Syllabus for Quantum Field Theory

1. Introduction :
   (a) Relativistic Wave equations (b) Lagrangian formulation of Particle Mechanics (c) Noether's theorem for relativistic fields

2. Field Quantization :
   (a) Scalar Field (b) Dirac field (c) Electromagnetic field

3. Perturbation Theory :
   (a) Scattering Matrix – In and Out states (b) Reduction Formalism
   (c) Wick's theorem (d) Feynman Diagrams in Momentum space
   (d) Cross sections and application to scattering

4. Renormalisation :
   (a) Divergences in Feynman integrals (b) Higher Order Corrections (c) Counter terms (d) Dimensional Regularisation
   (e) One loop renormalization

* 5. Path Integral formulation of Quantum Mechanics, Generating functionals of Green Functions

*6. Path Integral for a free scalar field, Fermi field – Grassmann algebra

*7. Path integral quantization of Gauge fields. Ward –Takahashi Identities in QED.

- * Depending on the interest and requirement of students these topics may be included.
