PHY681 (Quantum Field Theory)

Instructor: Dipankar Chakrabarti. [2018-19, First semester]

It will be an introductory course on Quantum Field Theory(QFT). Students will be taught canonical quantization only. At the end of the course, the students are expected to be able to calculate elementary processes in the lowest order of perturbation theory.

Prerequisits: Students should have good knowledge on quantum mechanics.[PHY432]

The plan of the course is as outlined below:

1. Preliminaries of QFT.
2. Space-time in QFT, Lorentz invariance.
3. Action principle, Euler-Lagrange equations
4. Symmetry transformations and Noether's theorem.
5. Canonical quantization of fields :
   (a) Scalar fields: real and complex scalar fields
   (b) Dirac fields
   (c) Gauge fields [$U(1)$ gauge fields]
6. S-matrix: Perturbative expansion, Wick's theorem.
7. Computing S-matrix from Feynman diagrams: Feynman rules.
8. Elementary processes in QED: Tree level calculations.

Books:

1. Quantum Field Theory- Peskin and Schroeder
2. Quantum Field Theory - Lahiri and Pal
3. Quantum Field Theory - Mandl and Shaw.