Agricultural Economics 652

Application of Quantitative Analysis: Mathematical Programming

Syllabus Spring 2020

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Prerequisites:
Agricultural Economics 552. As a substitute for 552, a thorough understanding of matrix algebra, differential calculus, and linear programming is a good substitute. If you have not had 552 or at least one course covering each of these topics, see the instructor to discuss your background and possible supplementary material.

Objectives:
The focus of the course will be on the theory and practical aspects of mathematical programming and on the formulation of mathematical models with a primary focus on optimization models. Topics will include: a review of optimality conditions and convex analysis for nonlinear programming and a variety of approaches to modeling. The modeling section of the course will include models of the consumer, the producer, and the sector. Model features such as risk, dynamics, and approaches to incorporating government policies and private contractual arrangements will also be addressed. Non-parametric efficiency testing will be included. The course will involve a good deal of hands-on model formulation and construction. The tool for numerical model solution will be the GAMS modeling language, the features of which will be addressed during the course.

Lectures:
Lectures will be delivered during regular class sessions. Expect to read the notes (see below), ideally keeping a bit ahead of the lecture. It is good to plan that we will get through about 25-30 slides per class. In addition, there will be a computer lab help session. The help session will be arranged so as to accommodate as many of your schedules as possible – to that end, we will take a poll a week or so into the semester to find a day/time that works for as many as possible.
Book:
An extensive (but not expensive!) set of notes will be available from the University Bookstore across State and Grant streets from Krannert. These notes bear a copyright notification and are not to be posted on line, and may not be changed without my written consent. Reference Book – Brooke, A., D. Kendrick, and A. Meeraus, GAMS: User's Guide and GAMS Solver Manuals, Release 2.25, GAMS Development Corporation, Washington, D.C., 1996. (This reference material, along with a variety of other useful documents relevant to the GAMS language, is on the Web at http://www.gams.com/docs/document.htm. These materials and more are also available for the most part through the GAMS help facility.)

Exams and Grades:
Grades will be based on performance on a two-part midterm examination (30%), a final examination (35%), homework and quizzes (30%) and class participation (5%). The tentative date for the first part of the midterm is the Thursday immediately before Spring Break during the regular class period. The tentative date for the second part of the midterm, which is a hands-on demonstration of your GAMS skills, is during the week immediately after Spring Break during the computer help session time-slot. The final will be scheduled by the University during finals week, will be two hours long and comprehensive. Exams are closed book and closed notes. You may bring one 8 ½” x 11” sheet of paper on which you may write or print whatever you want. You are encouraged to bring a calculator.

Homework Policy:
To be considered “on time,” homework papers must be submitted by the time the grader begins grading them. This will occur no earlier than 5:00 pm on the day that the papers are due, and may occur somewhat later. Check with the grader for the grading schedule if you will be handing in a paper late. Papers that are turned in late, but are turned in before corrected papers and solutions have been distributed, will receive a 10% penalty. Papers turned in after corrected papers and solutions have been distributed will be marked, but no credit will be given.

Homework comprises a substantial portion of the grade for this course. Some of the homework will be difficult. Because the instructor believes that you learn a lot by working together and that figuring things out together does a good job of simulating the way you will operate in your research career, you are encouraged to discuss homework and strategy for solution. However, you are required to write up the homework (including the programs) independently. Violations of this rule will be dealt with harshly (see Academic Misconduct section below).

Computer Usage:
Mathematical programming (not necessarily numerical) is pervasive in applied economics. It is used: as the basis for neoclassical economics, to simulate the implications of environmental change, to evaluate agents’ responses to policies and contracts, to derive econometric problems to be estimated, to estimate econometric problems, and to develop strategic and operational plans for a wide variety of businesses. For some purposes, these models have neat, closed-form solutions. One goal of this course is to help you understand when closed form solutions will exist, and when they will be tractable to derive. However, many models are impractical, or even impossible to solve analytically and hence are best approached numerically. Numerical solution
is often a stumbling block for the applied economist. One of the goals of this course is to remove this stumbling block. Hence, the computer will be one of the primary tools of analysis for this course.

Each student will have to learn to use the GAMS programming language (access is available on the Department’s computer network). You may also download GAMS from the Web at http://www.gams.com/download/. This is the full version of GAMS, but it does not support large problem sizes. I have obtained temporary licenses (good through May 2020) to allow you to solve larger problems if needed, and I will e-mail these two you a couple of weeks into the semester. With one or two possible exceptions, you should not need the large license for the homework. Use of GAMS will be required for the homework. Students should be familiar with the MS-Windows operating system. Operating system topics will not be addressed in the course.

**Mental Health Syllabus Statement:**
If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try WellTrack, https://purdue.welltrack.com/. Sign in and find information and tools at your fingertips, available to you at any time.

If you need support and information about options and resources, please see the Office of the Dean of Students, http://www.purdue.edu/odos, for drop-in hours (M-F, 8 am- 5 pm).

Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 and http://www.purdue.edu/caps/ during and after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

**Students with Disabilities:**
Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

**Campus Emergencies:**
In the unusual event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Information about ongoing on-campus emergencies will be posted at http://www.purdue.edu. Local news is available at http://www.wlfi.com and http://www.jconline.com. Cell phone emergency text messages will be sent to those signed up for them. You can register for this university service at http://www.purdue.edu/securepurdue/. For specific information regarding changes in this course, visit the course home page, contact me by email at preckel@purdue.edu, or call my office (494-4240).
Communication:
Please note that my primary out-of-class method of communication will be via email to your Purdue email address. I will not generally attempt to contact you at email addresses other than your Purdue email address. It is your responsibility to check for mail on a regular basis. I recommend checking your Purdue email at least once every 24 hours.

Academic Integrity:
Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

Honor Pledge:
“As a boilemaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue.”

Diversity & Inclusion:
Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. Purdue’s nondiscrimination policy can be found at: http://www.purdue.edu/purdue/ea_eou_statement.html.

This syllabus is subject to change.