Economics 7408 (12F2) Fall 2018
Math Methods for Economics J. Hamilton

Mathematical Methods and Applications to Economics

This is a half-semester course for students taking first-year Ph.D. courses in the theory and econometrics sequences offered by the Department of Economics. It is expected that students have had calculus through partial derivatives (or the summer math refresher course) prior to taking this course.

Most of this course covers elements of linear algebra needed for constrained optimization in microeconomics and for regression analysis in econometrics. The rest of the course focuses on an introduction to differential equations for dynamic optimization.

Note: This course is offered as a 1-credit or 2-credit course. Any student taking both this course and Game Theory for Economics (ECO 7404) should consult the Economics office on how many credits to register for. Whether one takes this as a 1-credit or 2-credit course will not affect the internal GPA computation for Economics Ph.D. students (both courses will count as one-half of a full-semester course).

Diagnostic Exam for Summer Course Topics: If you did not take this exam as part of the Math Camp, contact me after class.

Requirements:
Problem sets will be handed out approximately every week. These will be graded as an aid for your learning. Your performance on the problem sets will only affect your grade if you are on the border between letter grades (pluses and minuses included). You may work with other students in solving the problems, but each student must turn in his/her own homework. The goal is to learn the material, not simply to complete the assignments.

The final exam will be an in-class exam. The exact time will be announced several weeks in advance. Possible times are Wednesday evening 10 October, Friday 12 October, or in class Tuesday October 11.

Class Meetings Tuesdays and Thursdays 3rd-4th periods (9:35 - 11:30 am), MAT 114

Office Hours Wednesdays 10:00 am – 12:00 noon MAT 328
For other times, please call to make sure I am available. I am generally unavailable Friday mornings because of department seminars.

Contact Office: MAT 328
Phone: 392-2999 (2-2999 from on campus)
Email: hamilton@ufl.edu

Text: Bergin, *Mathematics for Economists with Applications*, Routledge (2015) (**B**)

(alternative) Sydsaeter and Hammond, *Mathematics for Economic Analysis*, Prentice-Hall, 1995 (**S&H**)

Supplementary Books:

Simon and Blume, *Mathematics for Economics*, Norton, 1994 (**S&B**)
This is an excellent reference book that you may find useful to own.

Lay, *Linear Algebra and its Applications*, Addison Wesley, 1997 (2nd edition)

Kamien and Schwartz, *Dynamic Optimization: The Calculus of Variations and Optimal Control in Economics and Management*, 2nd edition, North-Holland, 1993

There are many other mathematics for economics textbooks. If you are looking for a more elementary presentation of some of the material, you may find them helpful. Some of these books focus more on applications than on mathematics. Specific texts include:

Chiang, *Fundamental Methods of Mathematical Economics*
Novshek, *Mathematics for Economics*
Silberberg, *The Structure of Economics: A Mathematical Analysis*
Klein, *Mathematical Methods for Economics*
Baldani, Bradfield, and Turner, *Mathematical Economics*
Hands, *Introductory Mathematical Economics*

In addition to the readings, copies of lecture notes will be available on the Sakai website for the class. They are not intended as a substitute for class attendance nor are they necessarily complete.

Enrollment in this course constitutes acknowledgement of the following:

1) I understand that the University of Florida expects its students to be honest in all of their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action, up to and including expulsion from the University.

2) I will adhere to university copyright policies as found at http://www.uflib.ufl.edu/admin/Copyright.htm.

3) Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

Syllabus

(approximate)

(The readings in S&H and S&B usually cover the same material, so that it is not necessary to read both. For specific topics, when one text's coverage is much better than the other, I will announce that in class.)

Thurs-Tues 23-28 Aug — Introduction
- Integration: Functions of One Variable
- Techniques of Integration and Leibnitz's Rule
- Multiple Integration
- Applications of Integration

Readings: **B**, *14*
S&H, *10, 11;* **S&B**, *A4*

Thurs Aug 30 -Thurs 13 Sep — Linear Algebra
- Gaussian Elimination
- Linear Independence
- Rank of a Matrix
- Matrix Inversion
- Determinants of order n
- Eigenvalues and Eigenvectors
- Positive and Negative Definite Matrices and Determinant Tests

Readings: **B**, *2, 3 (examples), 9.1-9.3, 10, 15*
S&H, *14, 13.3-13.5, 13.7, 15.9*
S&B, *6, 7.1-7.4, 8.1-8.4, 9.1-9.2, 10, 11, 16, 23.1, 23.7-23.8*

Tues 18 Sep — Implicit Functions

Readings: **B**, *7*
S&H, *16.9-16.10;* **S&B**, *15.1, 15.3-15.5*

Thurs 20 Sep — Difference Equations

Readings: **B**, *17*
S&H, *20;* **S&B**, *23.2-23.4*

Tues 25 Sep-Tues 4 Oct — Differential Equations

Readings: **B**, *16*
S&H, *21;* **S&B**, *24, 25*
Kamien and Schwartz, Appendix B

Thurs 6 Oct — Review for Final Exam

Tues 11 Oct — **Final Exam** in class or **TBA**