., *Introduction to the Use of General Equilibrium Analysis*
- Debreu, G., *Theory of Value*
- Eatwell, J., M. Milgate, and P. Newman (eds.) *The New Palgrave: General Equilibrium*
- Quirk, J. and R. Saposnik, *Introduction to General Equilibrium and Welfare Economics*
- Starr, R. M., *General Equilibrium Theory: An Introduction*
- Varian, H., *Microeconomic Analysis, 3rd ed.*, 1992
- McCloskey, D. "The Futility of Blackboard Economics" in *The Vices of Economists--The Virtues of the Bourgeoisie*, Amsterdam University Press, 1996.
- Gibbard, A. and H. Varian, "Economic Models" *Journal of Philosophy*, v. 75, 1978, pp. 664-677.

TOPIC OUTLINE

Lectures will closely follow Starr's *General Equilibrium Theory: An Introduction*. Please read the relevant portion of Starr's *General Equilibrium Theory* before the topic is covered in class.

Introduction and Mathematics

1. The Edgeworth Box (1 lecture)
Starr, 'Frontmatter': preface to 1st & 2nd edition, Foreword,
Starr, Chap. 1, 3
Optional: Arrow-Hahn, chap. 1
2. Set notation and N-dimensional Euclidean Space (1 lecture)
Starr, Chap. 6, 7 (prior to section 7.1)
Optional: Bartle, Section 1, 7, 8, 11
Bartle and Sherbert, 2nd edition section 1.1, chap. 2, sections 3.1, 3.2, 3.3, chap.10; 3rd ed. section 1.1, chap. 2, sections 3.1, 3.4, 11.1, 11.2
Debreu, 1.2, 1.6, 1.9a - 1.9f
Carter, sections 1.1, 1.3, 1.3.1, 1.3.2
3. The Robinson Crusoe Model (1 lecture)
Starr, chapter 2
Optional: Cornwall, 1.1, 1.2, 1.3
4. Continuous Functions (2 lectures)
Starr, section 7.1
Optional: Bartle, Sections 2, 15
Bartle and Sherbert, 2nd ed., sections 5.1, 5.2, 5.3; 3rd ed. sections 5.1, 5.2, 5.3, 11.3
Debreu, 1.3, 1.8

Carter, sections 2.1, 2.1.1 & 2.3

5. The Brouwer Fixed Point Theorem, Convex Sets, and Existence of General Equilibrium in an N-commodity Economy (3 lectures)
Starr, chapters 5, 8 (prior to section 8.1)
Optional: Arrow-Hahn, chaps. 2
Carter, 1.4.4

Midterm 1 (on April 15) will cover topics 1, 2, 3, 4, 5; Monday April 18 will be devoted to a review of Midterm 1.

The Arrow-Debreu Model of Economic General Equilibrium

6. Representation of Commodities and Prices, Firms and Producers, (3 lectures)
Starr, chaps. 10, 11, 15
Optional: Geanakoplos "Arrow-Debreu Model of General Equilibrium" in *New Palgrave*.
Quirk and Saposnik, 1.7, 2.1, 2.3
Arrow-Hahn, Chapter 3
7. Households, Consumers (3 lectures)
Starr, chaps. 12, 13
Optional: Debreu, Chapter 4
Cornwall, Section 1.4
Quirk and Saposnik, 1.5, 1.6
Arrow-Hahn, 4.1-4.3
Varian, 7.1, 7.2
8. Brouwer Fixed Point Theorem (1 lecture)
Starr, chap. 9
Optional: Debreu, Section 1.10
Nikaido, "Fixed Point Theorems" in *New Palgrave: General Equilibrium*.
Carter, 2.4, 2.4.1, 2.4.4, 2.4.5
9. Equilibrium (3 lectures)
Starr, chap. 14, 15, 16, 17, 18.
Optional: Cornwall, Section 1.6
Quirk and Saposnik, 1.7, 2.1, 2.3
Arrow-Hahn, Chapter 5
Debreu, "Existence of General Equilibrium," *New Palgrave: General Equilibrium*
McKenzie, "General Equilibrium," *New Palgrave: General Equilibrium*

Varian, 17.1 - 17.5

Midterm Exam 2 based on topics 1 - 9 . Subject to revision.

Welfare Economics

10. Fundamental Theorems of Welfare Economics and Separation Theorems (3 lectures)
Starr, chapter 4, section 8.1, chapter 19
Optional: Debreu, Section 1.9.v - 1.9.x,
Cornwall, Sections 4.1, 4.2, 4.3, 4.5, 8.1.4
Quirk and Saposnik, 4.4, 4.5
Varian, 17.6, 17.7, 26.11

11. The Arrow Possibility Theorem (3 lectures)
Arrow, Kenneth J., "A Difficulty in the concept of social welfare", Journal of Political Economy, 58 (1950), pp. 328 - 346. Reprinted in Arrow and Scitovsky, eds., Readings in Welfare Economics, 1969.
"Kenneth J. Arrow (born 1921 -)" by R. Starr
Sen, Amartya, "Arrow and the Impossibility Theorem" on the web.

Extending the General Equilibrium Model

12. Equilibrium over Time: Futures Markets (1 lecture)
Starr, sections 20.1, 20.2

13. Constant Returns and U-Shaped Cost Functions (1 lecture)
Optional: Starr chapters 23, 24, 25

The final examination will cover topics 1 through 13.