1044-34-229 **Kening Lu*** (klu@math.byu.edu), Department of Mathematics, Brigham Young University, Provo, UT 84602, and **Qiudong Wang** (dwang@math.arizona.edu), Department of Mathematics, University of Arizona, Tuscon, AZ 85721. *Chaotic behavior in nonautonomous equations without any time periodicity.*

We investigate the chaotic behavior of ordinary differential equations with a homoclinic orbit to a dissipative saddle point under a general time dependent forcing *without any periodicity* in time. We study the Poincaré map return in the extended space, introducing a characteristic function that generalizes the classic Melnikov function. We then show that the dynamics of the solutions of these equations are largely determined by the asymptotic behavior of this new characteristic function. We prove the existences of a spectrum of dynamical scenarios including (i) an attracting integral manifold; (ii) the intersections of the stable and the unstable manifolds of the perturbed saddle point; and (iii) new dynamical structures that generalize Smale's horseshoes for time-periodic equations. In particular, the intersections of the stable and unstable manifolds of the perturbed saddle are neither necessary nor sufficient for chaotic dynamics to emerge. These results are also applied to Duffing's equation with a time dependent forcing. (Received September 02, 2008)