

## MODULE OUTLINE - ECONOMICS

### ECO1004 MATHEMATICS FOR ECONOMISTS 2009-2010

#### PREREQUISITES:

GCSE Maths - Grade B or Better - or equivalent

#### LECTURE TIMES AND LOCATION:

Tuesday	10:00 – 11:00	6UQ / G05
Thursday	10:00 – 11:00	LAN / 121
Friday	11:00 – 12:00	PFC / 209
Thursday*	13:00 – 14:00	PFC / 209

#### MODULE COORDINATOR AND LECTURER:

Chirantan Ganguly, Room 23.106, 23 University Square

e-mail: [c.ganguly@qub.ac.uk](mailto:c.ganguly@qub.ac.uk)

Office hours: M 1-2 pm

#### TUTORIALS:

Tutorials are held weekly starting in the third week of the semester. Tutorials are compulsory. **It is the individual student's responsibility to ensure he or she is allocated a tutorial.**

**\* A voluntary revision tutorial will be held weekly at 1:00 pm on Thursday in PFC / 209. This tutorial will begin on October 8.**

## **MODULE DESCRIPTION:**

This course builds on the Mathematics taught at GCSE level or an equivalent level. It begins with a revision of basic algebraic methods. These ideas are then further developed to cover more advanced mathematical concepts including linear and non-linear functions; matrix algebra; single variable calculus and calculus of several variables. The course is taught paying particular attention to the solving of economic problems.

## **MODULE AIMS:**

Mathematics has become the language of modern analytical Economics, as it allows economists to identify and analyse the general properties that are critical to the behaviour of economic systems. The aim of this module is to give students in Economics a basic working knowledge of the mathematics that is needed in the quantitative and non-quantitative level 2 and level 3 modules offered by Economics.

## **EXPECTED LEARNING OUTCOMES:**

On the successful completion of this module students will be able to:

1. Know what is meant by a function.
2. Use calculus methods to solve basic economic problems such as profit maximization.
3. Manipulate matrices, know when the inverse of a matrix can be calculated and be able to do the calculation.
4. Solve simultaneous equations using matrix algebra, for use in the level 2 and level 3 modules Quantitative Economics and Applied Econometrics.
5. Use calculus to locate the maxima and minima for functions of several variables, both unconstrained and constrained in economic problems.
6. The transferable skills are problem solving, numeracy and the communication of mathematical concepts.

## **MODULE ASSESSMENT:**

The module is assessed by a combination of continuous assessment and a final examination. The continuous assessment will consist of two in-class tests, each constituting 15 per cent of the total module mark. The first class test will be held in week 5 of term and the second in week 9. The final written examination accounts for the remaining 70 per cent of the total mark. The tentative dates for the class tests are as follows:

**Class Test 1: 11.00 am on Friday, 30<sup>th</sup> October, 2009 at PFC/G06.**

**Class Test 2: 11.00 am on Friday, 27<sup>th</sup> November, 2009 at DKB/LG/111.**

If there is a change in the times and/or venues for the class tests, students will be notified during the lectures as well as by email.

The class test marks will be the primary source of feedback to students about their performance and understanding of the course material.

The final exam will be one three-hour paper. Students complete four questions from six. There are two parts (A and B) and two questions from each part must be attempted. Past papers are available on QOL.

**TUTORIAL TOPICS:**

The tutorial exercises will be available on Queen's Online. The time students need to spend on the individual exercise sheet will, of course, vary with their mathematical abilities but they should expect to spend up to five hours a week on examples. Further practice can be gained by attempting the exercises in the textbook. Remember the only way you will master any quantitative technique is through practice.

**REQUIRED READING:**

Ian Jacques, Mathematics for Economics and Business, Prentice Hall, 2009 is an essential text on which the lecture/ tutorial material is based and the text should be purchased by all students.

**FURTHER READING:**

Geoff Renshaw, Maths for Economics, Oxford University Press, 2005.

Jean Soper, Mathematics for Economics and Business, Blackwell, 2004.

Knut Sydsaeter and Peter Hammond, Essential Mathematics for Economic Analysis, Prentice Hall, 2006.

## **MODULE TOPICS OUTLINE:**

### **1 THE MATHEMATICAL REPRESENTATION OF ECONOMIC RELATIONSHIPS**

- (i) Economic Models
- (ii) Relations and functions
- (iii) Indices
- (iv) Polynomial functions
- (v) Equalities, Inequalities and Absolute Values
- (vi) Logarithms
- (vii) Series: Arithmetic, geometric and exponential
- (viii) Compound interest, net present value

J: Ch 1, 2, 3.

### **2 STATIC - EQUILIBRIUM MODELS**

- (i) Market demand and supply
- (ii) A linear partial - equilibrium market model
- (iii) The effect of an excise tax in a competitive market
- (iv) Equilibrium in a linear National-Income Model
- (v) A Nonlinear Market Model

J: Ch 1, 2, 3.

### **3 MATRIX ALGEBRA**

- (i) Vectors and Matrices
- (ii) Determinants and the inverse matrix
- (iii) Linear simultaneous equations
- (iv) Economic applications

J: Ch 7

### **4 SINGLE VARIABLE CALCULUS**

- (i) Differentiation
- (ii) Turning points
- (iii) Integration
- (iv) Economic applications

J: Ch 4, 6

### **5 CALCULUS OF SEVERAL VARIABLES**

- (i) Functions of more than one variable
- (ii) Homogeneous functions
- (iii) Partial differentiation, Euler's Theorem
- (iv) Unconstrained Extrema
- (v) Constrained Extrema. Lagrange multipliers
- (vi) Economic applications

J. Ch 5