SOUTHEAST MISSOURI STATE UNIVERSITY

DEPARTMENT OF Computer Science   COURSE NO. CS155

TITLE OF COURSE Computer Science I   REVISION __2/2000

I.   CATALOG DESCRIPTION AND CREDIT HOURS OF COURSE: Fundamental principles of computer science and software engineering concepts, including working from software requirements in order to design, implement, and test programs; introduction to programming in a structured high-level language; significant hands-on experience with programming using a language development system and computer operating system. Four hours lecture and two hours lab. Prerequisite: Either IS130 or CS120, and MA134 with grades of C or better; or departmental placement. (5)

II.   PREREQUISITES: Either IS 130 Visual Basic I or CS 120 Introduction to Computer Science, and MA 134 College Algebra with grades of C or better; or departmental placement.

III.   COURSE OBJECTIVES: The objectives of the course are that the student will be able to

        A.   design, code, test, and debug computer-based solutions in several application areas, using accepted object-oriented software engineering principles;

        B.   use pre-defined and user-defined data types, including simple data types, one-dimensional arrays, and types provided in class libraries;

        C.   use standard algorithms, including searching and sorting arrays.

        D.   use standard C++ class libraries, including string, iostream, and the vector<T> class template from the Standard Template Library;

        E.   use interactive input/output (I/O) and text file I/O;

        F.   recognize the ethical and social implications of computer use.

IV.   EXPECTATIONS OF STUDENTS: Students are expected to

        A.   attend and participate in lecture discussions and classroom and laboratory activities.

        B.   complete exams, reading, laboratory exercises, and independently written programming assignments within a given time frame.

        C.   demonstrate a working knowledge of course concepts through satisfactory performance on exams, laboratory exercises and programming assignments.

V.   COURSE OUTLINE (Lecture/Lab): Laboratory exercises will be closely related to lecture topics and will include the following types of activities: tutorials; discovery

exercises; software testing; debugging; program modification; and computational experiments.

A. Introduction to basic concepts and skills (2/2)
   1. computer languages
   2. compilation, linking, and execution
   3. software engineering principles
   4. ethical use of computers
   5. use of programming environment within the operating system environment

B. Problem solving in C++ with: (8/4)
   1. fundamental programming constructs
   2. interactive I/O
   3. elementary data types
   4. program documentation (e.g. header comment)

C. Object-centered design and programming with functions. (7/3)
   1. introduction to functions, including void functions
   2. functions with simple if statements
   3. functions with for loops and indefinite loops
   4. libraries of functions

D. Object-oriented programming, using pre-defined class libraries (7/4)
   1. standard string class
   2. standard istream and ostream classes
   3. example of a programmer-written class

E. Structured programming with selection structures (3/2)
   1. if statements
   2. switch and break statements

F. Structured programming with repetition structures (5/2)
   1. for loop
   2. while loop
   3. do loop

G. Functions in depth (8/4)
   1. value and reference parameters
   2. scope of identifiers

H. Text files and streams (5/3)
   1. ifstream and ofstream
   2. basic fstream operations
   3. sequential file access

I. Linear algorithms (6/3)
   1. linear processing
   2. sequential search

3. quadratic sort

J. Vector<T> template and Standard Template Library (10/5)
1. defining vector<T> objects
2. using function members and operators
3. iterators

K. Optional topics (as time permits)
1. inline functions
2. overloading functions
3. creating templates
4. random file access
5. enumerations
6. C-style arrays
7. recursion
8. breadth topics (e.g. history, computer organization)

L. Exams (3)

Totals: Lectures, 64 hours; Labs, 32 hours

VI. TEXTBOOK(S) AND/OR OTHER REQUIRED MATERIALS OR EQUIPMENT:

A. Student textbook: <u>C++: An Introduction to Computing</u> 2nd Edition, by Joel Adams, Sanford Leestma, and Larry Nyhoff; Prentice Hall, 1998

B. Required lab manual: <u>Hands on C++(CodeWarrior Professional for Windows Version)</u> Joel Adams: Prentice Hall, 1998

C. Equipment:
1. IBM PC's or PC-compatibles.
2. Recommended: CodeWarrior Professional academic available from Southeast Book store.

VII. BASIS FOR STUDENT EVALUATION:

A. Exams, Programming assignments, and Final: 80%

B. Quizzes, Laboratory exercises, and/or Homework: 20%