PHYS 612: Advanced Topics: Quantum Field Theory
Spring Semester, 2022
Professor: Anthony Mezzacappa, 206 South College, 4-2621, mezz@utk.edu
Grader: Mu-Hung Chang

Class Times: TTh, 11:30 – 12:45
Class Location: Nielsen 306

Course Syllabus

1. Spin ½ - Laying the Groundwork
2. Representations of the Lorentz Group
3. Spinor Representations of the Lorentz Group
4. The Dirac Equation
5. Coupling to the Photon
6. Solutions of the Dirac Equation
7. Spin and Statistics
8. Discrete Symmetries
9. Quantum Electrodynamics
10. Processes in QED
11. QED as a Gauge Theory
12. Yang–Mills Theory
13. Quantum Chromodynamics
14. Weak Interactions at Low Energy
15. A Gauge Theory of the Weak Interactions: Electroweak Unification
16. Spontaneous Symmetry Breaking and the Higgs Mechanism
17. Renormalization

Course Texts

My lectures will draw primarily from the following texts:

1. Schwartz, Quantum Field Theory and the Standard Model
2. Halzen and Martin, Quarks and Leptons
3. Quigg, Gauge Theories of the Strong, Weak, and Electromagnetic Interactions

Office Hours

By Appointment

Grades

Grades will be based on: (1) graded homework assignments, (2) a midterm exam, and (3) a final exam. All three will be equally weighted. The midterm and final exams will be open-book, take-home exams. Mu-Hung will grade the homework assignments. I will grade the midterm and final exams.