Lecture Plan

Name of the College: Government College of Arts, Science and Commerce, Sanquelim-Goa

Name of Faculty: Aaron Alphonso	**Subject:** Mathematics	
Paper code: MAT-5205 - Computational Mathematics Using Python	**Program:** M.Sc. Mathematics	**Division: -**
Academic year: 2024-25	**Semester:** II	**Total Lectures:** 60

Course Objectives: The student will learn the basics of python programming

Expected Course Outcome: On completion of the course the student will be familiar with loops, Functions, Recursion, Object Oriented Programming

Student Learning Outcome: At the end of this course a student will be able to

1. Recall the various concepts and techniques in Python.
2. Use the concepts learnt in Python to write basic programs.
3. Apply the knowledge in python to solve writing programs useful in mathematics.
4. Correlate the concepts of mathematics with python to solve problems in Mathematics.

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
December	1 Dec 2025	6 Dec 2025	2	**Introduction to Python:** IDLE , Python strings, Relational Operators, Logical Operators, Precedence of Operators, Variables and assignment statements, Keywords, Script mode	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja and Naveen Kumar
December	8 Dec 2025	13 Dec 2025	4	**Functions:**Built-in functions; input, eval, composition, print, type, round, min, max, pow Type conversion, Random number generation; randint Functions from math module, complete list of Built-in functions using help and dir	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja and Naveen Kumar
December	15 Dec 2025	20 Dec 2025	2	**Functions:** Function Definition and call, fruitful and void functions, function help, default parameter values, keyword arguments Importing User-defined modules, Assert statement.	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja and Naveen Kumar
January	22 Dec 2025	23 Dec 2025	2	**Control Structures:** General form of if , if-else , if-elif-else conditional statement Nested if-elif-else conditional statement. For and While statements and their	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja

				comparison, Nested loops, Break, Continue, Pass statements Else statement associated with a For/While statement Testing, Debugging			and Naveen Kumar
January	2 Jan 2026	03 Jan 2023	4	**Scope of Variables/Names:**Objects and Object ids, Namespaces; Global and Local variables, LEGB Rule **Strings:** Slicing, membership, basic functions and methods on strings.	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja and Naveen Kumar
January	05 Jan 2026	10 Jan 2026	4	**Mutable and Immutable:** Objects Lists, functions and methods on lists, List comprehension, copying lists, Sets, functions and methods on sets	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja and Naveen Kumar
January	12 Jan 2026	17 Jan 2026	4	**Mutable and Immutable:** Tuples, functions and methods on tuples, Dictionary, dictionary operations, functions.	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja and Naveen Kumar

January	19 Jan 2026	24 Jan 2026	4	**Recursion:**Iterative Approach and recursive approach, Program to find Minors and Determinant of a matrix.	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja and Naveen Kumar
January	26 Jan 2026	31 Jan 2026	4	**Files and Exceptions:** File handling, writing structures to a file, exceptions	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja and Naveen Kumar
February	02 Feb 2026	07 Feb 2026	4	**Classes and Objects:** Class attributes, class variables, destructor, Person, Graphs: as an example of a class	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja and Naveen Kumar
February	09 Feb 2025	14 Feb 2025	4	**Classes and Objects:** Highest degree and least degree, operator overloading, instance method, static method, composition and inheritance.	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja and Naveen Kumar
February	16 Feb 2025	21 Feb 2026	4	**Graphics:** 2D graphics, mathplotlib, matplotlib installation, points, lines.	Programming assignments	Laptop, Smart Board	Python Programming: A Modular

							Approach by Sheetal Taneja and Naveen Kumar
February	23 Feb 2026	28 Feb 2026	4	**Practical 1:** Expressing the elements of the Symmetric group as a product of disjoint cycles.	Programming assignments	Laptop, Smart Board	
March	02 Mar 2026	07 Mar 2026	2	**Practical 2:** Characteristic Equation of a nxn matrix. Synthetic Division to find rational roots of a polynomial when rational roots exist. **Practical 3:** Row Reduction to (Reduced)Row Echelon form. Generating nxn Identity Matrix Inverse of a matrix using row reduction	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja and Naveen Kumar
March	09 Mar 2026	14 Mar 2026	4	**Practical 4:** Finding Basis for the Row Space, Column Space of a matrix A and solution space of AX=B. **Practical 5:** Havel and Hakimi's Algorithm for degree sequences.	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja and Naveen Kumar
March	16 Mar 2026	21 Mar 2026	4	**Practical 6:** Solutions of linear Diaphontine Equations	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by

							Sheetal Taneja and Naveen Kumar
March	23 Mar 2026	28 Mar 2026	4	**Practical 7:** Fitting of straight line and quadratic curve to given data	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja and Naveen Kumar
March - April	30 Mar 2026	04 Apr 2026	4	**Revision and Repeat Practicals**	Programming assignments	Laptop, Smart Board	Python Programming: A Modular Approach by Sheetal Taneja and Naveen Kumar

*** Assessment Rubrics**

Component	Max Marks
ISA 1	7.5
ISA 2	7.5
Mid Point Exam	15
Semester End Exam	20