

PROGRAM NAME: : B.Sc(H) Mathematics
COURSE NAME : DSE-1 C++ Programming for Mathematics
SEMESTER DURATION: July to December

Week	Topic(s)	Teaching Methodology Adopted/ Continuous Internal Evaluation
1.	Fundamentals of programming, Organization of logic flow in stored program model of computation, C++ as a general purpose programming language, Structure of a C++ program, Common compilers and IDE's, Basic data-types.	Practical/Assignment
2.	Variables and literals in C++, Operators, Expressions, Evaluation precedence, and Type compatibility. Outline of program development in C++, Debugging and testing.	Practical/Assignment
3.	Applications: Greatest common divisor	Practical/Assignment
4.	Random number generation.	Practical
5.	Structured data-types in C++, Arrays and manipulating data in arrays. Applications: Factorization of an integer, and Euler's totient.	Practical/Presentation
6.	Objects and classes: Information hiding, Modularity, Constructors and Destructors, Methods and Polymorphism	Practical
7.	Objects and classes: Information hiding, Modularity, Constructors and Destructors, Methods and Polymorphism	Practical
8.	Containers and Template Libraries: Sets, Iterators, Multisets, Vectors, Maps, Lists, Stacks and Queues with applications in basic set algebra.	Practical/Presentation
9.	Containers and Template Libraries: Sets, Iterators, Multisets, Vectors, Maps, Lists, Stacks and Queues with applications in basic set algebra <i>contd.</i>	Practical/Presentation
10.	Applications: Modulo arithmetic, Permutations, and Polynomials.	Practical
11.	Applications: Modulo arithmetic, Permutations, and Polynomials <i>contd.</i>	Practical
12.	Arbitrary precision arithmetic using the GMP package; Linear algebra: Two-	Practical

	dimensional arrays in C++ with applications in finding Eigenvalues, Eigenvectors, Rank, Nullity, and Solving system of linear equations in matrices.	
13.	Features of C++ for input/output & visualization: Strings, Streams, Formatting methods, Processing files in a batch, Command-line arguments, Visualization packages and their use in plots.	Assignment
14.	Features of C++ for input/output & visualization: Strings, Streams, Formatting methods, Processing files in a batch, Command-line arguments, Visualization packages and their use in plot <i>contd.</i>	Assignment

Course Objectives: This course introduces C++ programming in the idiom and context of mathematics and imparts a starting orientation using available mathematical libraries, and their applications.

Course Learning Outcomes: After completion of this paper, student will be able to:

- i) Understand and apply the programming concepts of C++ which is important to mathematical investigation and problem solving.
- ii) Use mathematical libraries for computational objectives.
- iii) Represent the outputs of programs visually in terms of well formatted text and plots.