Fall 2000 **Dr. Kohlhase**
MW 11:00am-12:30pm 212M **Univ. of Houston**

Econ 6390
Workshop in Research Methods 1:
Mathematics for Economics

Course Description: This is a first year graduate course that focuses on the structure of economic analysis. Economists extensively use mathematics to help them analyze economic problems and this course covers the mathematics that is most frequently used by economists. The course starts with a brief review of some fundamental math concepts and of one-variable calculus. Topics to be covered in depth include multivariate calculus and optimization (both constrained and unconstrained), convexity, the envelope theorem, matrix algebra, comparative statics, and differential equations. The course emphasizes applications with some attention to proofs. The PC computer program Mathematica may occasionally be used.

OFFICE: 201B McElhinney, 713-743-3799
hours: MW 12:30-2:00pm, and by appointment
email: jkohlhase@uh.edu
webpage: http://www.uh.edu/~kohlhase
FAX: 713-743-3798

TEACHING ASSISTANT: Naoki Sugimoto, Room 250 M, 713-743-3816
office hours: M 3-5pm, and by appointment
email: nsugimot@bayou.uh.edu

COURSE REQUIREMENTS:

Midterm 1	(tentatively Fri. Sept. 22)	25%
Midterm 2	(tentatively Fri. Oct. 27)	25%
Final Exam	(during week of Dec. 5-13)	40%
Homeworks		10%

Note: Midterms will be held Friday afternoons. The final will be comprehensive. Homeworks will be periodically assigned, but it is highly recommended that you do many of the exercises on your own in Grafton & Sargent, Simon & Blume, Chiang, Silberberg, and Solow.

REQUIRED TEXTS

Carl P. Simon and Lawrence Blume, Mathematics for Economists, Norton, 1994. (more advanced; also on 2-hour reserve in the library) **[SB]**

Knut Sydsaeter, Arne Strom, and Peter Berck, Economists' Mathematical Manual, Springer-Verlag, 3rd. ed., 1999. (this is a great reference manual that will be useful for all of your courses)

RECOMMENDED TEXTS (available in bookstore)

Alpha Chiang, Fundamentals of Mathematical Economics, 3rd. ed., McGraw-Hill, 1984. (highly recommended; is less rigorous than SB; also on 2-hour reserve in the library) **[C]**

R. Quentin Grafton and Timothy C. Sargent, A Workbook in Mathematical Methods for Economists, McGraw-Hill, 1997. (full of many solved problems). **[GS]**

Eugene Silberberg and Wing Suen, The Structure of Economics: a Mathematical Analysis, Irwin, McGraw-Hill, 3rd. ed., 2001. (this is a classic text with one of the most painstaking treatments of comparative statics; useful background material for many courses). **[SS]**

OTHER USEFUL TEXTS (on two-hour reserve; located on the third floor of M. D. Anderson library)

A. K. Dixit, Optimization in Economic Theory, 2nd. ed., Oxford University Press, 1990 (short, useful summary of optimization techniques). **[D]**

Daniel Solow , How to Read and Do Proofs, 2nd.ed., John Wiley, 1990 (a simple "recipe" for various approaches to proofs). **[S]**

COURSE OUTLINE

note: items in square brackets, [], are optional

	TOPIC	**READING ASSIGNMENTS**
1.	Introduction	SS 1; S 1;
2.	Sets, Functions	SB Appendix A1.1-1.2, 2.1; C 2.2,2.3,2.4 [GS 3]
3.	Algebraic Approach to Convexity and Quasiconvexity	C pp. 348-352, pp.387-393; SB 21.3; SS pp.139-140
4.	Brief Review of Proofs	S (entire book) SB Appendix A1.3
5.	Sequences and Series -discounting, e and ln	SB 12.1 C 10; SB 5

6.	One Variable Functions and Calculus	SB 2; C7.1-7.3 [SS 2; SB 3, 4]
	-Taylor series	C 9.5; SS 2.5 [SB 30.2]
7.	Maxima, Minima, and Convexity I	C9; SB 3.5, 3.6 [GS 4]
8.	Multivariate Functions	SB 14.1-14.5 C 11.1-11.2 [SS 3.1-3.5],
	-Implicit Function Theorem	SB 15.1-15.2 [SS 5.3]
	-homogeneous and homothetic	SS 3.6, 9.1-9.2 SB 20; [GS 3]
9.	Integration	C 13 [SB A4; GS 10]
10.	Matrices and Determinants	SB 7.1-7.4, 8,9 C 4,5 [GS 2]
	-vector spaces	SB 10.1-10.3, 10.7
	-linear dependence	SB 11.1
	-eigenvalues	SB 23.1, 23.3 C pp. 326-330
11.	Maxima, Minima, and Convexity II	SB 16,17 C 9,11 SB 21.1-21.3 S 4,6 [GS 4; SS 4]
12.	Constrained Optimization with Equality Constraints	C 12 SB parts of 18-19; [D 2,4] [SS 6, GS 5]
13.	Envelope Theorem, Value Functions, and Duality	SS 7 [GS 6]
14.	Constrained Optimization with Inequality and Nonnegativity Constraints	SS 14 SB parts of 18-19

[D 3,4; C 21.1-21.3]
[GS 8]

15. Differential Equations C 14; SB 24
[GS 12]