**I. COURSE TITLE:** Computer Applications in Engineering II

 **COURSE NUMBER:** 2270  **CATALOG PREFIX:** ENDS

**II. PREREQUISITE(S):**

**III. CREDIT HOURS:** 3  **LECTURE HOURS:** 3

 **LABORATORY HOURS:** 0 **OBSERVATION HOURS:** 0

**IV. COURSE DESCRIPTION:**

This course gives a working knowledge of a high level computer language. The student will write programs to solve specific problems using logical structures, industry standardize practices and standard Visual C++ language. Topics covered will include programming techniques, calculations, methods and conversions, loop structures, search and arrays, conditional branching, file creation and maintenance. Application will include Visual C++ language used programming

Industrial applications using an integrated controller.

**V. ADOPTED TEXT(S):**

*Programming with Visual C++*

Course Technology 2009

James Allert

 ISBN 978-1-4239-0186-0

**VI. COURSE OBJECTIVES:**

* Introduce critical thinking and logical problem solving skills
* Develop structured problem solving techniques.
* Develop skills in flowcharting and diagramming.
* Develop the skills necessary to problem solve in logical steps and be able to communicate those steps.
* Introduction to programming language concepts using Visual C++
* Explain data types, declaration, relational operators, functions, enumerated types of data
* Determine input/output controls using methods
* Programs for repeating, looping and conditional branching
* Conduct array processing and structuring data using classes
* Creating Window Platform programs
* Using Basic or Relay Ladder Logic, and Visual C++ to control industrial applications with an integrated controller, relays, lights and sensors

**VII. COURSE METHODOLOGY:**

May include but not limited to: Lecture/discussion method, independent and group projects, in-class and home assignments, tests and quizzes. Attendance is required for this course.

**VIII. GRADING**

 A = 90 – 100

 B = 80 – 89

 C = 70 – 79

 D = 60 – 69

 F = 0 - 59

**IX. COURSE OUTLINE:**

 By concepts:

1. Interface fundamentals of the components, hardware, software concepts and the basics of compilation of programs using the C++ compiler.
2. Arithmetic expressions, tasks involved in writing a program, tryparse.

 3. Integer data and the arithmetic operators, calculator function.

4. Selection structures, If, Else.

5. Repetition structures (looping) and declaring variables.

6. Introduce the concepts of methods and conversions.

7. Array and other data structures.

8. Implementing searches and the various types available, such as binary or

 sequential search.

9. Experiments with various sorting techniques.

 10. Importing pictures and backgrounds.

 11. Array pointers and sort boxes.

 12. BASIC review with Ladder Logic Controller module requirements, power source.

1. Visual C++ applied to control module, relays, light emitting diodes, etc.
2. Activating devices using a PLC with embedded controller.

**X. OTHER REQUIRED TEXTS, SOFTWARE, AND MATERIALS:**

Student will need to free access to a computer or own a computer capable of operating the software necessary to complete the course.

Students will use the CUBLOC industrial application kit including wiring a PLC

 with embedded logic controller from COMFILE Technology. (888-9CUBLOC)

**XI. EVALUATION:**

Periodic examinations, comprehensive final examination, homework, in-class participation, and

 reports will be evaluated.

Instructor will specify which criteria will apply to a particular assignment.

Student will be expected to complete programs on time utilizing course material covered. Other assignments, projects and reports will be assigned, individually and in groups. These will include useful circuits for input and output. These will be graded according to rubric explained at the beginning of the course.

Class attendance = 5%

Assignments = 25%

Examinations (3) = 50%

Final Examination = 20%

**XII. SPECIFIC MANAGEMENT REQUIREMENTS:**

 Suggested pace for the course, by week using a sample calendar:

 Week 1 Chapter 1 – Introduction, interface fundamentals of components,

 hardware, software, and compilation of programs using C++ compiler.

 Week 2 Chapter 2 – Programming tasks, arithmetic expressions, and tryparse.

 Week 3 Chapter 3 – Integer data and arithmetic operators, calculator function.

 Week 4 Chapter 4 – Selection structures If-then – If then Else nested logic. Test One.

 Week 5 Chapter 5 – Repetition structures – Do While – do Until (looping), declaring variables.

 Week 6 Chapter 6 – Concepts of Methods and Conversions, and sub-programming.

 Week 7 Chapter 7 – Arrays, data structures and other records.

 Week 8 Chapter 8 – Implementing Searches, various types available: binary, sequential, arrays.

 Week 9 Chapter 9 – Sorting and experimenting with various sorting techniques.

 Week 10 Chapter 10 – Importing pictures and backgrounds to improve visual appeal. Test Two.

 Week 11Chapter 11 – Pointers, array pointers and sort boxes.

 Week 12 – Review BASIC language, ladder logic controller module requirements, power source.

 Week 13 – Test Three. Visual C++ applied to control module, relays, light emitting diodes.

 Week 14 – Relays and current control. Sensors. Building an alarm system.

 Week 15 – Activating AC and DC devices using PLC with embedded controller.

 Week 16 - Final Examination

**XIII. OTHER INFORMATION:**

**FERPA:** Students need to understand that your work may be seen by others. Others may see your work when being distributed, during group project work, or if it is chosen for demonstration purposes. Students also need to know that there is a strong possibility that your work may be submitted to other entities for the purpose of plagiarism checks.

**DISABILITIES:** Students with disabilities may contact the Disabilities Service Office, Central Campus, at 800-628-7722 or 937-393-3431.