

**Course Number:** CSC 309

**Course Title:** Computer Programming for Scientists and Engineers

**Number of Credits:** 3

**Schedule:** Three hours of lecture/discussion per week.

**Prerequisite:** Math 226 or consent of instructor

### **Catalog Description**

Procedural programming in C for scientific applications. Good programming practices, and basic numerical and non-numerical algorithms for scientists and engineers.

### **Expanded Description**

Unix basics

Introduction to programming in C

Input/output

Variables and memory

Arithmetic and logic operations

If, if-else, switch

While, for, do-while loops

Arrays

Functions

Introduction to pointers

Reference parameters

Arrays as parameters

Introduction to Matlab programming

Variables and arrays

Colon notation

If, if-else, loops

Simple input/output

Functions

Files

Simple 2D and 3D plots

### **Course Objectives and Role in Program**

The objectives of this course include:

- Teach basics of programming in C, with focus on scientific/engineering applications
- Introduce students to good algorithm design, efficiency, documentation, testing, error diagnosis and debugging
- Apply programming techniques to scientific/engineering problems such as matrix operations, mechanics simulations, and Monte Carlo methods

- Introduce programming and simple data visualization in Matlab

Students will write a number of small C programs to implement common scientific/engineering problems, and learn to document, test and debug. They will apply the skills acquired in C /Unix to other environments that may be relevant to their work, such as Matlab. 309 was designed in collaboration with faculty from other College of Science and Engineering faculty; these basic programming and computing skills are necessary in most scientific disciplines today.

### **Learning Outcomes**

At the end of this course students will be able to

- Write simple programs or modules in C
- Solve simple scientific/engineering problems with software implementations
- Test simple programs and debug them
- Write basic documentation
- Write simple programs or functions in Matlab
- Create simple 2D and 3D plots in Matlab

### **Method of Evaluation**

Student learning will be evaluated on the basis of

- Short interactive in-class assignments
- Completeness and quality of programming assignments
- Grade on quizzes
- Grade on two midterms

The weight assigned to each element of evaluation will be determined by the instructor of the course on the first day of the class.

### **Required Textbooks**

*C How to Program* by Deitel and Deitel, 4<sup>th</sup> edition (Prentice Hall)  
CSc 309 Course reader by W. Hsu

**Modified by:** W. Hsu

**Last Revision Approved:** March 7, 2008