Course Syllabus

Department: Science & Technology

Date: 02-02-2015

I. Course Prefix and Number: ESC 170

Course Name: Computing for Engineers

Credit Hours and Contact Hours: 3 credit hrs (2 lec hr, 3 lab hrs)

Catalog Description including pre- and co-requisites: *supporting data required for grade prerequisite of 'C' or higher.*

A first course that introduces a variety of fundamental computational techniques to the engineering student which are essential in the analysis and solution of engineering problems. The course utilizes the software packages of MATLAB, LabVIEW, and EXCEL as the main computational tools. Topics include modeling, simulation, numerical analysis, data acquisition, data visualization, and instrument control. Both the structured text and graphical programming approaches are used in the course. *Co-requisite:* MAT 145.

Relationship to Academic Programs and Curriculum including SUNY Gen Ed designation if applicable:

This course is required primarily for the students in the Engineering Science program. Its main purpose is to familiarize the student with the basic engineering computational techniques and teach them the basics of the software packages of MATLAB, LabVIEW, and EXCEL. Other students from other programs may also take the course who are interested in learning the engineering computational techniques and the software packages mentioned above. This course is not a SUNY Gen Ed designated course.

II. Course Student Learning Outcomes: *State the student learning outcome(s) for the course (e.g. Student will be able to identify…)*

Upon completion of the course the student will be able to:

1. Demonstrate the basic principles of computer programming and their application to the solution of engineering problems.
2. Write text programs in MATLAB to analyze basic engineering problems.
3. Use SIMULINK to develop models for simulating dynamic engineering problems.
4. Write basic graphical programs in LabVIEW to control instruments.

5. Use EXCEL to analyze engineering problems and create data visualization tools.

College Learning Outcomes Addressed by the Course: *(check each College Learning Outcome addressed by the Student Learning Outcomes)*

☐ writing	☒ computer literacy
☐ oral communications	☐ ethics/values
☐ reading	☐ citizenship
☒ mathematics	☐ global concerns
☒ critical thinking	☐ information resources

III. Assessment Measures (Summarize how the college and student learning outcomes will be assessed): *For each identified outcome checked, please provide the specific assessment measure.*

List identified College Learning Outcomes(s)	Specific assessment measure(s)
eg: writing	*eg: student will complete a research paper*
Mathematics	Student will complete a computer programming project
Critical thinking	Student will answer specific test questions correctly
Computer literacy	Student will complete a computer programming project

IV. Instructional Materials and Methods

Types of Course Materials:

No textbook is required. Instructor notes are the main source of information for the course content. A course website is maintained on the internet for lecture schedule, test solutions, and other supplemental learning material. Software for MATLAB, LabVIEW, and EXCEL are provided to students on school computers.

Methods of Instruction (e.g. Lecture, Lab, Seminar …):

The instruction is done in a traditional lecture format as well as in the form of coaching student groups through their various assignments and projects. Small class sizes allow instructor to engage the students on a one-on-one basis. Hands-on approach is emphasized throughout the course. Students continually use the computers during instruction times.

V. General Outline of Topics Covered:

MATLAB Structure and Basics
Calculator mode
M-Files
MATLAB Vectors
Matrices in MATLAB
Graphing in MATLAB
Solving Linear Equations
Finite Difference Equations - Euler Method
Numeric Differentiation
Numeric Integration
Symbolic math toolbox
Introduction to Simulink
Modeling dynamic systems with Simulink
Various exercises using EXCEL
Graphing with EXCEL
Data analysis using EXCEL
Flow Charts algorithm for solving problems
Software as Virtual Instrument object
Front Panel Controls, Indicators in LabVIEW
Block Diagram arithmetic and logic functions
Types of Numbers and Variables
Editing and Debugging Programs
Structures I: For loop, While loop, Formula Node, MathScript Node
Structures II: Case Structure, Shift Registers & Feedback
Arrays & Clusters
Charts & Graphs: Waveforms, XY Graphs
Introduction to Data Acquisition
Introduction to Data Analysis built-in functions

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