Spectral behavior and dynamics of evolutionary equations under perturbations of the domain.

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In the first part of these lectures we will analyze the behavior of linear elliptic operators when some perturbation acts on the equation. We will be mainly interested in domain perturbations, which will be in general non-smooth, and will consider the most sensitive case of Neumann boundary conditions. We will show some results that guarantee the continuity of the spectrum (eigenvalues and eigenfunctions) under very general perturbations of the domain. As examples we will consider boundary oscillations and dumbbell type perturbations.

In the second part, we will study how we can use the continuity results obtained in the first part, to understand the asymptotic behavior of some dissipative nonlinear evolutionary equations, mainly reaction-diffusion equations, under the perturbations considered. We will analyze the behavior of the equilibria and their stability properties, its unstable manifolds and the attractors of the system under these perturbations of the domain.