Course Description

Economics studies the efficient allocation of scarce resources.

It follows almost immediately from this definition that while verbal and graphical analyses are often helpful too, economists derive their sharpest and most powerful results by setting up and solving constrained (because resources are “scarce”) optimization (because allocations should be “efficient”) problems. Hence, this course, EC720, will introduce you to a variety of techniques for doing just that: setting up and solving constrained optimization problems.

Specific methods to be covered include those based on the Kuhn-Tucker and envelope theorems, the maximum principle, and dynamic programming. Since this is a “math for economists course” as opposed to a “course in mathematical economics,” its emphasis will be not so much on stating and proving theorems but on developing an intuitive understanding of how and why each method works and determining when one particular approach may be easier or more convenient than all others to apply to a specific problem.

Course Materials

My lecture notes, which will serve as the main text for the course, are freely available through the course webpage at http://www2.bc.edu/~irelandp/ec720.html. Much of the material from these lecture notes is also covered in two textbooks:


Another excellent reference that deals with the same topics in greater detail and with more rigor but in most cases goes beyond what we will strictly speaking need for this course is:


Course Requirements and Grading

Your grade for this course will be based on a series of problem sets (40%) and a take-home final exam (60%).

The problem sets will be made available through the course webpage and your answers to the questions on those problem sets will be collected on dates announced ahead of time in class. Some of the problem sets will follow the material covered in class quite closely; others will highlight
problems and results that extend those covered in class. All of the problem sets will help you prepare for the final exam.

While it is fine for you to work together with other students on the problem sets, I still expect you to hand in your own individual answers to each question. Also, if you do work with others make sure that you fully understand the answers to each problem, keeping in mind that you will have to work individually on the final exam.

The take-home final exam will be handed out and made available through the course webpage on the day of our last regular class meeting at the end of the semester. Your answers to the questions on the final exam will be due on the date reserved for the EC720 final by the Economics Department’s official final exam schedule.

The take-home final will be an “open book” exam: it is fine to consult your notes, textbooks, and other references when working on the exam questions. Different from the problem sets, however, I will expect you to work independently on the final exam without consulting with other people, inside or outside of this class. That is, I expect that the work you will hand in for the final exam will be yours and yours alone.

Academic Integrity

Please familiarize or re-familiarize yourself with the University’s policies on academic integrity, which can be found at http://www.bc.edu/integrity and take care to uphold these standards as they apply to your work for this course.

Along these lines, to repeat: while it is fine for you to work together with other students on the problem sets, I expect that your work on the final exam will be yours and yours alone.

Office Hours

I will hold regular office hours (21 Campanella Way, Room 444) on Tuesdays and Thursdays from 12 noon to 1 pm. I will also be available at other times; to make an appointment, you can reach me by phone at 552-3687 or (preferrably) by email at irelandp@bc.edu.

Course Outline

1. The Kuhn-Tucker and Envelope Theorems
   Dixit, Chapters 2, 3, and 5
   Simon and Blume, Chapters 18 and 19
   Acemoglu, Appendix A
2. The Maximum Principle
   Dixit, Chapter 10
   Acemoglu, Chapter 7
3. Dynamic Programming
   Dixit, Chapter 11
   Acemoglu, Chapters 6 and 16