

MACQUARIE  
UNIVERSITY



FACULTY OF  
BUSINESS AND ECONOMICS

ECON864  
Mathematical Economics  
First Semester, 2009

Unit Outline

*Department of Economics*

## 1 Introduction

In this course we cover many topics in mathematics which are used in economic analysis. The formal prerequisite is a first year university course in calculus and linear algebra. The courses Math 135 and Math 136 offered at Macquarie University should offer adequate preparation, however hard work and some intellectual maturity can compensate for any missing background. Indeed hard work and some intellectual maturity are required even with adequate prior mathematics.

We will be using the text book by Alpha C. Chiang and Kevin Wainwright, [ACC05], *Fundamental Methods of Mathematical Economics*.

Usefull additional references include *Introduction to mathematical economics* by Edward T. Dowling, [Dow01]. This a Shaum's outline and contains many worked examples. A calculus book such as Stewart's *Calculus*, [Ste99], and a linear algebra book such as Anton's *Elementary linear algebra*, [Ant00] may also be useful as a reference. There is also a linear algebra textbook which can be downloaded from <http://joshua.smcvt.edu/linearalgebra/>.

## 2 Week by Week Outline

**Week 1** Introduction, Economic Models, some mathematics foundations, Static Analysis

**Week 2** Static Analysis, several variables, Matrix Algebra

**Week 3** Matrix Algebra, determinants, Cramer's Rule

**Week 4** Applications of Matrix algebra

**Week 5** Comparative Statics, limits, derivatives

**Week 6** derivatives, applications, partial derivatives

**Week 7** applications of partial dervatives, Jacobian Derivatives

**Week 8** Differentials Comparative-Static Analysis Total Derivatives

**Week 9** Optimization in one variable, Taylor Series

**Week 10** Optimization in several variables

**Week 11** Optimization in several variables, applications

**Week 12** constrained optimization

**Week 13** Non-linear programming

### 3 Assessment

There will be a midterm during the seventh week of class, a final exam at the end and six homework assignments.

Assessment will be computed from homework marks, midterm marks, and final examination marks. The final grade will be computed using the formula:

$$10\% \text{ Homework} \quad 10\% \text{ Midterm Exam} \quad 80\% \text{ Final Exam.}$$

### References

- [ACC05] Kevin Wainwright Alpha C. Chiang, *Fundamental methods of mathematical economics*, 4 ed., McGraw-Hill/Irwin, New York, 2005.
- [Ant00] Howard Anton, *Elementary linear algebra*, 8 ed., John Wiley & Sons, New York, 2000.
- [Dow01] Edward T. Dowling, *Introduction to mathematical economics*, McGraw-Hill, 2001.
- [Ste99] James Stewart, *Calculus*, 4 ed., Brooks/Cole Publishing Company, 1999.