# Introduction to Programming in C++

Keane
enabling transformation

**Course No.**

2307

**Description**

This course is a hands-on introduction to programming in C++. The course is intended to be a comprehensive description of the structured programming constructs of the C++ programming language.

The course serves as the first part of a three-part sequence. The emphasis in this part is on covering in great detail the basic programming constructs of C++. Constructs such as the C++ Data types (literal constants, variables, pointers, bool type, etc) are covered. All C++ statements such as the if-then-else, switch, for loop, while, and other control and iterative programming are discussed. Other concepts such as Function definition and prototyping, Argument Passing (Call-by-value, Call-by-reference), Function overloading, Default arguments, Blocks, nested scoping, and Function templates are also covered in detail.

Extensive programming examples and exercises are provided.

**Audience**

Software engineers, designers, and non C-programmers considering future application development in C++

**Prerequisites**

Knowledge of a programming language

**Objectives**

- Become acquainted with the basic concepts of object oriented programming
- Become familiar the core C features of C++
- Acquire an introductory knowledge of C++ programming
- Become fluent in writing Procedural-Based Programs

**Labs**

The course will be lab intensive. The students are expected to write a large set of small and average size programs. All programs will be developed in a UNIX programming environment. Students will be given homework assignments that they should finish prior to the next time the class meets.

**Duration**

5 days

**Maximum # Students**

8-10

## Course Contents

### Part I: C++, an Overview

**1. Getting Started**

- The First C++ Program: Writing it, Compiling and executing it.
- A First Look at Input/Output

**2. A Quick Tour of C++**

- History of C++
- Why inventing another language?
- Main Features of C++

### Part II: C++'s Basic Programming Constructs

**3. The C++ Data Types**

- Literal Constant
- Variables
- Pointer Types
- Const Qualifier
- Reference Types
- The bool Type
- Enumeration Types
- Array Types

**4. Expressions**

- Arithmetic Operators
- Equality, Relational, and Logical Operators
- Assignment Operators
- Increment and Decrement Operators
- The Conditional Operator
- The new and delete Expressions
- Comma Operator
- The Bitwise Operators
- Operator Precedence
- Type Conversions

**5. Statements**

- Simple and Compound Statements
- Declaration Statement
- The if Statement
- The switch Statement
- The for Loop Statements
- The while Statement
- The do while Statement
- The break Statement
- The continue Statement
- The goto Statement [1]

### Part III: Procedural-Based Programming

**6. Functions**

- Overview
- Function Prototype
- Argument Passing
- Returning a Value
- inline Functions
- main(): Handling Command Line Options

**7. Scope and Lifetime**

- Scope
- Global Objects and Functions
- Local Objects
- Dynamically Allocated Objects

**8. Overloaded Functions**

- Overloaded Function Declarations
- Argument Type Conversion
- Steps for Overload Resolution

**9. Function Templates**

- Function Template Definition
- Function Template Instantiation
- Template Argument Deduction
- Explicit Template Argument
- Template Explicit Specialization

**10. Exception Handling**

- Basics of C++ Exception Handling: try, throw, catch
- Throwing an Exception
- Catching an Exception
- Rethrowing an Exception
- Exception Specifications

### Appendices

A. Introduction to Using the Vim editor

B. Introduction to Sun Studio

[1] Note that indiscriminate use of transfers of control using the goto could cause great level of complexity during software development. Therefore, students taking this class should be discouraged from using this statement in their software development projects.