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, 4th edition (Prentice Hall)
CSc 309 Course reader by W. Hsu

Modified by: W. Hsu
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