

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

NUMERICAL APPLICATIONS USING FORTRAN
CST 2210

Class Hours: 3.0

Credit Hours: 4.0

Laboratory Hours: 3.0

**Date Revised: Fall
1999**

Catalog Course Description:

A study of FORTRAN with emphasis on modular design for solving problems selected from roots of equations, systems of linear equations, least squares data fitting, numerical integration, interpolation, and numerical methods for ordinary differential equations.

Entry Level Standards:

None

Prerequisite:

MTH 1010

Textbook(s) and Other Reference Materials Basic to the Course:

Weinman, David G., *VAX FORTRAN*, Second Edition; PWS-Kent; 1991.

I. Week/Unit/Topic Basis:

| Week | Topic |
|-------------|-------------------------------------|
| 1 | Introduction, VAX/VMS, EDT |
| 2 | Program Format, Intrinsic Functions |
| 3 | Control structures |
| 4 | Least squares, minima/maxima |
| 5 | Areas under curves, Test I |
| 6 | Binary search, zeroes of functions |
| 7 | Format, 1-dimensional arrays |
| 8 | Subprograms, Libraries |
| 9 | VMS Librarian, Run time library |
| 10 | Random number generation, Test II |

- 11 2-dimensional arrays
- 12 Systems of Equations
- 13 Character data, double precision
- 14 Sequential, Direct access files
- 15 Indexed files
- 16 Final Exam

II. Course Objectives*:

- A. Demonstrate proficiency in the FORTRAN programming language. III, VI, VII, IX, XI
- B. Reinforce structured programming concepts developed in earlier courses. III, IV, VI, VII, IX, XI
- C. Demonstrate logic and problem-solving skills. II, V, VI, XII
- D. Demonstrate use of modular programming concepts. II, V, VI

*Roman numerals after course objectives reference goals of the Business and Computer Technologies department.

III. Instructional Processes*:

Students will:

- 1. Create several programs to implement several numerical algorithms discussed in class. *Communication Outcome, Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Information Literacy Outcome, Active Learning Strategy*
- 2. Examine and implement algorithms that are efficient and reliable. *Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Active Learning Strategy*
- 3. Use professional tools to produce software components and documentation. *Technological Literacy Outcome, Transitional Strategy*
- 4. Use professionally accepted methods and materials in the approach to completion of applications. *Technological Literacy Outcome, Personal Development Outcome, Transitional Strategy*
- 5. Practice elements of the work ethic such as punctuality, professionalism, dependability, cooperation, and contribution. *Personal Development Outcome*

*Strategies and outcomes listed after instructional processes reference Pellissippi State's goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance*:

Upon successful completion of this course, the student should be able to write programs using and/or answer questions about the following FORTRAN topics::

- 1. FORTRAN data types: INTEGER, REAL, CHARACTER, DOUBLE PRECISION. A

2. One- and two-dimensional arrays A, C
3. Sequential file I/O A, C
4. Looping structures - DO, DO WHILE A, B, C
5. Decision structures - IF, IF-THEN-ELSE A, B, C
6. I/O Formats A, B
7. Functions - intrinsic, statement, subprograms A, B, C, D
8. Subroutines, user defined, libraries A, B, C, D
9. Translation of math into FORTRAN and vice-versa A, C
10. Operations on character data A, C
11. Create and link separately-compiled object modules A, D
12. Create and use object libraries A, D

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures: 60% of grade

There will be three 50-minute tests. Dates will be announced in class and each test will be weighted as follows:

Test 1 15%
Test 2 20%
Test 3 25%

B. Laboratory Expectations: 20% of grade

Several programming/lab assignments will be made during the term. Lab assignments will be selected from topics covered in class. If all lab assignments are completed, they will count for 20% of the final grade. Failure to complete all labs will result in a grade of F for the course.

C. Field Work: 20% of grade

A quiz over the current class or lab topic may be given at any time, with or without notice, in class or in lab. These quizzes will count for 20% of your final grade. NO makeups.

D. Other Evaluation Methods:

None

E. Grading Scale:

90 - 100 A
80 - 89 B
70 - 79 C
60 - 69 D
Below 60 F

VI. Policies:

A. Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course.

B. Academic Dishonesty:

Students are expected to do their own work in this class. If a student is unable to complete an assignment, it is the student's responsibility to get help from the professor (before the assignment is due).

C. Other Policies:

All exams are required, and make-ups will be allowed only in the rarest of cases. In the event that you have an emergency, you must notify the instructor in advance if at all possible.