

Programme: M. Sc. (Physics)

Course Code: PHGC-100

Title of the Course: Bridge Course in Mathematical Methods

Number of Credits: 2

Effective from AY: 2021-22

<u>Prerequisites for the course:</u>	NIL	
<u>Objectives:</u>	This course develops problem solving capabilities of students. It also helps to revise and understand the concepts based on Integration, differentiation and such other basic topics of mathematics, which are useful in solving problems based on Physics.	
<u>Content:</u>	1. Preliminary Calculus Differentiation from first principles; products; the chain rule; quotients; implicit differentiation; logarithmic differentiation; Leibnitz' theorem; special points of a function; theorems of differentiation, Integration from first principles; the inverse of differentiation; integration by inspection; sinusoidal functions; logarithmic integration; integration using partial fractions; substitution method; integration by parts; reduction formulae; infinite improper integrals; plane polar coordinates; integral inequalities; applications of integration 2. Partial Differentiation Definition of partial derivative; the total differential and total derivative; Exact and inexact differentials; Useful theorems of partial differentiation; the chain rule; Change of variables; Taylor's theorem for many variable functions; Stationary values of many variable functions; Stationary variables under constraints; Thermodynamic relations; Differentiation of integrals 3. Series and Limits Series; Summation of series (arithmetic, geometric); convergence of infinite series; Operations with series; Power series; Taylor series; Evaluation of limits. 4. Vector Algebra Scalars and vectors; Addition and subtraction of vectors; Multiplication by a scalar; Basis vectors and components; Magnitude of a vector; Multiplication of vectors; Equation of lines and planes; Using vectors to find distances; Reciprocal vectors. 5. Ordinary differential equations Linear equations with constant coefficients; Linear equations with variable coefficients; General ordinary differential equations.	8 hours 4 hours 4 hours 4 hours 4 hours
<u>Pedagogy:</u>	lectures/ tutorials/assignments/self-study	
<u>References/Readings</u>	1. K.F. Riley, M.P. Hobson and S.J. Bence, Mathematical Methods for Physics and engineering, Cambridge University Press, Cambridge UK (Reprint 2002). 2. George B. Arfken and Hans J. Weber, Mathematical methods	

	for Physicists, 7/e Elsevier Inc., 2012. 3. Mathematics text books of XI and XII Science prescribed by NTSE/CBSE/Goa Board.	
<u>Learning Outcomes</u>	1. Conceptual understanding of the meaning of the differentiation, partial differentiation, integration, ODE (Ordinary differential equations) and its application to solve the problems based on physics. 2. Understand the vector algebra, series and its application in solving the problems in physics and day to day life.	

