

Physics 570
Quantum Field Theory

Tentative Syllabus:

Relativistic fermions Quantized spinor fields, Dirac equation, Lorentz invariance, representation independence. Charge conjugation and antiparticles, massless fermions & neutrinos, Grassmann integration and Grassmann functional integrals.

Basic QED Free photons, photon-electron interaction, elementary processes.

Yang-Mills fields Abelian and non-Abelian gauge fields, functional integral quantization, gauge fixing, Feynman rules

Regularization and renormalization Dimensional continuation and other regulators, mass-independent renormalization, running couplings and renormalization group

Texts:

This course has no single textbook; attending lecture and taking good notes is essential. The following books are recommended for certain topics:

A. Zee, Quantum Field Theory in a Nutshell. Breezy presentation, broad but not overly detailed.

L. Brown, Quantum Field Theory. Good introduction to modern methods, can be challenging.

M. Srednicki, Quantum Field Theory, <http://www.physics.ucsb.edu/~mark/qft.html> . New online textbook.

M. Peskin and Schroeder, Introduction to Quantum Field Theory. Good intro to relativistic QFT.

The above books are on reserve in the physics library.