1.	Title of the Course	Computational Physics
2.	Course Number	PH5210
3.	Status of the Course	Core
4.	Structure of Credits	2-0-3-4
5.	Offered To	PG
6.	New Course/Modification to	New
7.	To be Offered by	Department of Physics
8.	To take effect from	July 2020
9.	Prerequisite	Nil
10.	Whether approved by the Department	Yes
11.	**Course Objective:** To equip students with essential tools of numerical analysis for solving various physics problems and to implement some of these in the laboratory to gain practical knowledge.	
12.	**Course Content:** Programming essentials; Approximations, error analysis; Linear algebraic equations and matrix manipulations; Regression and curve fitting: broadening of lines, decay profile; Fast Fourier transforms; Numerical integration: trapezoidal method, Simpson's method and Gauss quadrature; Numerical solution of ordinary differential equation: Euler, Crank-Nicolson and Runge-Kutta methods; Partial differential equations with finite difference methods; Monte-Carlo methods; Applications: 1-D Schrodinger equation, Poisson equation, Maxwell equations, and Ising model.	
13.	**Text book(s):** 1. Landau R H, Paez M J and Bordeianu C C, *Computational Physics: Problem Solving with Computers*, Wiley VCH (2007). 2. Pang T, *An Introduction to Computational Physics*, Cambridge University Press (2006).	
14.	**Reference(s):** 1. Chapra S C and Canale R P, *Numerical Methods for Engineers*, McGraw-Hill (2014). 2. Sastry S S, *Introductory Methods of Numerical Analysis*, Prentice Hall of India (1983). 3. Thijssen J M, *Computational Physics* , Cambridge University Press (1999).	