PROGRAMME NAME: BSc Mathematics
COURSE NAME: Numerical Methods
SEMESTER DURATION :July to December

WEEK	TOPIC(S)	TEACHING METHODOLOGY ADOPTED/ CONTINUOUS INTERNAL EVALUATION
1	Floating point representation and computer arithmetic, Significant digits; Errors: Round off error, Local truncation error, Global truncation error	Lectures
2	Order of a method, Convergence and terminal conditions	Demonstrations
3	Bisection method, Secant method	Discussions
4	Regula-Falsi method, Newton-Raphson method	Tutorials
5	Gaussian elimination method (with row pivoting), Gauss-Jordan method; Iterative methods: Jacobi method, Gauss-Seidel method	Self –Instruction
6	Interpolation: Lagrange form, and Newton form	Presentation
7	Finite difference operators	Case Study
8	Gregory-Newton forward and backward difference interpolations	Assignment
9	Piecewise polynomial interpolation: Linear, and Quadratic	Lectures
10	Numerical differentiation: First and second order derivatives	Self –Instruction
11	Numerical integration: Trapezoid rule, Simpson's rule.	Assignment
12	Extrapolation methods: Richardson extrapolation, Romberg integration	Discussion
13	Ordinary differential equations: Euler's method	Tutorials
14	Modified Euler's methods: Heun's method, The Midpoint method	Case Study

Course Objectives: The goal of this paper is to acquaint students for the study of certain algorithms that uses numerical approximation for the problems of mathematical analysis. Also, the use of Computer Algebra Systems (CAS) by which the intractable problems can be solved both numerically and analytically.

Course Learning Outcomes : After completion of this course, students will be able to:

i) Find the consequences of finite precision and the inherent limits of numerical methods.

ii) Appropriate numerical methods to solve algebraic and transcendental equations.

iii) How to solve first order initial value problems of ODE's numerically using Euler methods.