Course Description.

The general idea of this seminar is to introduce the student into the field of qualitative analysis of dynamic systems. We will emphasize in the analysis of nonlinear systems under the presence of structural changes, generally expressed as changes in the system's parameters. These changes may take the system to exhibit qualitatively different behaviors, even if the magnitude of the change is infinitesimally small. Those points where these qualitative changes in behavior are observed, are called bifurcations. These bifurcations correspond to changes in the structure of eigenvalues of the differential equations modeling the system. The importance of this analysis lies in its consequences in areas like engineering, economy, biology, etc. We will also be exploring some ideas on the application of Evolutionary Computation to this exciting area.

This seminar will cover the basics of bifurcation theory. Extensive use of Mathematica will be expected to produce descriptions of the systems under analysis. In the last part of the seminar, we will produce a qualitative model of bifurcation diagrams, and a simulation algorithm to produce explanations about the changes a system may exhibit near bifurcation points.

Please contact me if you need more information.

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