Instructor: Howard Haber
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Office Hours: Mondays 3–4 pm and Thursdays 2–3 pm
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Course web page: `http://scipp.ucsc.edu/~haber/ph217/`

REQUIRED TEXTBOOK:

Quantum Field Theory and the Standard Model, by Matthew D. Schwartz

Recommended Outside Reading:

Secondary texts:

An Introduction to Quantum Field Theory, by Michael Peskin and Daniel Schroeder
Quantum Field Theory (Second Edition), by F. Mandl and G. Shaw

Other useful texts:

A Modern Introduction to Quantum Field Theory, by Michele Maggiore
Quantum Field Theory, by Lowell S. Brown
Lectures on Quantum Field Theory, by Ashok Das
Field Quantization, by W. Greiner and J. Reinhardt
Quantum Electrodynamics (Fourth Edition), by W. Greiner and J. Reinhardt
Student Friendly Quantum Field Theory (Second Edition), by Robert D. Klauber
Quantum Field Theory for the Gifted Amateur, by Tom Lancaster and Stephen J. Blundell
A First Book of Quantum Field Theory, by Amitabha Lahiri and Palash B. Pal
Quantum Field Theory, The Why, What and How, by Thanu Padmanabhan
Quantum Field Theory, by Mark Srednicki
The Quantum Theory of Fields (Volume 1), by Steven Weinberg
Quantum Field Theory in a Nutshell (Second edition), by Anthony Zee

The classics:

Quantum Electrodynamics, by V.B. Berestetskii, E.M. Lifshitz and L.P. Pitaevskii
Relativistic Quantum Mechanics, by J.D. Bjorken and S.D. Drell
Relativistic Quantum Fields, 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 Poincareé Groups and their Lie algebras
4. Field Theory of a Spin-Zero Particle
5. Two-component fermion fields
6. Four-component fermion fields and the Dirac Equation
7. Field Theory of a Spin-1/2 Particle
8. Discrete Symmetries (CPT and all that)
9. Interacting Fields and Scattering Theory
10. Feynman Diagrams
11. Elementary Processes in Quantum Electrodynamics

Course Requirements

The requirements of this course consist of five problem sets (65%) and a final exam (35%) [percentage of the course grade indicated in parentheses]. Problem sets will be handed out on a regular basis. The first problem set is due Tuesday October 11, with each of the subsequent problem sets due two weeks later on the corresponding Tuesday. The homework problem sets are not optional. You are encouraged to discuss the class material and homework problems with your classmates and to work in groups, but all submitted problems should represent your own work and understanding.

The final exam will take place on Thursday December 8 from 12–3 pm in ISB 231 and will cover the complete course material. You will be allowed to consult the course textbook, class handouts and personal handwritten notes during the exam. You must take the final exam to pass the course.

Disability Statement to Students in Class

UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access in this course, please submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) to me privately during my office hours or by appointment, preferably within the first two weeks of the quarter. At this time, we would also like us to discuss ways we can ensure your full participation in the course. We encourage all students who may benefit from learning more about DRC services to contact DRC by phone at 831-459-2089 or by email at drc@ucsc.edu.