Syllabus
Economics 245 – Math for Economists
Professor Cecilia Fieler, University of Pennsylvania
Spring 2012

Evaluation   Homework (10%), midterm 1 (20%), midterm 2 (30%), final exam (40%).

Homework   Problem sets are assigned each Tuesday and due the next Tuesday, except for weeks in which there is an exam. Worst problem set dropped. Late homework not graded. You may work in groups, but you must write them up individually.

Midterms   In class on February 14 and March 27. Closed book and notes.

No make-up midterms. If you cannot take one or both midterms, the remaining evaluative items will be scaled up proportionately.

Final Exam   May 8, 12-2pm. Cumulative. Closed book and notes.

Prerequisites   The prerequisites are Math 114 or 115 (college calculus II – multivariate), and Econ 101 and 102 (intermediate micro and macro). Some knowledge of elementary probability theory, as is taught in Econ 103, will be helpful.

Hours   The class meets on Tuesdays and Thursdays, 9-10:30 in Stiteler Hall, B21. My office hours are **Thursdays, 11:00am - 12:00 noon** in 434 McNeil or by appointment. afieler@econ.upenn.edu.

Teaching Assistant   The TA is Yanhao (Max) Wei, yanhao@sas.upenn.edu. He will have primary responsibility for solution sets and grading – all questions about grading of particular problems and exams should be taken first to him. His office hours are **Fridays, 5-7pm** in 472 McNeil.

Notable Dates   The exams are on February 14, March 27 and May 8.

Texts   The following books should be available at Penn Bookstore.

- Dixit, Avinash K., *Optimization in Economic Theory,* Oxford, 1990 (2nd ed).

- Simon, Carl P. and Lawrence Blume, *Mathematics for Economists,* Norton, 1994.

- Mas-Colell, Andreu, Michael D. Whinston and Jerry E. Green, *Microeconomic Theory*, Oxford University Press, 1995.

The Dixit (D) text is short and sweet and cheap. The Simon & Blume (SB) text is long and heavy and expensive. The lectures will be more advanced than D and less advanced than SB. If you contemplate going to graduate school in economics or some related field, you should buy and master SB. Some homework problems will be taken from both books. Mas-Colell et al. is also long, heavy and expensive. I will draw only some proofs from it.

Relevant lecture notes from courses taught elsewhere can be found on the web at http://www.econphd.net/notes.htm#Mathematics . Many of the lecture notes found on this webpage are too advanced for this course. The online tutorial by *Osborne* is appropriate.

Topics We study the following mathematical ideas, primarily regarding optimization, and their uses in economics.

1. Review of differentiability. First-order conditions for optimality.

2. Consumer problem. First-order Lagrangian conditions.

3. Shadow prices. Comparative statics. Implicit function theorem.

4. Value functions. Total differentiation. Envelope theorems.

5. Convexity and concavity.

6. Separating hyperplanes. Second welfare theorem.

7. Second-order conditions for optimality.

8. Choice under uncertainty. Expected utility, risk aversion.

9. Introduction to dynamic programming.