UNIVERSITY OF Cincinnati

Mathematical Sciences
P.O. Box 210025
Cincinnati, OH 45221-0025

Applied Mathematics Practicum (Autumn 2007)

Time and Place: MWF 3:00-3:50 PM, Old Chem 835   (15-MATH-517-001)
Instructor: Donald A. French (820D Old Chemistry)
    (http://math.uc.edu/∼french)
Phone and Email: 556-4039 (Messages 556-4050), french@math.uc.edu
Office Hours: MW 4:00-5:00 PM

Prerequisites: Calculus I–IV, Differential Equations, Linear Algebra, experience in programming (preferably MATLAB), familiarity with partial differential equations and physics, and some maturity/skill in mathematics at the senior or graduate level.

Description: Techniques in applied mathematics are useful in solving, approximating or simplifying a wide class of differential equation problems which model physical systems. This course is intended for graduate or advanced undergraduate students in Engineering, Physics, Chemistry, and Mathematics. We will study nondimensionalization, qualitative analysis (dynamical systems), perturbation, modeling and computational techniques in the context of real world problems. Examples from solidification, phase separation, and osmotic flow, may be considered. The instructor has been working in mathematical physiology during the past five years and may introduce problems in calcium dynamics, neurons and neuronal networks, glycolysis, and enzyme kinetics.

Grading: There will be two exams;

> Midterm: Wednesday, October 24, 2007 (In Class)
> Final: Wednesday, December 5, 2007 4-6 PM.

They will count toward most of the course grade. Homework assignments will also count and will be given every 1-2 weeks. Late homework may not be accepted or be subject to point reductions. You are encouraged to work together on the homework but your problem solutions should be written independently.

References:

1. Mathematics Applied to Deterministic Problems in the Natural Sciences by C.C. Lin and L.A. Segal, SIAM Publishing (1988).

2. Nonlinear Dynamics and Chaos by S.H. Strogatz Perseus (2000).

3. Principles of Applied Mathematics by J.P. Keener Perseus (2000).

4. Applied Mathematics by J.D. Logan (2006).

Please note that your class notes are your primary resource for this course.