ANALYSIS OF MULTI-DISCIPLINARY PROBLEMS

Introduction and Overview

1/. Approach to multi-disciplinary problem solving with a simple mathematical set of skills.

2/. Problems of a multi-disciplinary nature:

Examples: i) Duckworth-Lewis method, ii) Art forgery, iii) Population and industrial growth, iv) Spread of technological innovations, v) Tumour growth, vi) Theory of conflict, vii) Combat models, viii) Competitive exclusion, ix) Spread of epidemics.

(Examples are not limited to the above).

3/. Universality: Find universal mathematical features that are independent of specific forms or microscopic details. Define a UNIVERSALITY CLASS.

4/ Modelling assignments: (3 Cases):

i.) The revenue growth, annual profit and the annual human resource of <u>IBM</u>,

ii.) Network structure in the free-software operating system. <u>Debian</u>, iii.) Traffic flows.

5/ Resources for learning:

i/. Differential Equations and Their Applications — M. Braun.

ii/. Journal papers and reviews.

iii/. Basic programming and plotting.

iv/. <u>Supplementary texts</u>: A.) Practical Applied Mathematics — Sattonison,

B.) An Introduction to Mathematical Modelling — E. A. Bender.

v/. TED talks