**Programme:** M. Sc. (Physics)

**Course Code:** PHY-523 **Title of the Course:** Computer programming with C

**Number of Credits:** 2

**Effective from AY:** 2022-23

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| **Prerequisites for the course:** | Nil | |
| **Course Objectives:** | This course develops concepts of computer programming in general and introduces programming language C. | |
| **Content:** | **1. Introductory Concepts**<br>Introduction to computers, Introduction to Linux OS, Linux basics, Introduction to C, writing a C Program, Compiling and Executing the Program, Error Diagnostics, Some simple C Programs, Desirable Program Characteristics.<br>**2. C Fundamentals**<br>The C character set, Identifiers and Keywords, Data types, Constants, variable and Arrays, Declarations, Expressions, Statements, Symbolic Constants<br>**3. Operators and Expressions**<br>Arithmetic Operators, Unary Operators, Relational Logical Operators, Assignment Operators, the Conditional Operators, Library Functions.<br>**4. Data Input and Output**<br>Preliminaries, Single character input and output, entering Input data, writing output data, Opening and closing data file, format statements.<br>**5. Control Statements**<br>Preliminaries, Branching statements, Looping statements, nested control structure, switch, break, continue, go to statements. Practical Exercise<br>**6. Functions**<br>Defining functions, accessing functions, Passing arguments to a function. Practical Exercise<br>**7. Arrays**<br>Defining an array, processing an array, passing arrays to functions, multidimensional arrays. Practical Exercise | 7 hours<br>10 hours<br>10 hours<br>7 hours<br>10 hours<br>8 hours<br>8 hours |
| **Pedagogy:** | Lectures/ Laboratory work/self-study | |
| **References/Readings** | 1. Byron Gottfried, Programming with C, Tata McGraw-Hill (1996). | |

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| **Course Outcomes:** | Student will be able to<br>1. Understand programming in general;<br>2. Understand C programming language;<br>3. Write and run simple programs.<br>4. Compose programs for regression analysis and error analysis | |

**Programme:** M. Sc. (Physics)

**Course Code:** PHY-524 **Title of the Course:** Computer programming with Python

**Number of Credits:** 2

**Effective from AY:** 2022-23

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| **Prerequisites for the course:** | Nil | |
| **Course Objectives:** | This course develops concepts of computer programming in general and introduces programming language Python. | |
| **Content:** | 1. **Fundamentals of Python**:<br>Introduction to programming in Python, installation and writing, and running Python programs on Windows and Linux<br><br>2. **Handling data**:<br>Data types and variables, user input and output, mathematical operators<br><br>3. **Decision making and looping**:<br>Logical expressions and operators, conditional operators, lists, for loop, while loop<br><br>4. **Arrays and Functions**:<br>Lists, tuples, sets, special arrays, writing and calling user-defined functions,<br><br>5. **Data plotting and fitting**:<br>scattered plots, bar plots, histograms, reading data and plotting, linear or quadratic least square fitting<br><br>6. **Error analyses**:<br>Propagation of errors, significant figures, Gaussian distribution, mean, median, standard deviation, variance, weighted average. | 8 hours<br><br>8 hours<br><br>12 hours<br><br>12 hours<br><br>10 hours<br><br>10 hours |
| **Pedagogy:** | Lectures/ Laboratory work/self-study | |
| **References/Readings** | 1. "Python Cookbook: Recipes for Mastering Python 3" by by David Beazley and Brian K. Jone, O'Reilly | |