Econ 512  
Empirical Methods  
Fall 2012-Spring 2013

Professors:  
Mark Roberts  
Paul L. E. Grieco

E-mail:  
mroberts@psu.edu  
paul.grieco@psu.edu

Office:  
513 Kern  
509 Kern

Office Phone:  
863-1535  
867-3310

Office Hours:  
T, Th, F after 4:00pm  
W 10-12

Description:  
This is a required one-year course for second-year Ph.D students in economics. It will meet once per week for both fall and spring semester. For administrative reasons, the three credits and grade will be given in the spring semester.

Its goal is to provide students with practical experience using computational tools to solve economic models numerically, program econometric methods, and present empirical results.

Grading:  
The grades will be based on homework exercises that use the computer, class attendance and participation, and an empirical research project. There will be one grade given at the end of the spring semester.

The empirical project requires either replicating and extending an existing empirical paper or developing a new application that involves either econometric estimation or numerical solution of a theoretical model. The empirical research project is to be written in the form of a journal article with motivation, model development, data explanation, and clearly documented empirical results. In addition to homework exercises, which will due throughout the course, there are several deadlines for the empirical project.

December 12 (last class in the fall semester) - An outline of the empirical project is due. This should describe the project, the data and computational methods that will be used, and the relevant literature it is based on.

March 11 (the first day after spring break) - A complete first draft of the empirical project is due. Students will present their project during the last seven weeks of the semester and can do revisions during this time. There will be approximately 3 presentations each week.

April 27 (last day of classes in the spring) - Final draft of the empirical project is due.

Recommended Textbooks:


Matlab References (optional):

*Getting Started With Matlab: A Quick Introduction for Scientists and Engineers*, Rudra Pratap, Oxford University Press, 2010


**Fall 2012** (15 classes)

1. Solving Nonlinear Equations.  MF chapter 3 and Judd chapter 5
   
   Bisection, Fixed-Point Iteration, Newton’s method, Broyden’s Method, Complementarity Methods

2. Optimization.  MF chapter 4 and Judd chapter 4

   Newton-Raphson, Quasi-Newton, Nelder-Mead Simplex, Constrained Optimization.  Include numerical differentiation.

3. Numerical Integration.  MF chapter 5, Judd chapter 7 and 8

   Newton-Cotes Methods, Gaussian quadrature, Monte Carlo methods


5. Dynamic Programming I: Finite and Infinite Horizon, Deterministic and Stochastic DP

   MF Chapters 7, Judd Chapter 12.1-5, AC Chapter 1,5

**Spring 2013 until spring break (8 classes, weeks of Jan 7 – March 1)**

6. Dynamic Programming II: Collocation Methods, Dynamic Games, Homotopy Methods

   MF Chapter 9, Judd Chapter 6, 12.7-11


7. Bayesian Estimation Methods
   CT Chapter 13


8. Nonparametric Methods
   CT Chapter 9.


Spring 2013 after spring break (7 classes). Student presentations, 3 students/week.