MATHEMATICAL COMPUTING II

MATH 3200

Course Description:

This course is a second course in mathematical computing. It covers the design and development of algorithms and the elements of programming in a mathematical context. The computer algebra system Maple will be used. The programming assignments are primarily based on calculus concepts and designed to reinforce and deepen the understanding of these concepts. **3 credits**

Prerequisites:

CIST 1400 OR MATH 2200, and MATH 1970 (the latter may be taken concurrently)

Overview of content and purpose of the course:

Students will become proficient in using a computer algebra system to develop algorithms and programming solutions to mathematically oriented problems. Students will also deepen their understanding of the mathematical concepts involved in the programming problems.

Anticipated audience/demand:

Primarily designed for mathematics majors, but also of interest to science and engineering majors.

Major topics:

1) Basic Aspects of Maple

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

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

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

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

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

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

Methods:

This course will be presented by lecture and class discussions. Some classes will be held in the computer lab to facilitate hands-on learning.

Student Role:

Students must attend and participate in class and must complete the course requirements.

February 2016