Course Description

The focus of this course is on optimization in relation to economic theory. The course will cover static optimization problems using the Lagrange and Kuhn-Tucker formulation and develop theorems such as the envelope and maximum theorem, followed by optimization techniques useful for dynamic problems, including the Pontryagin Maximum Principle and the Bellman approach of Dynamic Programming. This is a “math for economists course” as opposed to a “course in mathematical economics”, so intuitive understanding and ability to solve problems is the goal of the course. Lectures will develop the theory of optimization, but proofs of theorems will often be outlines rather than rigorous. In pursuit of a good understanding of the theorems, some formal mathematical results will be covered, and so some mathematical maturity will be presumed. A good understanding of multivariable calculus and the basics of linear algebra is necessary, and experience with formal mathematics and basic knowledge of real analysis will be useful.

Course Materials

The course webpage can be found at [http://www2.bc.edu/samson-alva/ec720f11/](http://www2.bc.edu/samson-alva/ec720f11/). I will furnish some lecture notes as the semester progresses. Much of the material from these lecture notes is also covered in the following textbooks:


Other excellent textbooks that deal with the same topics in this course, with varying levels of mathematical rigor, are:

Course Requirements and Grading

Your grade for this course will be based on a series of problem sets (40%), a midterm exam (20%) and a final exam (40%).

You will generally have no less than one week from the date a problem set is distributed to return the solutions. While it is fine for you to work together with other students on the problem sets, I still expect you to write 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.

Both exams will be in-class exams, but they will be “open book” exams, which means you may consult your notes, textbooks, and other physical references when working on the exam questions. However, no collaboration will be allowed for the exam. It is unlikely that you will need to use any references if you have adequately prepared. The purpose of the “open book” policy is to reduce the stress of memorizing results, and increase the time spent understanding them.

The date of the final exam will be the one determined by the Department. The midterm will be on October 11, but is subject to change.

Academic Integrity

Please familiarize yourself with the “Academic Integrity” Section of the Boston College Catalog (35-36) or online at http://www.bc.edu/integrity.

You are encouraged to work together on the problem sets, but the work you hand in must be your own, both in solution and in writing. Collaboration on exams, however, is forbidden, including any take-home part of any exam, should there be one.

Accommodations for Disability

If you have a disability and will be requesting accommodations for this course, please register with either Kathy Duggan (kathleen.duggan@bc.edu), Associate Director, Academic Support Services, the Connors Family Learning Center (learning disabilities and ADHD) or Suzy Conway (suzy.conway@bc.edu), Assistant Dean for Students with Disabilities (all other disabilities). Advance notice and appropriate documentation are required for accommodations.

Course Outline

1. Math Preliminaries

   Acemoglu: Appendix A
   Intriligator: Appendix A
   Kamien, Schwartz: Appendix A

2. Classical and Nonlinear Programming

   Dixit: Chapters 2–5, 7, 8
Simon, Blume: Chapters 18, 19
Acemoglu: Appendix A
Intrilligator: Chapters 2–4
Kamien, Schwartz: Appendix A

3. Optimal Control and the Maximum Principle
   Dixit, Chapter 10
   Acemoglu, Chapter 7
   Intrilligator: Chapters 11, 12, 14
   Kamien, Schwartz: Part 2

4. Dynamic Programming and the Bellman Equation
   Dixit, Chapter 11
   Acemoglu, Chapters 6 and 16
   Intrilligator: Chapters 13
   Kamien, Schwartz: Part 2