Semester	Code	Module Title	Credits	C/E/O	GPA/NGPA
7,8	MA4240	Mathematical Methods in Theoretical Physics	3	E	GPA

Hours/Week		Pre-requisites/Co-requisites	Evaluation (%)	
Lecture	Tute/Lab		CA	WE
3	0	MA2034	30	70

Learning Outcomes

After the successful completion of this course students should be able to
- Understand the basics of Differential Geometry and apply that knowledge to understand concepts of Relativity.
- Understand the basics of Functional Analysis and apply that knowledge to understand concepts of Quantum Mechanics.

Syllabus Outline

Differential Geometry and Relativity
- Manifolds
- Curvature
- Geodesics
- Tensors
- Special Relativity and Flat Space-time
- Electromagnetic Four-Potential
- Einstein's Law of Gravitation
- The Newtonian Approximation
- The Schwarzschild Solution

Functional Analysis and Quantum Mechanics
- Dual Spaces
- Linear Operators and Distributions
- Spectral Theory
- Hilbert Spaces
- Lagrangian and Hamiltonian Mechanics
- Wave function and the Uncertainty Principle
- Schrodinger's Equation
- The Hydrogen Atom
- Dirac Equation
- The Path Integral Formulation of Quantum Mechanics