COURSE INFORMATION FORM

DISCIPLINE
Engineering
COURSE TITLE
Programming for Engineers and Scientists
CR.HR 3 LECT HR. 2 LAB HR. 2 CLIN/INTERN HR. _____ CLOCK HR. _____

CATALOG DESCRIPTION
Includes analysis and synthesis of structured computer algorithms in Visual Basic Applications for Excel and MATLAB. These tools will be used to solve engineering problems and present data graphically.

PREREQUISITES
Math 180

EXPECTED STUDENT OUTCOMES IN THE COURSE (ESO)
Upon completion of this course, the student will be able to:
1. Compose Visual Basic Application for Excel programs to solve common engineering analysis problems.
2. Use the following low-level programming structures and concepts in programs: data typing, variable assignment, loops, decisions, debugging and testing, and modular programming.
3. Solve an engineering problem by writing programs that make use of arrays and files.
4. Use programming structures, arrays, and files in MATLAB.
5. Compose M-Files in MATLAB to solve common engineering analysis problems and to generate graphs.
6. Use specific programming features of MATLAB, including script/function files and graphical user interfaces.
7. Use Microsoft Excel, including menu navigation, populating cells, addressing/referencing cells, and basic mathematical operations.
8. Numerically analyze engineering problems using technical features of Microsoft Excel, including predefined and custom functions, graphical capabilities, mathematical and Boolean operators, matrix algebra, lookup, and optimization.
9. Create and apply macros in Microsoft Excel.

GENERAL EDUCATION OUTCOMES (ESO)
Specify which general education outcomes, if any, are substantially addressed by the course. Numbers in parentheses identify the Expected Student Outcomes linked to the specific General Education Outcome.

Outcomes ESO
PROGRAM-LEVEL OUTCOMES

CAREER AND TECHNICAL EDUCATION PROGRAM OUTCOMES
Specify which Career and Technical program outcomes, if any, are substantially addressed by the course by completing the “Career and Technical Education template” to show the relationship between course and program outcomes to assessment measures.

1.

CLASS-LEVEL ASSESSMENT MEASURES
Student accomplishment of expected student outcomes may be assessed using the following measures. (Identify which measures are used to assess which outcomes.)

1. Students will compose and test Visual Basic for Applications (VBA) programs (1, 2, 3)
2. Students will compose and test MATLAB scripts (4, 5, 6)
3. Students will create Excel worksheet solutions to assigned problems (7, 8, 9)
4. Multiple Choice Quizzes (2, 3, 4)
5. Proctored Exams (2, 3, 4)
Individual instructors may order this outline as fits the needs of their individual courses. In addition, they may place more emphasis on some areas than on others. What is assured is that this particular list is covered in the course. Other topics may be added to a course as the instructor sees fit, and as time and interest allow. An *asterisk can be used to mark an item as optional.

I. Computation with Excel
   A. Excel Basics
   B. Operator Basics
   C. Trigonometric Functions
   D. Differentiation and Integration
   E. Engineering Functions
   F. Macros

II. Programming with VBA
   A. VBA Introduction
   B. Worksheet Functions
   C. Modular programming
   D. Object-oriented programming
   E. Debugging & Testing
   F. Data Typing
   G. Computation

III. MATLAB
   A. MATLAB Basics
   B. Arrays
   C. Script Files
   D. Managing Data
   E. Plotting
   F. Programming: Decisions and Loops
   G. Functions/Function files
   H. Graphical User Interface