Quantum Field Theory II outline
Phys 890A – Advanced Theoretical Physics

Fall 2009

I Review and extension of basic ideas
- review
- spin-statistics theorem
- calculational methods for the Dirac field
- practical group theory techniques

II Gauge theory treated right
- gauge fixing
- ghosts
- Feynman rules

III Perturbative gauge theories
- gauge invariance and Feynman rules
- renormalization of QED
- the classic calculations
- the running QED coupling constant

IV Effective Field Theory
- energy scales and degrees of freedom
- the sigma model as an example
- integrating out heavy degrees of freedom
- the low energy effective action
- calculating in non-renormalizable theories

V Anomalies
- path integrals and symmetries
- perturbative and path integral treatments
- anomalies in field theory

VI. Field Theory and Statistical Physics
- I hope to develop this section, but have not yet planned it out

VII. The Standard Model
- construction of the model
- asymptotic freedom and perturbative QCD
- weak decays and particle mixing