

|                                 |                                                                                                                                                                                                                                                    |                                      |             |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------|
| Course Title                    | Programming Fundamentals                                                                                                                                                                                                                           |                                      |             |
| Course Code                     | CSC-110                                                                                                                                                                                                                                            |                                      |             |
| Credit Hours                    | 3 (3,0)                                                                                                                                                                                                                                            |                                      |             |
| Category                        | Computer Science Core                                                                                                                                                                                                                              |                                      |             |
| Prerequisite                    | None                                                                                                                                                                                                                                               |                                      |             |
| Co-Requisite                    | None                                                                                                                                                                                                                                               |                                      |             |
| Follow Up                       | CSC-111 Object Oriented Programming                                                                                                                                                                                                                |                                      |             |
| Course Introduction             | This course provides fundamental concepts of programming to freshmen. The course is a prerequisite to many other courses; therefore, students are strongly advised to cover all the content and try to achieve CLOs to the maximum possible level. |                                      |             |
| Course Learning Outcomes (CLOs) | At the end of the course, the students will be able to:                                                                                                                                                                                            | BT                                   | PLO         |
|                                 | CLO1: Demonstrate proficiency in writing, debugging, and executing basic programs using programming languages such as C++ or Python.                                                                                                               | C3 (Apply)                           | 1,2,4,5     |
|                                 | CLO2: Explain core programming concepts including variables, control structures, functions, and data types.                                                                                                                                        | C2 (Understand)                      | 1,2         |
|                                 | CLO3: Develop simple algorithms to solve computational problems.                                                                                                                                                                                   | C6 (Create)                          | 1,2,3,4     |
|                                 | CLO4: Apply best practices in coding to produce efficient and readable programs.                                                                                                                                                                   | C3 (Apply)                           | 1,2,4,5,8,9 |
|                                 | CLO5: Analyze program outputs and troubleshoot common errors effectively.                                                                                                                                                                          | C4 (Analyze)                         | 1,2,3,5,10  |
| Text Book(s)                    | 1. Tony Gaddis, Starting out with C++, 10th Edition, Pearson, 2024.                                                                                                                                                                                |                                      |             |
| Reference Material              | 1. Object Oriented Programming in C++ by Robert Lafore<br>2. Problem Solving and Program Design in C++, 7th Edition by Jeri R. Hanly & Elliot B. Koffman                                                                                           |                                      |             |
| Weekly Lesson Plan              |                                                                                                                                                                                                                                                    |                                      |             |
| Week No.                        | Course Content                                                                                                                                                                                                                                     | Assignments/Readings                 |             |
| Week 1                          | Introduction to Problem Solving: Problem solving steps, algorithms, pseudo-code, flowcharts, overview of Von-Neumann Architecture                                                                                                                  | Gaddis: Chapter 1 Handouts           |             |
| Week 2                          | Overview of the structured program theorem (sequence, selection and iteration)                                                                                                                                                                     | Gaddis: Chapter 1 Handouts<br>Quiz 1 |             |
| Week 3                          | Introduction to C++: Structure of a C++ program, compilation process (compiler & linker), development environment, simple program (printing text), Variables and Data Types: Concept of variables, data types (int, float, char, bool)             | Gaddis: Chapter 2 Assignment 1       |             |
| Week 4                          | Input/output using cin/cout, arithmetic expressions, assignment statements, Operators and Expressions: Arithmetic operators, operator precedence, integer division, type casting, introduction to memory concepts                                  | Gaddis: Chapter 3 Quiz 2             |             |

|                |                                                                                                                                                                     |                                    |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| <b>Week 5</b>  | Decision Making I: Relational and equality operators, if and if-else statements, nested if                                                                          | Gaddis: Chapter 4                  |
| <b>Week 6</b>  | Decision Making II & Loops: Logical operators, while loop, structured program development                                                                           | Gaddis: Chapter 4-5<br>Quiz 3      |
| <b>Week 7</b>  | Iteration Control: for, do-while loops, break and continue, introduction to switch statement                                                                        | Gaddis: Chapter 5<br>Assignment 2  |
| <b>Week 8</b>  | Functions I: Modular programming, function definition and prototypes, passing arguments by value                                                                    | Gaddis: Chapter 6<br>Quiz 4        |
| <b>Week 9</b>  | Functions II: Passing by reference, scope rules, recursion, recursion vs iteration, random number generation                                                        | Gaddis: Chapter 6                  |
| <b>Week 10</b> | Arrays I: One-dimensional arrays, initialization, processing arrays, passing arrays to functions                                                                    | Gaddis: Chapter 7<br>Quiz 5        |
| <b>Week 11</b> | Arrays II: Searching and sorting arrays, multidimensional arrays, character arrays (strings basics)                                                                 | Gaddis: Chapter 8<br>Assignment 3  |
| <b>Week 12</b> | Strings and Structures: C++ strings, string handling functions, structures, accessing members, typedef, unions                                                      | Gaddis: Chapter 9-10<br>Quiz 6     |
| <b>Week 13</b> | Pointers I: Pointer concepts, declaration and initialization, pointer operators, pointers and arrays                                                                | Gaddis: Chapter 9-10               |
| <b>Week 14</b> | Pointers II & Dynamic Memory: Pointer arithmetic, array of pointers, function pointers (intro), dynamic memory allocation (new/delete)                              | Gaddis: Chapter 9-10<br>Quiz 7     |
| <b>Week 15</b> | File Handling & Preprocessor: File streams (read/write), sequential files, basics of random access, preprocessor directives (#include, #define, macros, assertions) | Gaddis: Chapter 12<br>Assignment 4 |
| <b>Week 16</b> | Advanced Topics & Review: Bitwise operators, enumerations, command-line/variable arguments, program termination (exit), course review                               | Gaddis: Chapter 11                 |