

**BERGEN COMMUNITY COLLEGE  
COMPUTER SCIENCE DEPARTMENT  
COURSE SYLLABUS**

**INSTRUCTOR:** \_\_\_\_\_ **PHONE:** \_\_\_\_\_  
**EMAIL:** \_\_\_\_\_

**COURSE TITLE:** CIS-270 PROGRAMMING FOR SCIENTIFIC APPLICATIONS

**PREREQUISITE:** MAT-180

**CREDITS/HOURS:** 3 Credits / 4 Hours

**GENERAL EDUCATION COURSE:** CIS-270 **is not** a General Education course

**COURSE DESCRIPTION:**

CIS-270 is a computer programming language course with emphasis on mathematical, scientific, and engineering applications using structured programming principles. Topics include data types specifications, fixed and floating point arithmetic, input and output techniques, multi-dimensional arrays, external functions and subroutines.

**COURSE OBJECTIVES:**

This course has been designed to introduce students to

1. The fundamental concepts of digit computer systems.
2. Modern techniques for problem solving and algorithm designs.
3. Applications of these techniques to mathematics, science, and engineering.

**STUDENT OUTCOMES:** Upon completion of this course, the student will

1. Have knowledge of the following data types: integer, real numbers, complex numbers, character strings and logical data.
2. Be familiar with the fundamental binary operations of the above data categories.
3. Be able write statements to handle inputs of any form.
4. Be able write statements to display output in any layout.
5. Be able to write program segments using standard decision and loop structures of the computer language.
6. Be able to use one and multi-dimensional arrays to handle mathematical series and matrix operations.
7. Be able to write a function subprogram as well as a subroutine subprogram.
8. Be able to write a complete computer program to solve a simple mathematical scientific problem using the above mentioned techniques.

**STUDENT LEARNING OUTCOMES ASSESSMENT MEASURES:**

Each of the above listed student learning outcomes will be assessed by:

- Assigned readings from the text;
- Written assignments and/or quizzes;
- Written examinations and a comprehensive final examination.

### **COURSE GRADE/EVALUATION METHODS:**

Student will be evaluated using a variety of methods which may include, but not be limited to, some or all of the following: quizzes, exams, programming assignments, and term projects.

**Textbook:** C++ for Engineers and Scientists, 3rd Edition, Gary J. Bronson, 2010, Cengage Learning, ISBN-10: 0324786433 ISBN-13: 9780324786439

### **COURSE CONTENT:**

1. Language:  
Data types; Constants and variables; Binary operations of numerical data; Input methods and display of output data.  
Application:  
Evaluation of algebraic expressions and formula.
2. Language:  
Conversions of data types; Built-in functions of the computer language; Trigonometric functions.  
Application:  
Resolution of vectors into components; addition and subtraction of vector quantities.
3. Language:  
Conditional and un-conditional branching; Structured programming principles; Decision structures; If-then-else and Selection-case syntax.  
Application:  
Quadratic equations; Classification of solutions based on values of the discriminant.
4. Language:  
One dimensional arrays; Addresses and pointers; Multi-dimensional arrays.  
Application:  
Coordinate systems in mathematics; Recording and collecting of experimental data; Matrices and arrays.
5. Language:  
The iteration or loop structure; Normal and exceptional exits; Nested loops.  
Application:  
Maximum and minimum; Mean and averages evaluation; Basic sorting techniques.
6. Language:  
Computer graphics; Straight lines and circles; general two-dimensional graphs.  
Application:  
Space-time graphical representation of a simple particle in motion; Graphical representation of experimental data.
7. Language:  
Sub-Programs; Functions and subroutine; Arguments and parameters; Passing by value and by reference.  
Application:  
Method of least square; Numerical methods for equations of one unknown; Numerical differentiation and integration.

***The Department of Computer Science prohibits the use of any electronic devices such as, but not limited to, calculators, cell-phones, PDAs, laptops, headphones, etc. in classes unless otherwise specified in writing in the course outline by the instructor.***