L11106 QUANTITATIVE ECONOMICS I *(15 credits)*

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Office Hours: Mo 15-18, Tu 10-12, 16-17, We 14-17

Module Aims and Objectives

There are no pre-requisites for this module. In particular, there is no assumption that Mathematics has previously been studied to A-level standard. In common with practically all subjects, theory in Economics is intrinsically mathematical, and those areas of Mathematics - principally differential calculus and its applications - most relevant to Economics will be covered. The mathematical techniques will be illustrated through economic applications, principally microeconomic, in part because a microeconomics module is taken in parallel with this one.

It is important that you **practice and try to understand the mathematical concepts** presented to you within this module as they will be used throughout your undergraduate Economics degree. If you do not understand the mathematical concepts presented then seek help from the lecturer, the tutor or your QE1 tutor group. **Do not delay in seeking help**.

The main aims of this module are:
- To provide a basis in the **fundamentals of Mathematics** most relevant to the study of Economics. In particular the focus is on differential **calculus**, especially its application to **optimisation**, including constrained optimisation, problems.

- To allow students to see how **mathematical tools can be applied** in the analysis of theoretical economic problems.

- To facilitate the development of **analytical skills** leading to an understanding of which economic problems are susceptible to a formal treatment, and which results are capable of formal proof.

On completing this module, the learning outcomes are such that students will be able to:
- Demonstrate the ability to **apply standard techniques** of differential calculus

- Apply these techniques **to solve economic problems**

- Recognise those economic questions to which these techniques can be applied, and formally prove some economic theoretical results.

Emphasised learning outcomes (see undergraduate student handbook):

A. Knowledge and Understanding:
A4 - Demonstrate understanding of verbal, graphical, mathematical and econometric representation of economic ideas and analysis, including the relationship between them.
A5 - Show understanding of relevant mathematical and statistical techniques.

B. Intellectual Skills:
B1 - apply complex ideas to solve problems
B3 - reason logically and work analytically
B5 - understand the context in which a problem is to be addressed.

C Professional / Practical Skills:
C2 - select and apply appropriate techniques to solve problems.

D. Transferable Skills:
D1 - apply mathematical, statistical and graphical techniques in an appropriate manner
D3 - analyse and solve complex problems accurately.

Module Content (Summary)

The Module contains of three sections and a general introduction. Each of the three sections has its own field of economic applications. The examination at the end of this module will consist of three questions, one for each section, on the economic applications. It is therefore necessary for the student to both practice the mathematical techniques and understand the economic applications.

0. Introduction: Reading and writing formulas, functions, functional, graphs, sets, equations, elementary type theory, variable bindings.

A. Algebra: Elementary algebraic rules, linear functions, equational systems, polynomials, 2x2 matrices. Economics of equilibrium.

B. Mathematics of Finance: Logarithms and exponential functions, percentages, interest compounding methods. Economics of saving and investment.

C. Optimization: Differentiation, maximization and minimization of functions, differentiation rules, optimization subject to a constraint. Economic analysis of elasticity, production and consumer theory.

Module Text
The lectures follow the textbook:
Jacques, I. Mathematics for Economics and Business, Addison-Wesley.

Lecture and Reading Timetable

Study week	Begin	Section	Chapter
Week 1	26/9/2011	0	1
Week 2	3/10/2011	0	6
Week 3	10/10/2011	A	7.1, 7.2
Week 4	17/10/2011	A	2.3, 2.4
Week 5	24/10/2011	A	3.1, 3.2
Week 6	31/10/2011	B	3.3, 3.4
Week 7	7/11/2011	B	4.1, 4.2
Week 8	14/11/2011	C	4.4, 4.8
Week 9	21/11/2011	C	4.5
Week 10	28/11/2011	C	4.6, 4.7
Week 11	5/12/2011	C	5.1-5.5
Week 12	12/12/2011	C	5.6

Module Assessment

There is a compulsory 1½-hour examination at the end of the module, held during the January examination period, forming 100% of the assessment. Previous Examination Papers and Feedback for all modules can be viewed online but is restricted to registered students only.