

1.	Title of the course	Mathematical Methods for Basic Sciences II
2.	Course number	ID601L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To ID6101/2
6.	To be offered by	Department of Physics
7.	To take effect from	July 2022
8.	Prerequisite	CoT
9.	Course Objective(s): To provide a few advanced mathematical techniques to postgraduate/PhD students in Physics and Chemistry.	
10.	Course Content: Integral transforms: Laplace transforms and Fourier transforms. Applications in Spectroscopy and Quantum Mechanics. Complex functions. Cauchy-Riemann conditions. Power series. Cauchy's integral theorem. Conformal mapping. Singularities: poles, essential singularities. Residue theorem. Contour integration and examples. Analytic continuation. Multiple-valued functions, branch points and branch cut integration. Coulomb functions. Applications of the Lambert W function to solve problems in quantum mechanics. Probability theory. Probability distributions and probability densities. Standard discrete and continuous probability distributions. Moments and generating functions. Central Limit Theorem. Group theory: Elements of group theory. Molecular Point Groups. Proof of the Great Orthogonality Theorem. Character Tables. Continuous groups. Rotation groups. SO(3), SU(2) and SO(4).	
11.	Textbook(s): 1. Arfken G and Weber H J, <i>Mathematical Methods for Physicists</i> , 7th Edition, Academic Press (2012). 2. Boas M, <i>Mathematical Methods in Physical Sciences</i> , 3rd Edition, John Wiley (2006).	
12.	Reference(s): 1. Tinkham M, <i>Group Theory and Quantum Mechanics</i> , Dover (2003).	