

**MATHEMATICAL METHODS FOR ECONOMICS**  
**ECO 5405-01: Summer/Fall 2015**

---

MTRF	10:00 am-12:30 pm	BEL 0203
------	-------------------	----------

---

Professor:	Manoj Atolia	Email: <a href="mailto:matolia@fsu.edu">matolia@fsu.edu</a>
Office Hours:	MR 2:30 pm-3:30 pm in BEL 269 Also by appointment.	Tel: 644-7088 Office: BEL 269 Mailbox: BEL 289
Review Sessions (TA): M-F	Time to be announced	

### **COURSE OBJECTIVE**

This course aims to familiarize first-year economics PhD students with major mathematical concepts and tools that are used in economics and that will be used in various subsequent courses. The course will develop a basic understanding of mathematical analysis, dynamical systems and optimization theory, which is essential to problem solving in economics and understanding economic literature. The treatment of material will emphasize understanding of why certain mathematical concepts are needed rather than introducing them without context.

The course assumes familiarity with basic mathematics such as calculus and basic linear algebra. Economic sophistication at the level of intermediate microeconomics is assumed. To help assess preparedness for this course, an outline is provided below of the topics in mathematics that are assumed to known to the students.

### **BOOKS**

#### Required Textbooks:

Simon, C.P and Blume, L. *Mathematics for Economists*. Norton, 1994. This book provides a very **lucid** and excellent introduction to various mathematical tools for economists.

Carter, M. *Foundations of Mathematical Economics*. MIT Press, 2001. The book is an excellent, not so rigorous (but **more rigorous** than Simon and Blume), introduction to mathematical analysis for economists. It highlights the important connection between various abstract mathematical concepts of real analysis and their implications, especially in context of economic problems.

Both books are a must have for this course.

#### Recommended Textbooks:

Fuente, A. de la. *Mathematical Methods and Models for Economists*. Cambridge University Press, 2000. This is an excellent book that provides a **complete and very systematic** introduction to basic mathematical/ real analysis for economists. It also has a very good coverage of dynamical systems including the chapter on solving difference and differential equations.

It is the first book you should buy after the two that you are required to.

Axler, Sheldon. *Linear Algebra Done Right*, 1997. The book provides a very accessible introduction to linear algebra from the perspective of linear operators. An excellent text to read on subject of linear algebra whether you have or not have taken the first course in linear algebra typically taught using different approach.

Chiang, A.C. *Fundamental Methods of Mathematical Methods*. McGraw-Hill Irwin, 2005. The book follows a lucid approach to introduction to mathematical tools for economists, just like the book by Simon and Blume.

Corbae, D., Stichcombe, M.B., and Zeman, J. *An Introduction to Mathematical Analysis for Economic Theory and Econometrics*. Princeton University Press, 2009. The book provides a more advanced treatment of mathematical analysis than Fuente's book that is geared towards economic theory and econometrics as the title suggests.

## **ADVANCE PREPARATION FOR THE COURSE**

Following material from Simon and Blume's book will provide a useful way to prepare for the course. It will help you review and refresh the basic concepts and tools of calculus and linear algebra that will be taken as granted in the course. If you have used other books that cover same material, please feel free to use them as well.

*Sets, Numbers, Proofs:*

Appendix A1.

*Calculus (one variable):*

Chapter 2

Chapter 3: Sections 3.1 to 3.4

Chapter 4

Appendix A.4

*Exponents and logarithms:*

Chapter 5

*Linear algebra:*

Chapter 6: Section 6.1

Chapter 7: Sections 7.3 and 7.4

Chapter 8: Sections 8.1, 8.2, 8.4, and 8.6

Chapter 9: Sections 9.1 and 9.2

Chapter 10

Chapter 11

Loosely speaking, the course will assume your **mastery** over the contents of chapters 1 to 11 at the beginning of the course.

## **COURSE STRUCTURE**

The course will begin with the coverage of basic concepts from real analysis. The material is well covered in books by Carter and Fuente. I will distribute extensive notes for this material

which will also draw from sources other than these books. The notes will have many exercises that you will be expected to solve, as many as you can. This will be followed by discussion of operator theory and dynamical systems that will rely on Simon and Blume's book and notes based on other sources. The final part of the course will cover optimization where again book by Simon and Blume will be the basic text, supplemented by notes building on material in Carter and Fuente and other sources.

Besides lectures, the course will have daily hour-long review sessions conducted by Philip Brookins who is the TA the course.

### **GRADING**

The grade for the course will be based on two in-class exams with equal weights. No make-up exams will be given unless an emergency arises, for which documentary verification will be needed.

### **UNIVERSITY ATTENDANCE POLICY:**

Excused absences include documented illness, deaths in the family and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. These absences will be accommodated in a way that does not arbitrarily penalize students who have a valid excuse. Consideration will also be given to students whose dependent children experience serious illness.

### **ACADEMIC HONOR POLICY**

The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to ". . . be honest and truthful and . . . [to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at <http://fda.fsu.edu/Academics/Academic-Honor-Policy.>)

### **AMERICAN WITH DISABILITIES ACT**

Students with disabilities needing academic accommodation should:

- (1) register with and provide documentation to the Student Disability Resource Center; and
- (2) bring a letter to the instructor indicating the need for accommodation and what type. This should be done during the first week of class.

This syllabus and other class materials are available in alternative format upon request.

For more information about services available to FSU students with disabilities, contact the:

Student Disability Resource Center  
874 Traditions Way  
108 Student Services Building  
Florida State University  
Tallahassee, FL 32306-4167  
(850) 644-9566 (voice)  
(850) 644-8504 (TDD)  
[sdrc@admin.fsu.edu](mailto:sdrc@admin.fsu.edu)  
<http://www.disabilitycenter.fsu.edu/>

#### **SYLLABUS CHANGE POLICY**

“Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice.”