

AAE 526: Quantitative Methods in Agricultural and Applied Economics

University of Wisconsin Madison

MWF 7:45–8:35am, Russell Lab 104
Fall Semester, 2019

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Overview

What modeling frameworks can be used to evaluate the economic consequences of Brexit? How does road infrastructure affect congestion and urban unemployment? What about methods for evaluating the impact of parking fees on urban traffic congestion? How do renewable portfolio standards affect regional electricity prices? Economic equilibrium models provide one method of producing *ex-ante* assessment of policy impacts in a wide range of policy issues.

The starting point for this course will be nonlinear programming, a modeling format commonly employed in economic and managerial decision making. We will subsequently introduce nonlinear complementarity models, a format which is well suited for models based on the building blocks of microeconomics (price theory and game theory).

This course provides an introduction to applied general equilibrium and other applied models of economic choice commonly formulated for economic policy analysis. The course will more generally cover applications of nonlinear optimization and complementarity methods in economics, with a problem-solving perspective emphasizing the formulation and application of models to economic issues.

This semester we focus on (i) partial and general equilibrium models commonly applied for trade policy analysis, (ii) linear and nonlinear programming methods for estimation and matrix balancing, (iii) bottom-up models for transportation and electricity networks, (iv) methods for top-down / bottom-up assessment of transportation and electricity policy impacts from an economy-wide perspective.

Learning Objectives

This is a three credit course appropriate for undergraduate and graduate students interested in learning about economic policy analysis, applied nonlinear programming, and the use of numerical methods in economic policy analysis. This semester will focus on applications in traffic and electricity networks in addition to mainstream economy-wide general equilibrium applications.

The course is open to students who have had been introduced to textbook models of economic choice, linear algebra and calculus. Familiarity with linear programming is recommended but not required.

Economics students will be introduced to a bit of the science and art of numerical modeling. Industrial engineering and computer science will be introduced to some of the key ideas in the economic theory of choice and their application to practical issues.

The course incorporates skills related to both numeracy and literacy. We will learn about how to locate and interpret economic datasets. We learn to use a modeling language, methods for graphical representation and elementary spreadsheet and database skills for understanding data. We develop an appreciation for the role of models and evidence in the rhetoric of economic policy.

Instructional Mode: Face-to-face

Assignments and Assessment

- Five homework assignments (20% total)
- Two modeling assignments (40% total)
- One mid-term exam (15%, held in class on Monday, October 28)
- A final exam (25%, Tuesday, December 17, 7:45am-9:45am, loc TBA).

Homework assignments must be done individually, but the modeling assignments can be completed in groups of two. You may work with a particular classmate on at most one assignment. The assignments will preparation of a short paper and a deck of slides outlining your approach to the problem, model formulation, data and results.

Texts and Teaching Resources

Class notes, assignments, readings, and other resources will be posted to the class site Canvas page on Learn@UW. A few readings will have direct web links from the syllabus. My goal is to place the PDF lecture notes on line by the evening before lecture to encourage participation by providing a clear summary of what material the class session will cover. Access to the site requires registration for the class and a valid UW NetID.

The course will use the GAMS modeling language runs on both Windows and Mac computers. The course license is shown below. This license will work with all platforms supported by GAMS and will expire at the end of 2018.

California, Berkeley)

The remainder of readings for the class will be provided on the course web page.

Contact Information: Thomas F. Rutherford

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 - Wednesday Afternoons (1:30-4:00 pm)
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