Programme: M. Sc. (Physics)

Course Code: PHY-522 **Title of the Course**: Computer Programming in Fortran 95

Number of Credits: 2

Effective from AY: 2022-23

Prerequisites for the course:	Nil	
Course Objectives:	This course develops concepts of computer programming in general and introduces programming language FORTRAN 95.	
Content:	**1. Fundamentals of Computer Programing** Programming Languages, Fortran Evolution, Character Set, Intrinsic Types, Numeric Storage, Literal Constants, Names, Significance of Blanks, Implicit Typing, Numeric and Logical Type Declarations, Character Declarations, Initialisation, Constants (Parameters), Comments, Continuation lines, Expressions, Assignment, Intrinsic Numeric Operations, Relational and Intrinsic Logical Operators, Intrinsic Character Operations, Operator Precedence, Mixed Type Numeric Expressions, Mixed Type Assignment, Integer Division, Formatting input and output, WRITE Statement, READ Statement, Prompting for Input, Reading and writing to a file, How to Write a Computer Program, Statement Ordering, Compiling and Running the Program, Practical Exercise 1 **2. Logical Operations and Control Constructs** Relational Operators, Intrinsic Logical Operations, Operator Precedence, Control Flow, IF Statement, IF ... THEN ... ELSE Construct, IF ... THEN ELSEIF Construct, Nested and Named IF Constructs, SELECT CASE Construct, The DO construct, Conditional Exit Loop, Conditional Cycle Loops, Named and Nested Loops, Indexed DO Loops, Practical Exercise 2 **3. Arrays** Declarations, Array Element Ordering, Array Sections, Array Conformance, Array Syntax, Whole Array Expressions, WHERE statement and construct, COUNT, SUM, MOD, MINVAL, MAXVAL, MINLOC and MAXLOC functions, Array I/O, The TRANSPOSE Intrinsic Function, Array Constructors, The RESHAPE Intrinsic Function, Named Array Constants,	15 hours 15 hours 15 hours 15 hours

	Allocatable Arrays, Deallocating Arrays, Vector and Matrix Multiplication, Practical Exercise 3. **4. Procedures** Program Units, Introduction to Procedures, Intrinsic Procedures, Intrinsic statement Mathematical Intrinsic Function Summary, Numeric Intrinsic Function Summary, Character Intrinsic Function Summary, Main Program Syntax, Functions, Subroutine and Functions, Practical Exercise 4	
Pedagogy:	Lectures/ Laboratory work/self-study	
References/Readings	1. V. Rajaraman, Computer Programming in FORTRAN 90 and 95, Prentice-Hall of India, New Delhi 1999. 2. Martin Counihan, Fortran 95, UCL Press Limited University College London (1996). 3. Stephen Chapman, Fortran 95/2003: for Scientists and Engineers, McGraw-Hill (2007).	
Course Outcomes:	Student will be able to 1. Understand programming in general; 2. Understand FORTRAN programming language; 3. Write and run simple programs. 4. Compose programs for regression analysis and error analysis	