CLARENCE FITZROY BRYANT COLLEGE

PROGRAMME:	*INFORMATION TECHNOLOGY ASSOCIATE DEGREE*
CURRICULUM:	*Information Communications Technology*
COURSE TITLE:	*Fundamentals of Programming and Problem Solving*
COURSE CODE:	IFTH1006
LEVEL OF STUDENTS:	N/A
CREDITS:	*3*
SEMESTER:	*1 (one)*
DURATION:	*45 hours*
PREREQUISITE(S):	*None*

RATIONALE

The mass production of computers and constant reduction in their cost has given more people access to computer technology in their homes, schools and places of work. The prevalence of computer communication hardware in developed and developing societies have given far more people access to powerful computers, in the form of desktops, laptops, handhelds, and notebooks, than was the case a decade ago. Yet, the myth surrounding the complexity of the matter of programming has kept many brilliant Caribbean scholars from pursuing programming as a business. Hence, Caribbean nationals remain more interested in being end-users rather than developers of computer programs.

This course seeks to change the skills set of the Caribbean Associate degree graduate by providing all ICT majors with the building blocks of problem solving and programming in C++. It provides the right instructional conditions to develop, in students, programming skills that will enable them to create original computer programs that are solutions to problems that are unique to us in the Caribbean. The course content challenges students to use their natural talents and creative powers to apply more imagination to the problems that exist among Caribbean societies. Thus, we hope that knowledge that is gained from this course will not only

stimulate the student's interest in pursuing a career in programming, but provide adequate foundational skills that enable those who choose to do additional programming courses to master them, and those who choose to pursue program development as a career to be exceptional creative programmers.

COURSE DESCRIPTION

This course introduces the fundamentals of computer programming and problem solving. It provides basic instructions on the process of problem solving, and deep exploration of fundamental computer-related problem solving techniques such as flowcharting, pseudo code and algorithms. It introduces students to the syntax of the C++ programming language, and provides them with opportunities to use this language to generate solutions to real organisational and societal problems.

LEARNING OUTCOMES

On completion of this course students should be able to:

1. Describe the basic control structures in C++
2. Apply the principles of flowcharting to the software develop cycle.
3. Create pseudo codes for real life problems and use to develop algorithms.
4. Use abstraction to create Computer Software in an efficient manner.
5. Analyze the features of one high level language to determine its constructs and program structure.
6. Describe data types and structures for computer representation.
7. Evaluate the functions and subroutines that are embedded in the C++ programming a language
8. Write a simple program in C++ and use it to make decisions.
9. Explain Event Driven Programming and Object Oriented Programming methods.

CONTENT KNOWLEDGE

1. An Overview of Programming Technologies:
    - Machine Languages
    - Assembly Language and high level languages
    - Structured Programming
    - Software Trends: Object Technology
    - Hardware Trends

2. Introduction to programming language-independent analysis and the problem-solving process.
    - Flowcharting
    - Algorithms
    - Pseudo codes

3. Fundamentals of Programming Languages:
   - High level languages
   - Procedural Programming language constructs, conditional branching, looping
   - Data Types
   - Operators
   - Functions and Subroutines
   - Event Driven Programming, Object Oriented Programming

4. Programming languages
   - Popular Languages: C, C++, Visual BASIC and Java;
   - Mark-up Languages: HTML & XTML.

5. Programming in C ++:
   - The Basics of a typical C ++ environment
   - Writing a simple program
   - Printing one line of text
   - Adding two integer
   - Memory concepts
   - Arithmetic
   - Decision-making- Equalities and relational operators

6. Basic Control Structures of C++
   - Algorithms
   - Formulating algorithms
   - Formulating algorithms with top down and stepwise refinement
   - Pseudo code
   - If Selection structure
   - If/ else selection structures
   - While repetition structure:

     i. Increment and decrement operators
     ii. Logical operators
     iii. Functions
     iv. Arrays
     v. Pointers and strings
     vi. Classes and data attributes
     vii. Operator overloading
     viii. Inheritance

7. Assignment operators
   - Increment Operators
   - Recrement operators

8. Logical operators
   - Confusing equalities (= =)
   - Assignment (=) operators

9. Structured Programming Summary

10. Functions
    - Programme components of C++
    - Math Library functions
    - Function Definitions
    - Function prototypes

11. Arrays
    - Elements Arrays
    - Static Arrays

12. Pointers and strings
    - Referencing variables
    - Printing a string

13. Classes and data abstractions
    - Creating a structure
    - Setting structure members
    - Printing structure
    - Utility functions
    - Constructors and default arguments

TEACHING AND LEARNING METHODS

To facilitate fulfilment of the requirements of this course lesson will utilise the following methods:

- Instructor Presentations
- Group and Individual Projects
- Lab Work
- Demonstrations
- Peer-Tutoring
- Tutoring

Assessment Procedures

1. *Coursework (60%)*

- Programming Assignment [20 marks]
- Programming Project [40 mark]

2. *Examination (40%)*

ASSESSMENT SUMMARY

Selected Text: **Fundamentals of Programming and Problem Solving: A Guide for College and University Students and Lecturers**

CHAPTER	TASK	ASSESSMENT METHODOLOGY	Due Date	Time	Weighting	Learning Outcome
CHAPTER 1 - An Overview Of Programming Technologies	**1.**	• Activity 1: Machine Language Translation • Activity 2: Object-Oriented Programming • CASE STUDY: IMPLEMENTING A NEW BANKING SYSTEM	26th September 2023	11:59 mid night	10%	1
CHAPTER 2 -Introduction To Programming Language - Independent Analysis And The Problem Solving Process	**2**	• 2.4. Activity: Flowcharting • 2.5. Pseudocode Activity (Real-world application): • 2.6. Algorithm Activity (Real-world application): • 2.7. Flowcharting Activity (Real-world application) • 2.8. Algorithm Activity (Real-world application) • 2.9. Flowcharting Activity (Real-world application) • CASE STUDY: IITAE LTD AND THE INTRODUCTION TO PROGRAMMING LANGUAGE INDEPENDENT ANALYSIS AND THE PROBLEM SOLVING PROCESS	09th of October 2023	11:59 mid night	20%	2
CHAPTER 3 - Introduction To C++ Programming	**3**	• 3.6. Activity # 1: • 3.9. Activity # 2: • 3.12. Activity # 3: • 3.15. Activity # 4: • GROUP PROJECT: INTRODUCTION TO C++ PROGRAMMING • CASE STUDY: INTRODUCTION TO C++ PROGRAMMING AT XYZ COMPANY	30th of October 2023	11:59 mid night	10%	3
CHAPTER 4 - Control Structures And Functions	**4**	• 4.2. Activities 6 and 7: • 4.5. Activities 8 and 9: • 4.8. Activities 10 and 11: • 4.11. Activities 12 and 13: • 4.15. Activities: • 4.18. Activities: • 4.20. Activities 14 and 15: • GROUP PROJECT: "CREATING A TEXT ADVENTURE GAME"	13th of November 2023	11:59 mid night	10%	4

		• PRACTICAL CASE STUDY: BUILDING A CALCULATOR				
CHAPTER 5 – Object Oriented Programming	**5**	• 5.2. Activities 16 and 17: • 5.5. Activities 18 and 19: • 5.8. Activities 20 and 21: • 5.11. Activities 22 and 23: • 5.14. Activities 24 and 25: • 5.18. Activities 26 and 27: • GROUP PROJECT: OBJECT ORIENTED PROGRAMMING • CASE STUDY: OBJECT ORIENTED PROGRAMMING	27th of November 2023	11:59 mid night	20%	5
CHAPTER 6 - Advanced C++ Features	**6**	• 6.2. Activity 28 and 29: • 6.5. Activity 30 and 31: • 6.8. Activity: • 6.11. Activities 32 and 33: • 6.14. Activities 34 and 35: • 6.17. Activities: • 6.20. Activities: • 6.23. Activities 36 and 37: • 6.26. Activities 38 and 39: • GROUP PROJECT: ADVANCED C++ FEATURES • CASE STUDY: ADVANCED C++ FEATURES AT IITAE LTD	11th of December 2023	11:59 mid night	10%	6
CHAPTER 7 - Debugging And Testing	**7**	• 7.4. Activities 40 and 41: • GROUP PROJECT: DEBUGGING AND TESTING IN C++ • CASE STUDY: DEBUGGING AND TESTING AT IITAE LTD	18th of December 2023	11:59 mid night	10%	7, 8
CHAPTER 8 - Real-World Applications	**8**	• 8.2. Activity 42 and 43: • 8.5. Activity 44 and 45: • 8.8. Activity 46 and 47: • 8.11. Activity 48 and 49: • 8.14. Activity 50 and 51: • GROUP PROJECT: REAL WORLD APPLICATIONS IN C++ • CASE STUDY: REAL-WORLD APPLICATIONS AT IITAE LTD	18th of December 2023	11:59 mid night	10%	9

Nb: Dates are subjected to be changed.

TEXTBOOKS AND REFERENCES

Zak, D. (2015). *An introduction to programming with C++.* Custom eight (8) edition, Course Technology.

MIT, D. R. (2023). *Fundamentals of Programming and Problem Solving: A Guide for College and University Students and Lecturers*

READING LIST

1. Farrell*, J. (2014). Programming Logic and Design, Introductory. Eight edition.*
2. Zak, D. (2012). *An introduction to programming with C++.* Custom seventh (7) edition, Course Technology.
3. Zak, D. (2010). An Introduction to Programming with C++. Sixth (6) edition.