



جامعة الحكمة، إلورن - نيجيريا

AL-HIKMAH UNIVERSITY, ILORIN, NIGERIA

Adeta Road, Adewole Housing Estate, P.M.B. 1601, Ilorin

.....learning for wisdom and morality.....

CENTRE FOR ICT AND DISTANCE LEARNING (IDL)

e-CONTENT DEVELOPMENT (DL) UNIT

Course Content Structure

A. Course Lecturer's Detail

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B. Faculty, Department and Programme

Faculty: Natural and Applied Sciences

Department: Physical Sciences

Programme: Physics

C. Course Title, Code, Credit Unit and Outline

S/No.	Course Title	Course Code	Credit Unit	Course Outline
1	COMPUTATIONAL PHYSICS	PHY405	3	Use of numerical methods such as Trapezoidal rule, Simpson's rule, Gaussian quadrature, linear interpolation, Finite difference, self-consistent solution of some problems in Physics, Numerical differentiation, Finite difference approximation. Numerical solutions of differential equations in Physics. Concept of error and statistical analysis in Physics, various methods of numerical integration, differentiation. Statistical analysis of experimental data. Computer programming in C

D. Topics to be taught

- i. Concept of C programming: Flowchart, Basic Structure, Loop Control Structure, Arrays and String, Pointers, Structure and Unions
- ii. Errors: Description, Type and Sources of Error. Errors in Numerical Computations and Error in Series Approximation.

- iii. Numerical Solution of Algebraic and Transcendental Equation: Algorithm, Flowchart, and Code Writing for Bisection, Iteration, Regula Falsie, and Newton Raphson Methods.
- iv. Interpolation – Linear, Lagrange and Quadratic interpolation with Algorithm, Flowchart.
- v. Numerical Integration and Differentiation: Algorithm and Flowchart of Simpsons and Trapezoidal rule.
- vi. Numerical Solution of Ordinary Differential Equations: IVP and BVP using Euler, Taylors and Runge Kutta Methods.
- vii. Systems of Linear Equation: Gaussian Elimination and Gauss Jordan Method
- viii. Statistical Methods.

E. Further Readings

1. DeVries, P. L., & Hasbun, J. E. (2011). A first course in computational physics. Jones & Bartlett Publishers.
2. Goyal, M. (2008). Computer Based Numerical & Statistical Techniques. Laxmi Publications, Ltd. Download - <https://drive.google.com/file/d/0B5nnI0VCa9KCMG4yV1hTbmtvREU/edit>
3. Newman, M. (2013). Computational physics. CreateSpace Independent Publishing