Nonlinear Dynamics and Chaos by Steven H. Strogatz

INSTRUCTOR: Blake Temple, 3148 MSB, 752-2214
Lecture: MWF 1:10-2:00pm, 146 OLSON HALL
Office Hours: MWF 2:00-3:00pm or by appt.
e-mail: temple@math.ucdavis.edu
TA: Edward Tavernetti, Mathematics
Office: 3127 MSB; Office Hours: T-Th 2-3 & W 12-1.
TA: David Melgin, Math/Physics

PREREQUISITE: MAT 21-22 Lower Division Math Series

DESCRIPTION: The topic of Math 119 is Ordinary Differential Equations, (ODE). An ODE is an equation that involves a function $x(t)$ of one independent variable $t$, and its derivatives, the highest order derivative appearing being the order of the equation. The point is that the function $x$ should depend on only one real variable $t$, so all derivatives are ordinary derivatives, not partial derivatives. When the function $x$ is a vector valued function, we call the equations a system, and when $x$ is a single function of one variable, we call the equation scalar.

ODE’s are of fundamental importance to science. The reason, essentially, is that fundamental laws of science...of biology, physics, chemistry, geology,..., almost always come to us stated in terms of a rates of change; that is, in terms of derivatives. Thus to use a law of science to get a graph and make a prediction, one must first write down the ODE it implies, then solve it. Complicated ODE’s cannot be solved by an explicit formula, but must be understood by clever reasoning, computer simulation, and by making analogies with simpler equations which can be solved explicitly. The simpler examples are extremely important and play a fundamental role because they give us an intuition and a theory for what is happening in important problems too complicated to solve in closed form. In this class we introduce and begin the theory of ODE’s, the implications of the Laws of Science.