ENGR 2311 Computer Programming

Common Course Outline

Course Information

Description
This course introduces students to problem solving skills by solving engineering and scientific problems utilizing spreadsheets, programming language(s), and mathematical software. Topics include engineering and scientific problems that may employ statistics, algebra, calculus, linear algebra, optimization, and image processing in their solutions. Use of computers as a means for written and graphical communication is stressed. This course will cover standard ABET professional outcomes a, and f through k. Prerequisite: ENGR 1110.

Career Cluster
Engineering, Manufacturing & Technology

Instructional Level
Associate Degree

Total Credits 3.00
Total Hours 4.00

Types of Instruction

Instruction Type Credits/Hours
Lecture 2
Lab 1

Institutional Core Competencies

1. Critical and creative thinking: Students will develop the disposition and skills to strategize, gather, organize, create, refine, analyze, and evaluate the credibility of relevant information and ideas.

2. Teamwork and problem-solving: Students will demonstrate the ability to work together cohesively with diverse groups of persons, including working as a group to resolve any issues that arise.

3. Written and oral communication: Students will communicate effectively in a range of social, academic, and professional contexts using a variety of means, including written, oral, numeric/quantitative, graphic, and visual modes of communication.

Course Competencies

1. Examine the Excel workbook

Learning Objectives
Identify major components of the Excel window
Navigate within and between worksheets
Enter data in an Excel worksheet
Manipulate columns and rows
Create and display simple formulas
Use Spell Checker
Preview and print a workbook
Use the HELP features of Excel

2 Format worksheets.

Learning Objectives
Format the worksheet to aid readability of the data
Apply and modify various formatting styles
Change alignment of cell contents
Apply borders, background colors, and patterns to cells & worksheets
Apply conditional formatting to a range of cells
Use Print Setup options to prepare worksheet for printing
Add headers & footers to printouts

3 Analyze formulas and functions.

Learning Objectives
Examine the syntax of formulas and functions
Copy & paste formulas and functions
Work with relative and absolute cell addresses
Use the Insert Function dialog box
Use the AutoFill to copy formulas and series
Work with financial and logical functions

4 Utilize Excel to develop programming logic and solve engineering problems.

Learning Objectives
Construct equations and links for problem solving.
Create scenarios and options for engineering problems.
Develop tabular data from problems.
Develop graphical representations of calculated data.

5 Present data in a chart format.

Learning Objectives
Create column, line, 3D, and pie charts.
Modify charts objects.
Edit chart data sources.
Create trendlines and equations from chart data.

6 Examine the basic operation of mathematical software.

Learning Objectives
Examine the menus and toolbar.
Identify major components including arrays, files, and plots.
Perform operations using the interactive modes or script files.
Debug programs.
Utilize the help menu.
Preview and print a workbook
Use the HELP features of Excel

7 Solve engineering problems using mathematical softwares.

Learning Objectives
Set-up a mathematical program from a given engineering problem.
Solve the engineering problems.
Create plots and tables of results.

8 Program Arduino micro-controllers using open source softwares.
Learning Objectives
Summarize basic programming language parameters.
Utilize structures, values (variables and constants), and functions to control output.
Program the Arduino to perform basic tasks.
Add programming language to existing programs to change outputs.

9 Utilize Arduinos to solve engineering problems and assignments.
Learning Objectives
Construct simple circuits with actuators and sensors.
Program the Arduino to perform assigned tasks with circuits, actuators, and sensors.
Debug programs and circuits.
Present the operational project to class.

SCC Accessibility Statement
If you have a disability and need accommodations to participate in the course activities, please contact your instructor as soon as possible. This information will be made available in an alternative format, such as Braille, large print, or cassette tape, upon request. If you wish to contact the college ADA Coordinator, call that office at 507-389-7222.

Disabilities page http://southcentral.edu/academic-policies/disability-rights.html