

Syllabus for Particle Physics

1. Introduction
 - (a) fundamental particles and their searches
 - (b) Accelerators and colliders
 - (c) Basic interactions
 - (d) Relativity, antiparticles
 - (e) Rotation, Isospin, Addition of Angular momentum
 - (d) Conservation laws in decays and scattering

2. Discrete Symmetries
 - (a) Charge Conjugation (C), Parity (P) and Time reversal (T)
 - (b) Transformation of spinor bilinears under C, P, T
 - (c) CP Violation in Kaon system
 - (d) CPT invariance and its consequences

3. Feynman Diagrams, Cross-section and decay widths

4. Gauge Symmetries
 - (a) U(1), SU(2) and SU(3) local gauge invariance
 - (b) Yang Mills Lagrangian

5. Quantum chromodynamics
 - (a) Production of hadrons in electron positron scattering
 - (b) Deep inelastic scattering
 - (c) Parton Model and Bjorken scaling

6. Symmetry Breaking
 - (a) explicit and spontaneous
 - (b) Goldstone Theorem
 - (c) Higgs Mechanism

7. Standard Model of electroweak interactions
 - (a) Gauge, Fermion and Higgs interactions
 - (b) Spontaneous symmetry breaking and masses of particles
 - (c) Yukawa interactions, Fermion masses, CKM Matrix
 - (d) Physical processes involving charged and neutral current
