MATHEMATICAL COMPUTING I

MATH 2200

Course Description:

This is a first course in mathematical computing. It covers the basic elements of scientific programming in both a computer algebra system and a high-level programming language. Explored are implementation issues, problem description, model building, method development, and solution assessment. **3 credits**

Prerequisites:

MATH 1950

Overview of Content and Purpose of the Course:

Students will learn the fundamental components of computational problem solving by exploring level-appropriate scientific programming problems. They will learn how to build the models, solution methods, and actual programs to solve the problems.

Major Topics:

1) Looping and Repetition
   a. Newton's Method
   b. Riemann Sums
   c. Series Convergence
   d**.** Approximating Lengths of Curves

2) Program Conditionals
   a. Double Integral Approximation
   b. Computational Geometry

3) Procedures
   a. Optimizing Functions of Two Variables
   b. More Computational Geometry

4) Graphics Programming and Animation
   a. Approximating Solids of Revolution

5) Recursion
   a. Recurrence Relations
   b. Sorting
   c**.** Base N Representations of Numbers

6) Project
   a. Fractals (Crystal Growth)
   b. Inscribed Polygons
   c**.** Random Walks