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ECONOMICS 113 - INTRODUCTION TO MATHEMATICAL ECONOMICS: GENERAL EQUILIBRIUM THEORY

Preliminary – Subject to Revision

Teaching assistant: The course teaching assistant is ELAINE WONG, (e5wong@ucsd.edu). ELAINE is responsible for grading assignments and responding to e-mail inquiries. ELAINE and Prof. Starr will share responsibility for grading examinations.

e-mail: Please send e-mail to e5wong@ucsd.edu. Include 'Econ 113' in the subject line.

Requirements: There will be weekly problem sets, two midterms, 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 ELAINE 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, Monday, April 24.

Midterm 2 (covers syllabus sections 1 to 11). In Class, Friday, May 19 and Take Home due Friday May 19.

Final: There will be a take home section of the final exam, due date TBA. In-class final exam is scheduled for Thursday, June 15 , 11:30 a.m. - 2:30 p.m.

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*
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

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. Approximate dates where topics will be treated in class appear below.

Scheduled holiday: Monday, May 29.

<u>Introduction</u>

1. The simplest general equilibrium model: Robinson Crusoe (April 3, 5, 7)
   Starr, 1.1, 1.2

2. The Edgeworth Box (April 10, 12)
   Starr, 1.3

3. A simple demonstration of existence of general equilibrium (April 14)
   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

<u>Mathematics</u>

4. Set notation, Euclidean N-dimensional space, R^N (April 17, 19)
   Starr, 2.1 "Set Theory"
   Starr, 2.4 "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 (April 21)
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: Monday April 24

6. Convexity (April 26)
Starr, 2.6 "Convexity"
Optional: Debreu, Section 1.9

<u>The Arrow-Debreu Model of Economic General Equilibrium</u>

7. Representation of Commodities and Prices (April 28)
Starr, chap. 3
Optional: Debreu, Chapter 2
Geanakoplos "Arrow-Debreu Model of General Equilibrium" in *New Palgrave*.

8. Firms, Producers (May 1, 3)
Starr, chap. 4
Optional: Debreu, Chapter 3
Quirk and Saposnik, 1.7, 2.1, 2.3
Arrow-Hahn, Chapter 3

9. Households, Consumers (May 5, 8, 10)
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

10. Brouwer Fixed Point Theorem (May 12)
Starr, 2.7 "Brouwer Fixed Point Theorem"
Optional: Debreu, Section 1.10
Nikaido, "Fixed Point Theorems" in *New Palgrave: General Equilibrium*.

11. Equilibrium (May 15, 17)

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 Friday, May 19.

Welfare Economics

12. Separation Theorems (May 22)
Starr, 2.8 "Separation Theorems"
Optional: Debreu, Section 1.9.v - 1.9.x
Cornwall, Section 8.1.4
Varian, 26.11

Memorial Day Holiday, Monday, May 29

13. Fundamental Theorems of Welfare Economics (May 24, 26, 31)
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.

14. Problems in Welfare Economics: Fairness, Public Goods, External Effects (May 31)
Readings TBA

Extending the General Equilibrium Model

15. Equilibrium over Time: Futures Markets (June 2)
Starr, 15.1 "Introduction", 15.2 "Time: Futures Markets"

16. Constant Returns and U-Shaped Cost Functions (June 5)
Starr, 16.7 "Kakutani Fixed-Point Theorem"
Additional notes TBA

17. Who Needs Economic Theory Anyway? (June 7, 9)
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.