Course Syllabus for Economics 8433:
Computational Trade Policy Analysis

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Overview

The primary goal of this course is to provide graduate students in economics with the mathematical and computer skills required for building and analyzing large scale numerical equilibrium models of trade policy reform. The course objectives are to provide students with:

- a practical working knowledge of the mathematical concepts which underly partial and general equilibrium trade policy models,
- an introductory overview of the way in which computational equilibrium models are used in policy analysis,
- hands-on experience in the formulation from scratch of general equilibrium models,
- an opportunity to develop facility in doing computational economics with the GAMS programming language for data management, model formulation and analysis.

Prerequisites

This course is open to both MA and PhD students. All students must have completed a graduate course in micro theory, at the level of Econ 6070. Students are expected to be comfortable with the standard mathematical tools used in economics, specifically calculus, linear algebra and constrained optimization.

Conduct of the Course

Students must attend and participate in classes. Readings must be completed prior to associated lectures. The first half of the term will have a traditional lecture format with periodic reading assignments and problem sets. Class meetings during the second half of the term will devote time to student presentations of term papers and discussions of assigned journal articles. Communication skills, both written and oral, are an important part of how students will be assessed.

Workload

Three in-class tests.

One term paper with four components: (i) initial abstract and outline, (ii) revised abstract and outline, (iii) first draft, (iv) final draft.

Final examination: two hours at time/date scheduled by the university.
Auditing

Auditing students are welcome, provided that they complete all homework assignments on time and write all tests. Graduate students must take the course for credit if they wish to do thesis work using these methods.

Books and Materials

The GAMS User's Guide

Notes on the MPSGE Modeling Framework

Several journal articles and working papers. A comprehensive reading list will be provided on the first day of class.

Convenient access to a PC is highly recommended for this class. Minimum hardware requirements are a Pentium based machine with 64 MB of memory.

Student version of GAMS software are provided without charge to enrolled students.

Students should be well acquainted with a fully-functioned text editor. The links on the GAMS Tools Page

Topics of Study (more or less one per week)

1. Linear Programming

   Textbook exposition, formulation of some standard linear programming (LP) models. Karush-Kuhn-Tucker conditions and the linear complementarity problem (LCP), economic interpretation of dual multipliers. Exercises in LP formulation, converting an LP into an MCP, graphical representation.

2. Programming with GAMS


3. Nonlinear Programming

   Graphical introduction. Lagrange's method. KKT conditions again. The spatial equilibrium model. Integrability of demand and supply functions. Extensions of the competitive model. Formulate and analyze a spatial price equilibrium model using real data.

4. Complementarity Programming

   This section of the course introduces a comprehensive framework for economic analysis. The introduction focuses on extensions of the spatial equilibrium model to incorporate imperfectly competitive behavior. An exercise will involve the formulation of a market equilibrium model in
a NLP format and then converting the model into the nonlinear complementarity format.

5. General Equilibrium Modeling with MPSGE

MPSGE is a high-level language for applied general equilibrium analysis. We look at a sequence of increasingly complex models based on ideas from international trade and environmental economics. We will begin with Markusen's introductory examples.

6. The GTAP Global Trade Dataset and Model (GTAPinGAMS)

This section begins with basic ideas behind social accounting matrices. Introduce basic GAMS programming for simple data tasks such as aggregation. Excercises will involve working with large-scale datasets and implementing a simple general equilibrium structure.

7. Modeling International Trade Agreements

We will examine regional trading agreements emphasizing the formulation and application of models with imperfect competition and increasing returns to scale.

8. Environment-Trade Issues and Applications Economics

There are a range of issues related to the environmental impacts of trade policy reform. We will read three or four background papers dealing the carbon taxes and trade, labor standards and acid rain.