MATHGM02 (Nonlinear Systems)

Year: 2014–2015
Code: MATHGM02
Level: Masters
Value: 15 UCL credits (= 6 ECTS credits)
Term: 1
Structure: 3 hours lectures per week
Assessment: 100% examination
Lecturer: Professor SR Bishop

Course Description and Objectives

This component aims to give an overview of the main aspects of nonlinear systems and to provide definitions and theoretical background. Special emphasis is placed on how nonlinear systems are used in the context of modelling.

Recommended Texts

(iv) D.K.Arrowsmith & C.M.Place, Dynamical Systems, Chapman Hall
(v) J. Guckenheimer and P. Holmes, Nonlinear Oscillations, Dynamical Systems and Bifurcations of Vector Fields, Springer
(vi) L.D.Landau & E.M.Lifshitz, Course of Theoretical Physics, Vol. 1 Mechanics, Pergamon
(vii) Drazin and Johnson, Solitons, Cambridge Texts
(viii) and other books by Drazin, e.g. Nonlinear Systems

Detailed Syllabus


Non-linear waves: Linear waves, dispersion relations, dispersion versus dissipation, stable and unstable waves. Travelling wave solutions of non-linear partial differential equations, for example the Korteweg-de Vries, non-linear Schrodinger equations. Phase-plane analysis, solitons.