- path-integral quantization *Lecture notes,* Cheng & Li, Chapter 1
- scalar field and ϕ^4 theory *Lecture notes,* Cheng & Li, Chapter 2
- *LSZ reduction (relation between Green functions and scattering amplitudes)* *Peskin & Schroeder, Sec. 7.2*
- perturbative expansion, Feynman rules *Lecture notes;* Izykson & Zuber, Sec. 6-1
- dimensional regularisation and renormalisation *Lecture notes;* Cheng & Li, Chapter 2.
- constraints, Dirac-Bergmann algorithm, relation between gauge symmetry and 1st-class constraints *Lecture notes;* Dirac "Lectures on Quantum Mechanics"
- quantization of gauge fields, non-Abelian gauge theory, Faddeev-Popov ghosts
  Lecture notes; Cheng & Li, Sec. 9.1, 9.2, 9.3
- renormalization group, transmutation and running of QCD coupling, asymptotic freedom
  Cheng & Li, Chapter 3 and Sec. 10.1; *Yndurain, Sec. 3.7, 3.8*
- *scaling in deep inelastic scattering (DIS)* *Peskin & Schroeder, Sec. 17.3*
- electroweak theory, fermion mixings Peskin & Schroeder, Sec. 20.2; Cheng & Li, Chapter 11 and Sec. 13.2
- Brout-Englert-Higgs mechanism Cheng & Li, Sec 8.3; Peskin & Schroeder, Sec. 20.2
- various (loop) calculations in the Standard Model Homework problems
- chiral anomalies and $\pi^0 \to \gamma\gamma$ Peskin & Schroeder, Sec. 19.3, 19.4; Izykson & Zuber, Sec. 11-5;
- introduction to effective-field theories, low-energy light-by-light scattering
  Izykson & Zuber, Sec. 7-3-1 and 4-3-4
- linear and nonlinear sigma model, chiral perturbation theory Weinberg Vol. 2 Sec. 19-4, 19.5, 19.6