

Suggestions for One-Semester Course

May 8, 2013

This book is intended to play the dual role of a reference and as a textbook for an advanced graduate course. There is plenty of material for a two-semester course. Realistically, however, many institutions only offer a one-semester course. In fact the book grew out of a one-semester course that I taught at the University of Pennsylvania, and I have used it several times for one-semester courses at Princeton University. Each instructor will want to determine for his- or herself what materials to include or omit for a one-semester course, but below I offer some suggestions and comments on a subset of topics which might be ambitiously possible to cover. The website also has links to lecture notes (somewhat expanded from what was actually presented on the blackboard) and other materials that were made available to the students at Princeton. In practice, I usually did not have enough time to cover the last two topics (on supersymmetry and grand unification). The lecture notes on the Higgs were somewhat updated to take into account the Higgs observation at the LHC. The supersymmetry notes have not been updated. There are also notes and text for an introduction to high energy physics and introductory notes on collider physics that were not thoroughly covered in the book.

Chapter 1

This is only needed for reference, except possibly for the definition of the metric and the comment on units.

Chapter 2

Include most of Sections 2.1-2.8 and 2.12, except for the sections on Potential Scattering (pp 21-22), two-component notation (pp 47-48), and the Fierz identities (p 49).

Chapter 3

Omit Sections 3.3.2, 3.3.5, 3.3.7, 3.3.8, the section on a Complex Scalar in a Hermitian Basis (pp 118-119), and the section $SU(m)$ Tensor Notation (pp 129-130).

Chapter 4

Omit Sections 4.4 and 4.5.

Chapter 5

Include most of Sections 5.1-5.7 except for the calculation of the $GG \rightarrow q_0\bar{q}_0$ amplitude (pp 195-198). Include the beginning of Section 5.8, but not 5.8.3-5.8.5.

Chapter 6

Omit Sections 6.2.4, 6.2.6, and 6.2.7.

Chapter 7

Omit Sections 7.2.3 and 7.2.4. Include most of Sections 7.3-7.5, possibly shortening or omitting such topics as Beyond the Standard Model (pp 353-357), W Helicity Measurements (p 361), and Extended Higgs Sectors (pp 370-371). Include most of Section 7.6 except for 7.6.5, 7.6.6, and the calculation of Δm_K (pp 380-385). Include most of Section 7.7 except for 7.7.2, A Comment on Phases (pp 409-410), the Extension to Two or More Families (pp 413-417), Electromagnetic Form Factors (pp 424-425), Mixed Mass Models (p 444), and Textures (pp 444-446).

Chapter 8 Include Section 8.1, the beginning of 8.2 (through 8.2.1), and possibly the beginning of Section 8.4 (through 8.4.1).

Appendix

Section H on Collider Kinematics. The others sections for reference only.