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Collegio Carlo Alberto
Mathematics for Economics
Fall 2012

Instructor: Gerardo Ferrara

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Contact Information

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Class: Classroom 2
Class Hours: M, T, and F 14:30-16:30
Office Hours: By appointment

Course Description

The purpose of this course is to provide incoming PhD students with the essential mathematical tools for their programs. The course covers topics in linear algebra, deterministic calculus, optimization, and dynamic analysis. Aside from providing mathematical tools, one of the primary aims of this course is to develop the level of mathematical sophistication necessary to conduct research in modern economics.

Text

Fundamental Methods of Mathematical Economics, 4th Edition, 2005, Alpha C. Chiang and Kevin Wainwright, McGraw-Hill, New York.

Homeworks

Homeworks will be assigned on a regular schedule. Late homework will not be accepted.

Exam

There will be a final exam during the second week of December. It will consist of a series of exercises to be solved in 2 hours time.

Grading

Attendance (10%), Homework (20%), Midterm Exam (40%), Final Exam (30%).

Working Together

It is okay to work together on homework. However, when it comes time for you to write up the solutions, I expect you to do this on your own.

Topics of the course

I. Matrix algebra

- Addition, subtraction, and multiplication of matrices
- Some algebraic "Laws" of matrices and special matrices
- System of linear equations in matrix form
- Determinants, non-singularity, and rank
- Properties of determinants
- Cramer's rule
- Inverse of a matrix and its properties
- Solving linear equations with the inverse
- Applications of matrices in Econometrics: OLS Method

II. Deterministic calculus

- Derivability, differentiability and Taylor's formula for multivariate real functions
- Quadratic forms and their signature
- Maxima and minima for multivariate real functions
- Classical optimization (unconstrained and constrained)
- Definite and indefinite integrals

III. Dynamic analysis

- Fundamentals of ODE's
- ODE's and systems of ODE's
- Cauchy problems
- Differential equations with separable variables
- First-order linear differential equations
- First-order linear differential systems
- Second-order linear differential equations