

Common course outline

Title: Computing Fundamentals for Engineers

Course #: ENGR1671

Credits: 3

Pre-requisites: CS1300 or equivalent with a C or better, PHYS2211 with a C or better.

Catalog description:

This course introduces computing principles and programming practices with an emphasis on the design, construction analysis and implementation of algorithms in engineering problem-solving using a high level programming language appropriate to engineering.

Expected Educational Results:

As a result of completing this course the student should be able to:

- Navigate and use Matlab environment to write scripts in solving simple science/math/engineering problems,
- Create vectors, store, retrieve and manipulate data in vector form,
- Apply conditionals, iteration and built in functions to solve problems,
- Know encapsulation and write new functions,
- Know and apply structure arrays, manipulate character strings,
- Understand recursion and apply it to dynamic data structure stacks, and trees,
- Know plotting in 2-d and 3-d with shading/lighting,
- Know and apply matrix operations for plots,
- Understand and use file I/O operations,
- Create and manipulate images in color,
- Apply interpolation, curve fitting, integration and differentiation to problem solving,
- Know Big O notation for algorithms, sorting algorithms (no coding),
- Understand object oriented concepts, classes, dynamic data structures queues, linked lists, stacks, Binary Trees and Binary Search trees (optional)

General Education Outcomes

- I. This course addresses the general education outcome of communication in the following manner:
 1. Develop reading comprehension skills by reading the text and course materials.
 2. Listening skills thru lectures and discussion in problem solving in class and during in class lab exercises
 3. Develop reading and writing skills thru class assignments, homework, and algorithm development. Students are expected to provide small written programs, to show their understanding of computing skills. Students also provide solutions to problems in the form of logical sequence of instructions.

- II. This course addresses GEO relating to problem-solving and critical skills in very direct manner. Students are expected to enhance their problem-solving skills in math/science/engineering thru programming assignments. Students are expected to obtain a viable practical solution to such problems by critical thinking process.

- III. This course addresses the GEO relating to mathematical concept usage and scientific inquiry in multiple ways. Students apply physics/math based solutions to problems and test application under a variety of conditions by programming. An important aspect of the course is to apply scientific inquiry to determine the limitations and the practicality of solutions to simple engineering problems

- IV. The course addresses the GEO relating to organization and analysis of information using a computer directly by using Matlab, a programming language designed specifically for solving engineering problems on computers.

Course content:

Overview of computing:

Abstraction, testing and debugging methods

Data types, storage, mathematical and logical operations

Decision, repetition statements, modular programming: functions and procedures

Arrays and operations on arrays, sorting/searching methods,

File I/O, recursion,

Manipulating sounds and images, dynamic data types: queues, stacks, lists, trees

2-d and 3-d plots of data

Entry level competencies:

The students entering this course must have achieved the expected educational results of PHYS2211 and CSCI1300.

Assessment of outcomes:

I. COURSE GRADE

The course grade is to be determined by the individual instructor by variety of evaluation techniques consistent with the overall college policies. The procedure should include at least three one-hour tests (40% to 50%) and a comprehensive final examination (30% to 35%) and class/home work (15% to 25%) which should include programming solutions to engineering problems.

II. DEPARTMENTAL ASSESSMENT

Assessment of the expected educational results of this course must be conducted every five years. The assessment instrument will be a set of selected questions in the final examination which cover major topics in the course content section.

III. USE OF ASSESSMENT FINDINGS

The Engineering curriculum committee will analyze the results of the assessment and determine the level of success in expected educational results and summarizing the findings to the Academic Discipline Group, with any changes in the curriculum after careful review of curricula of transfer institutions.