ENAE 202 Aerospace Computing

Credits & Contact Hours: 3 credits (2 hours of lecture, 2 hours of laboratory)

Course Status: Required

Schedule: Offered every Spring semester

Course Description: Introduction to computational tools for the solution of engineering problems. C++ & MATLAB programming including branching and loops, functions, file handling, arrays, and data structures. Students will be introduced to object-oriented programming, basic computing, algorithms, and principles of software engineering.

Pre-Requisites: None

Co-Requisites: MATH 140

Textbooks: (1) D. Etter and J. Ingber. Engineering Problem Solving with C++. Pearson Education Inc., second edition 2008 (recommended).
(2) E. Magrab, S. Azarm, B. Balachandran, J. Duncan, K. Heraold, G. Walsh. An Engineer's Guide to Matlab. Pearson Prentice Hall, Second edition, 2005 (recommended).

Other Required Material: Course lecture notes and handouts

Course Oversight: Undergraduate Committee

Syllabus Prepared By/Date: Dr. Robert Sanner, June 13, 2011

Course Objectives/Student Learning Outcomes:
1. Understand how to develop algorithms and code that utilize the computational tools available in MATLAB and C++
2. Design, implement, and debug MATLAB scripts/functions and C++ programs to solve practical physics and engineering problems
3. Gain initial exposure to the object-oriented programming paradigm

Topics Covered:
Unit I: Matlab
1. Variables, native functions, plotting, scripts
2. Calculations with complex numbers and polynomials
3. Matrix and vector operations
4. User-defined functions
5. Logical expressions and conditionals
6. For and while loops

Unit II: C++ programming
1. Program structure, compilation, screen output
2. Keyboard input, mathematical functions
3. Conditionals and loops in C++

4. User-defined functions in C++
5. Arrays in C++
6. File input and output
7. Data structures
8. Classes and the object oriented paradigm
9. Function and operator overloading

Relationship of Course Objectives to Program Outcomes
This course addresses program outcomes: 1, 3, 4, 5, 9, 16