

<b>Course Outcomes</b>	<b>CSC 1248</b>
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## **CSC 1248: Programming with Applications in Statistics**

**Credit Hours:** 3 hours

**Prerequisites:**

MATH 1021 or placement in MATH 1022 or 1023 or 1431 or 1550.

**Prerequisites by Topics:**

Basic problem solving skills for developing and solving algebraic formulas.

**Catalog Course Description:**

Credit will not be given for both this course and CSC 1250 or 1253 or 1350 or ISDS 3107. Not for degree credit for computer science majors. Computer programming using a high level language with applications in elementary statistics.

**Course Outcomes**

1. Be familiar with basic hardware and software types,
2. Master problem solving using algorithm development,
3. Master basic syntax and semantics of a high-level imperative language,
4. Be familiar with the basic data structure of lists in simple applications,
5. Be familiar with structured programming techniques,
6. Be familiar with modular design and implementation,
7. Be familiar with designing text-oriented user interfaces,
8. Be familiar with text file input and output,
9. Be familiar with command-line interface with an operating system.
10. Be familiar with basic descriptive statistics, population parameters, normal and bimodal distributions, linear regression.

**Texts and Other Course Materials**

Essential C++ for Engineers and Scientists. Jeri Hanly, ISBN 0-201-74125-3. (text varies by instructor)

**Major Topics**

- Hardware and Software: different types of computers and terms; parts of a computer (memory, CPU, I/O); how data and instructions are represented including base conversions; types of software; types of programming languages and terms. Introduction to operating systems.
- Compilation process, programming process (software development lifecycle), algorithm development, writing algorithms using pseudocode.
- Structured programming principles and construction.
- Preprocessor directives and system libraries.

- Variables, expressions (arithmetic, Boolean, literals), assignment statements, precedence, association, data types.
- Interactive input/output, formatting output.
- Branching statements (single selection, double selection, nested selection).
- Repetition structures (while, do-while, for). Counter-control loops (incremental and decremental), event control loops including sentinel control. Nested repetition.
- Programming standards and style guidelines: good documentation.
- Modular design, functions, predefined functions. (omit recursive functions). Different types of parameter passing.
- Single dimensional partially filled arrays.
- Unordered and ordered linear search. Binary search of arrays. Selection sort.
- Character and string I/O. Predefined string functions. Character manipulation I/O: get and put. Introduction of the standard class string.
- Streams and text File I/O: open files, close files, end of file, and formatting output.
- Descriptive statistics: observations, populations, frequency distributions, classes, histograms, sampling.
- Population parameters: arithmetic mean, median, mode, variance, standard deviation, percentiles and fractiles, skewness, kurtosis.
- Normal and bimodal distributions.
- Linear regression.

### **Assignments/Projects/Laboratory Projects/Homework**

Create an interactive program to calculate and print a customer statement for the Clean & Gas Convenience Store.

Construct a relative frequency distribution histogram for a data set.

Create a modular program to read input from a file and create an output report containing an echo of the input data in columnar format and showing the mean, range, variance and standard deviation.

### **Curriculum Category Content (estimated in semester hours)**

<b>Area</b>	<b>Core</b>	<b>Advanced</b>	<b>Area</b>	<b>Core</b>	<b>Advanced</b>
Algorithms	9	0	Data Structures	9	
Software Design	5	0	Prog. Languages	12	
Computer Arch.	3	0			

## Relationship to Criterion 3 Outcomes

A	B	C	D	E	F	G	H	I	J	K
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### *Math and Fundamentals:*

Descriptive statistics: observations, populations, frequency distributions, classes, histograms, sampling; Population parameters: arithmetic mean, median, mode, variance, standard deviation, percentiles and fractiles, skewness, kurtosis; Normal and bimodal distributions; Linear regression - total 12 hours

### *Data Structures:*

Use of lists, specifically single and multi-dimensional arrays, to solve unique problems; searching for unordered and ordered arrays, sorting– 9 hours

### *Algorithms and Software:*

Problem Analysis – 5 hours

Solution Design including modular design– 6 hours

### *Computer Organization and Architecture:*

Parts of a computer including the CPU (ALU and control unit), machine language, portability, decimal to binary, octal and hexadecimal conversions – 3 hours

### *Concepts of Programming Languages:*

Character set, data types, variables, constants, arithmetic expressions, assignment statements, relational and logical operators, standard I/O streams, standard I/O streams, scope and lifetime of variables – 12 hours

### *Social and Ethical Issues:*

#### *Oral Communication (presentations):*

#### *Written Communication:*

Students are required to submit well documented code including program headers, good variable names, comments before significant blocks of code, etc.

Course Coordinator: Dr. Nathan Brener

Last Modified: