Physics 217 Introduction to Quantum Field Theory Fall 2006

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REQUIRED TEXTBOOK:

An Introduction to Quantum Field Theory, by Michael Peskin and Daniel Schroeder

Other introductory texts:

Quantum Field Theory, by F. Mandl and G. Shaw
A Modern Introduction to Quantum Field Theory, by Michele Maggiore
Field Quantization, by W. Greiner and J. Reinhardt
Quantum Electrodynamics, by W. Greiner and J. Reinhardt
Relativistic Quantum Mechanics and Field Theory, by Franz Gross
A First Book of Quantum Field Theory, by Amitabha Lahiri and Palash B. Pal
Quantum Field Theory—From Operators to Path Integrals, by Kerson Huang
Quantum Field Theory, A Modern Introduction, by Michio Kaku
Quantum Field Theory, by Lewis H. Ryder
The Quantum Theory of Fields (Volume 1), by Steven Weinberg
Quantum Field Theory, by Lowell S. Brown
Quantum Field Theory in a Nutshell, by Anthony Zee

Other useful texts [the classics]:

Quantum Electrodynamics, by V.B. Berestetskii, E.M. Lifshitz and L.P. Pitaevskii
Relativistic Quantum Fields, by J.D. Bjorken and S.D. Drell
Relativistic Quantum Mechanics, by J.D. Bjorken and S.D. Drell
Quantum Field Theory, by Claude Itzykson and Jean-Bernard Zuber

Course Outline

1. Relativity and Quantum Mechanics
2. Classical Relativistic Field Theory
3. The Lorentz and Poincaré Groups and their Lie algebras
4. Field Theory of a Spin-Zero Particle
5. Fermion fields and the Dirac Equation
6. Field Theory of a Spin-1/2 Particle
7. Discrete Symmetries (CPT and all that)
8. Interacting Fields and Scattering Theory
9. Feynman Diagrams
10. Elementary Processes in Quantum Electrodynamics
11. Radiative Corrections: Some Formal Developments
12. Beyond the trees: $g - 2$ of the electron