Athens University of Economics and Business
School Of Economics
Master's Program
M.Sc. in Economics

MATHEMATICS

Winter Semester 2024-2025
Tuesday 12:15-3:00 pm / Main Building, Derigny Section, 5th Floor

Instructor: Vanghelis Vassilatos
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Course Outline

This course is an introduction to commonly used dynamic optimization methods in economics. The emphasis is on solution methods rather than rigorous proofs. After completing the course, students will be able to compile the knowledge they have gained and, apply the techniques mastered in order to analyze, evaluate and solve dynamic models.

Evaluation

The course grade will be determined by the final exam.

A 10% bonus will be awarded to all students that will fulfill all assignments that will be distributed during the course. The bonus is not valid for the September resit examination period.

Syllabus

A. Dynamic Optimization in Discrete and Continuous Time Dynamic Systems

    A1. Optimal control
    A2. Dynamic programming

B. Discrete Dynamics

    B1. First, second and higher order linear difference equations
    B2. Linear difference equation systems

C. Solution methods of linear rational expectations systems

D. Continuous Dynamics

    D1. First, second and higher order linear differential equations
    D2. Linear differential equation systems
    D3. Phase Diagrams

Reading List

Abadir, Karim and Magnus, Jan, Matrix Algebra, Cambridge Universiy Press, 2005.

Adda, Jerome and Cooper, Russell, Dynamic Economics, MIT Press, 2003.

Blanchard, Olivier and Fischer, Stanley, Lectures on Macroeconomics, MIT Press, 1989.

Caputo, Michael R., Foundations of Dynamic Economic Analysis, Optimal Control Theory and Applications, Cambridge University Press, 2005.

Chiang, Alpha, Elements of dynamic optimization, McGraw-Hill, 1992.

De la Fuente, Angel, Mathematical methods and models for economists, Cambridge Universiy Press, 2000.

Farmer, Roger, The Macroeconomics of Self-Fulfilling Prophecies, MIT Press, 1993.

Gandolfo, Giancarlo, Economic Dynamics, Springer 1997.

Hadley, G., Linear Algebra, Addison-Wesley, 1961.

Hoy, Livernois, McKenna, Rees, Stengos, Mathematics for Economics, 2nd edition, MIT Press, 2001.

Kamien, Morton and Schwartz, Nancy, Dynamic Optimization, North Holland 1991.

Ljungqvist, Lars, Sargent, Thomas J., Recursive Macroeconomic Theory, 3d edition, MIT Press, 2012.

Shone, Ronald, Economic Dynamics, Cambridge Universiy Press, 1997.

Simon, C.P. and Blume, L., Mathematics for Economists W.W.Norton, 1994.

Sorger, Gerhard, Dynamic Economic Analysis, Deterministic Models in Discrete Time, Cambridge Universiy Press, 2015.

Stachurski, John, Economic Dynamics, Theory and Computation, MIT Press, 2009.

Stokey, N.L., Lucas, R.E., Recursive Methods in Economic Dynamics, Harvard University Press, 1989.

Sydsaeter, Hammond, Seierstad, Strom, Further Mathematics for Economic Analysis, Prentice Hall, 2005

Turkington, D.A., Mathematical Tools for Economics, Blackwell, 2007.

Turnovsky Stephen, Methods of Macroeconomic Dynamics, 2nd edition, MIT Press, 2000.