AGEC 652 - Application of Quantitative Analysis: Mathematical Programming

Spring 2022 - Tuesdays and Thursdays 9:00–10:15 AM, Rawls Hall 1071

Instructor: Diego S. Cardoso

Office: Krannert 636

Office hours: Tuesdays 2:30–4 PM or by appointment

Email: cardosod@purdue.edu. Please include [AGEC652] in the subject.

Phone: (765) 494-4212

Course website: https://github.com/PurdueAGEC652/Spring2022

This syllabus is subject to change. You will be notified of any changes as far in advance as possible. Please monitor your Purdue email daily for updates.

Course Information

Credit hours: 3.0

Instructional Modality: Face-to-face (subject to change under university direction)

Objectives

This course will introduce you to key computational methods used in applied economics research and prepare you to use these methods in your own research projects. By the end of the course, you should have an expanded tool set for applied research: you will understand why and when computational methods are needed in economics research, learn to identify and model economic problems that can be solved using such methods, and apply the appropriate method for each type of problem.

Course summary

This course can be conceptually divided into four parts. In the first part, we will cover the fundamentals of scientific computing and best practices for research in economics. In the second part, we will study core computational methods including numerical linear algebra and calculus, rootfinding, and optimization.

Prerequisites

AGEC 552 or ECON 615. Alternatively, you should have a thorough understanding of matrix algebra and differential calculus, which are fundamental to this course.

Some familiarity with computer programming is desirable but not strictly necessary. Please reach out to the instructor if you would like to discuss your background and possible supplemental materials.

Readings

This course will be based on lecture notes provided by the instructor and select research papers. Course materials and references to research papers will be posted on the course website. The lecture notes will draw from and present a summarized version of select chapters from the three companion textbooks listed below. While there is no mandatory textbook for this course, it is highly recommended that you consult these references

1. Judd, Kenneth L. *Numerical Methods in Economics*. Cambridge, MA: MIT Press, 1998.
2. Miranda, Mario J. and Paul L. Fackler. *Applied Computational Economics and Finance*. Cambridge, MA: MIT Press, 2002.
3. Nocedal, J. and S. J. Wright. *Numerical Optimization*. New York: Springer, 2nd edition, 2006.

Course Policies

University Policies

Classroom Guidance Regarding Protect Purdue

Any student who has substantial reason to believe that another person is threatening the safety of others by not complying with Protect Purdue protocols is encouraged to report the behavior to and discuss the next steps with their instructor. Students also have the option of reporting the behavior to the Office of the Student Rights and Responsibilities. See also Purdue University Bill of Student Rights and the Violent Behavior Policy under University Resources in Brightspace.

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 integr ity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information is submitted the greater the opportunity for the university to investigate the concern. More details are available on our course Brightspace table of contents, under University Policies.

Purdue Honor Pledge

"As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together – we are Purdue."

Nondiscrimination Statement

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 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. A hyperlink to Purdue's full Nondiscrimination Policy Statement is included in our course Brightspace under University Policies.

Accessibility

Purdue University is committed to making learning experiences accessible. 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.

Mental Health and Wellness Statement

If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try WellTrack. 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 contact or see the Office of the Dean of Students. Call 765-494-1747. Hours of operation are M-F, 8 am- 5 pm.

If you find yourself struggling to find a healthy balance between academics, social life, stress, etc. sign up for free one-on-one virtual or in-person sessions with a Purdue Wellness Coach at RecWell. Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is completely free and can be done on BoilerConnect. If you have any questions, please contact Purdue Wellness at evans240@purdue.edu.

If you're struggling and need mental health services: 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 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.

Basic Needs Security

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday. Considering the significant disruptions caused by the current global crisis

as it related to COVID-19, students may submit requests for emergency assistance from the Critical Needs Fund

Emergency Preparation

In the 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 beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.