PHY665: Quantum Field Theory
Winter 2009

Text: Srednicki: Quantum Field Theory

Other references: There are many; I'll suggest additional references as we proceed.

Instructor: Prof. Graham Kribs

Office: 470 Willamette Hall

Office Hours: Anytime my door is open.

E-mail: kribs@uoregon.edu
(This is the best way to reach me)

Class Website: http://wingate.uoregon.edu/phy665
(Announcements, homework, solutions, syllabus, etc.)

Homework: Homework will be assigned periodically and due roughly one week later. A homework set/mini-project will be due the last week (dead week) of classes.

Grade: 100% Homework; last one may be a mini-project

Grading Policy: Pass (B- and above): A solid attempt on virtually all problems of all homework sets turned in on-time.
Fail (C+ and below): Habitually late homework, > 1 missed homework sets, several missed problems on several problem sets.

Late Homework: Homework turned in more than 24 hours after the due date/time is not accepted without prior approval from me. Any variation in this policy is at my discretion; contact me in advance (or have a documented medical emergency).

Class Cancellation: In the unlikely event that I have to cancel class at the last minute (bad weather or otherwise), I will attempt to email everyone.
Syllabus

This course is the second quarter of a three-quarter sequence on Quantum Field Theory. In this term we will do fermions and gauge theory at tree-level, i.e., quantum electrodynamics.

A rough outline of the plan:

(33-35) Representations of Lorentz Group; Spinors; 2-Component
(36) Lagrangian for 2- and 4-Component Spinors
(37) Canonical Quantization (u,v, and Dirac eq)
(38-41) Spinor technology; operators; LSZ
(42) Propagator
(43-44) Fermion Path Integral
(45-47) Feynman rules; spin sums; traces
(54-59) Photons, Feynman rules, QED
(62-64) Radiative corrections (time permitting)

The main goal of the course is to build up the foundations of fermions and photons of QFT so that you can calculate tree-level scattering processes in QED. Depending on time and interest, various more advanced topics will be introduced, including loop corrections, running couplings, non-Abelian gauge theories, etc.

Comments on Homework

I will grade on a scale of $P^+, P, P^-, F$.
$P^+$ means you basically nailed all problems of the homework.
$P$ means you did a decent job, with a few issues here and there.
$P^-$ means you missed parts of problems, didn’t get certain issues, but you made a decent attempt at all problems.
$F$ means you missed many parts of problems or missed entire problems or did not turn in your set outline.
At the end of the quarter, I look at how you did on homework as a grade as well as written comments that I record about your performance to determine your final grade.

Please write clearly, legibly, and organize your solution. Don’t be afraid to waste paper to ensure your solution can be clearly followed, step-by-step.

It is very helpful to start new problems and/or parts of problems on new pages.

In the absence of a grader, I can only do only a brief check of your homework, and I may emphasize or deemphasize certain problems as appropriate. It is your responsibility to carefully check your graded homework against solutions.