COURSE 002. INTRODUCTORY MATHEMATICAL ECONOMICS
Instructors: Abhijit Banerji and Sugata Bag

Objectives. To learn some of the tools that frequently feed into Micro, Macro and Econometrics.

Prerequisites. Mathematical content at the level of Sydsaeter and Hammond, the undergraduate Mathematics for Economics textbook in the University of Delhi.

Description. There are 3 parts to the course.
1. Preliminaries, and Optimization (AB)
2. Linear Algebra (SB)
3. Differential Equations (AB)

We will list the course content for Part 1 here. The main text we'll use for this part is

Rangarajan Sundaram. 1996. A First Course in Optimization Theory. Cambridge University Press. (RS)

An alternative textbook that covers a lot of the same material is
Carl Simon and L. Blume. 1994. Mathematics for Economists. Norton and Co.
We will not use this book, by and large, but this is a good book to read (on your own) if your Math is a bit shaky.

You may find RS hard even if your Math is *not* shaky, but if you stay with it, you will only grow. And if you find RS quite doable (or a breeze), you are underchallenged: you should consider building up your real analysis foundations in that case. Alternative texts include the ones by Shilov, baby Rudin, Apostol; or at a more advanced level, Efe Ok.

Course Content for Part 1

(i) Preliminaries: Logical Implications, Sets, Relations, Functions etc. (RS - Appendix A).
(ii) Optimization: Existence of Optima; Unconstrained Optimization; Optimization with (a) Equality Constraints (b) Inequality Constraints; Envelope Theorem; Convexity and Optimization; and possibly, Parametric Continuity. (RS- Chapters 1-6, a bit of chapters 7 and 9). Real Analysis background will be interspersed in the exposition.