Economics 331

Mathematical Economics

Mr. Moody

Spring 2023

Text: Chiang and Wainwright, *Fundamental Methods of Mathematical Economics (Fourth Edition)*

Note: There is no need to buy the fourth edition. There are many used copies of the third edition (Chaing without Wainwright) on the internet. For example

https://www.abebooks.com/9780070108134/Fundamental-Methods-Mathematical-Economics-3rd-0070108137/plp.

More sellers can be found by Googling "Chiang Third Edition".

The parts of the fourth edition that are not available in the third edition are available in the Course Documents section of the Blackboard web site.

All readings, except Chiang and Wainwright are available on Blackboard in the Course
Documents section. Readings from earlier editions of Chiang are also available in the Blackboard site.

Tests: Midterm (33%), March 16, in class, open book; Final (67%), May 11, 9am open book

You are invited to write an optional paper on any subject using the tools and methods developed in the course: with optional paper: midterm 25%, paper 25%, final 50%

Grading scale: A 90-100, B 80-89, C 70-79, D 60-69. Numerical grades are rounded up.

Maple: much of the material in this course is replicated using the Maple mathematical language; more information is available in the Course Information section of the Blackboard site.

Linear Algebra and General Equilibrium

Chiang and Wainwright, Chapters 1-5

Application: computable general equilibrium (Leontief input-output analysis)

Linear Programming and Duality: Optimization of linear functions subject to linear constraints and non-negativity conditions

Chiang Chapters 19,20 (Blackboard)
Bassi, L.J. "The Diet Problem Revisited," *The American Economist*, 20, Fall 1976, 35-39

The knowledge problem

Spontaneous order

Capitalism vs Socialism

Game Theory (two person zero sum games): minimax solutions

Chiang Game Theory (Blackboard)

Application: American football

Comparative Static Analysis

Chiang and Wainwright, Chapters 6-8

Application: IS-LM macro model

Allen, R.G.D. *Macro-Economic Theory*, ch. 7 (Blackboard)

Optimization of unconstrained nonlinear functions

Chiang and Wainwright, Ch. 9-11.

Optimization of constrained nonlinear functions

Chiang and Wainwright, Ch. 12

Optimization of nonlinear functions with linear constraints and non-negativity conditions: nonlinear programming

Chiang and Wainwright, Ch. 13
Kuhn, "Duality in Mathematical Programming" (Blackboard)

Takayama, A. "Behavior of the Firm under Regulatory Constraint." *American Economic Review* (1969) 255-260. (Blackboard)

Applications

The Envelope Theorem (Chiang and Wainwright Ch 13)

Mathematical History

The Oil Crisis and Entitlements