

ECONOMICS 113 - MATHEMATICAL ECONOMICS: GENERAL EQUILIBRIUM THEORY

Preliminary – Subject to Revision

Requirements: There will be weekly problem sets, two midterms, and a take-home portion of midterm 2 and the 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, date TBA.

Midterm 2 (covers syllabus sections 1 to 11). In Class, date TBA and Take Home due TBA.

Final: There will be a take home section of the final exam, due date TBA. In-class final exam is scheduled for Friday June 12, 2009 , 11:30a - 2:29p (subject to cancellation).

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*** , Cambridge University Press, 1997. Available in paperback from campus bookstore and from amazon.com. Update Starr with corrigenda.

Reserve Materials: The following items have been requested on reserve in the Geisel library:

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
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.

Scheduled holiday: Monday, May 25.

Introduction

1. The simplest general equilibrium model: Robinson Crusoe (3 lectures)
Starr, 1.1, 1.2
2. The Edgeworth Box (2 lectures)
Starr, 1.3
3. A simple demonstration of existence of general equilibrium (1 lecture)
Starr, 1.4
"Kenneth J. Arrow (1921 -)" by R. Starr
Optional: Arrow-Hahn, chaps.1, 2
Cornwall, 1.1, 1.2, 1.3
Geanakoplos, John, "Arrow-Debreu Model of General Equilibrium" in *The New Palgrave: General Equilibrium*
Varian, 17.1 - 17.5

Mathematics

4. Set notation, Euclidean N-dimensional space, \mathbb{R}^N (1 lecture)
Starr, 2.1 "Set Theory"
Starr, 2.4 " \mathbb{R}^N , Real N-dimensional Euclidean Space"
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

5. Continuous Functions (1 lecture)

Starr, 2.3 "Functions,"

2.5 "Continuous Functions"

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

Midterm 1: will cover topics 1 – 5

6. Convexity (1 lecture)

Starr, 2.6 "Convexity"

Optional: Debreu, Section 1.9

The Arrow-Debreu Model of Economic General Equilibrium

7. Representation of Commodities and Prices, Firms and Producers (2 lectures)

Starr, chap. 3, 4.

Optional: Debreu, Chapter 2, 3

Geanakoplos "Arrow-Debreu Model of General Equilibrium" in *New*

Palgrave.

Quirk and Saposnik, 1.7, 2.1, 2.3

Arrow-Hahn, Chapter 3

8. Households, Consumers (3 lectures)

Starr, chaps. 5, 6

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

9. Brouwer Fixed Point Theorem (1 lecture)

Starr, 2.7 "Brouwer Fixed Point Theorem"

Optional: Debreu, Section 1.10

Nikaido, "Fixed Point Theorems" in *New Palgrave: General Equilibrium*.

10. Equilibrium (2 lectures)

Starr, chap. 7

Optional: Debreu, Chapter 5

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*

Midterm Exam 2 based on topics 1 -10

Welfare Economics

11. Separation Theorems (1 lecture)

Starr, 2.8 "Separation Theorems"
Optional: Debreu, Section 1.9.v - 1.9.x
Cornwall, Section 8.1.4
Varian, 26.11

12. Fundamental Theorems of Welfare Economics (3 lectures)

Starr, chap. 12
Optional: Debreu, Chapter 6
Cornwall, Sections 4.1, 4.2, 4.3, 4.5
Quirk and Saposnik, 4.4, 4.5
Varian, 17.6, 17.7.

13. 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.
"Social Choice" by David Ahn

Extending the General Equilibrium Model

15. Equilibrium over Time: Futures Markets (1 lecture)

Starr, 15.1 "Introduction", 15.2 "Time: Futures Markets"

16. Constant Returns and U-Shaped Cost Functions (1 lecture)

Starr, 16.7 "Kakutani Fixed-Point Theorem"
Additional notes TBA