**Trinity College Dublin**                                    **Department of Economics**

**Spring 2010**

## EC2040 - MATHEMATICS (AND STATISTICAL METHODS)

**Course Supervisor**: Dudley Cooke.

**Outline and Scope**: The aim of this course is to familiarize you with some of the mathematical techniques used by economists. At the end of the course you should be able to, (i) convert a verbal description of an economic problem into a mathematical problem, (ii) recognize the appropriate mathematical tools needed to solve this problem, (iii) solve the problem and interpret the results economically.

**Textbook**: There is no textbook which covers precisely the material that I am going to be covering in this course. A close one is *Fundamental Methods of Mathematical Economics* by Alpha C. Chiang and Kevin Wainwright, McGraw-Hill Education, 2005 (hereafter CW). Another good book is *Mathematics for Economics* by Hoy, J. Livernois, C. McKenna, R. Rees and T. Stengos, The MIT Press, 2001. There are other textbooks available, some of which are listed below.

1. Baldani, J., et al., Mathematical Economics, Second edition, Thomson South-Western, 2005.

2. Pemberton, M. and Rau, N., 2007. Mathematics for Economists, Manchester University Press, 2007.

3. Sydsaeter, K., and P. Hammond, Essential Mathematics for Economic Analysis, Second edition, Prentice Hall, 2006.

4. Simon, C., and L. Blume, Mathematics for Economists, W. W. Norton & Company, New York, 1994. (advanced)

All of the above-mentioned books are available in the library. You are advised to look at all the books listed here and purchase one that suits your needs. It is difficult for me to recommend one book because students typically come with different mathematical backgrounds and no book suits all students. Along with a textbook, you may also find Martin Osborne's online Mathematics tutorial useful, available at,

`http://www.economics.utoronto.ca/osborne/MathTutorial/index.html`

**Time Schedule**: The following constitutes a rough schedule for the course.

1. Weeks 1–2: Review of single variable calculus, optimization, and applications (e.g., profit function/maximization, production functions). Reading: Chapters 7.1-7.3, 9.1-9.4, and 10 of CW.

2. Weeks 3–4: Matrix algebra and applications (e.g., IS and LM, supply and demand). Reading: Chapters 4 and 5 of CW.

3. Weeks 5–6: Multiple variable calculus, unconstrained optimization, and applications (e.g., profit functions/maximixation, utility functions/maximization). Reading: Chapters 7.4-7.6, 8, and 11 of CW.

4. Weeks 7–8: Constrained optimization and applications (utility maximization, cost minimization). Reading: Chapters 12.1-12.3, 12.5, and 13.5 of CW.

5. Weeks 9-10: Integration and applications (Producer's and consumer's surplus, present discounted values). Reading: Chapter 14 of CW.

**Course Material**: The primary source for all course material will be at my homepage, which is, `http://www.tcd.ie/Economics/staff/dcooke/`. This will contain, among other things, lecture slides, problem sets, and any other material that I think necessary.

**Classes**: All students are required to register for one of the classes that are an essential part of this course. Attendance in the classes is mandatory. The classes will provide closer interaction than is possible in the lectures. You are encouraged to carefully note things that you do not understand in the lectures and raise them with the class teacher and myself.

**Problem Sets**: Problem sets will be put on the web in advance. This will be solved in class by the class teacher. You are strongly advised to try solving the problems before going to class (it is recommended that you form groups to jointly solve the problems.). From time to time you will be asked to solve exercises in class and then to share your solutions with class members.

**Assessment**: There will be a mid-term test, covering topics 1-3. **Attendance is compulsory**. Other details regarding the test will be announced during the course of the term.