

Suggestions for One-Semester Course

January 13, 2017

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 at www.sas.upenn.edu/~pg1/SMB2/ 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 during courses in 2011-2013. The lecture notes were based on the first edition of the book, with only the section on the Higgs partially updated. There are also notes and text for an introduction to high energy physics and introductory notes on colliders and accelerators. In practice, I usually did not have enough time to cover the last two topics (on supersymmetry and grand unification).

The chapter, section and page numbers in the following refer to the current (second) edition:

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 18-20), two-component notation (pp 41-42), and the Fierz identities (p 43).

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 101-102), and the section $SU(m)$ Tensor Notation (pp 110-111).

Chapter 4

Omit Sections 4.4 and 4.5.

Chapter 5

Include most of Sections 5.1-5.5 except for the calculation of the $GG \rightarrow q_0 \bar{q}_0$ amplitude (pp 167-170). Include Sections 5.7, 5.8.1, and 5.8.2.

Chapter 6

Include Sections 6.1.1, 6.1.2, and the beginning (through p 216) of 6.2.

Chapter 7

Omit Sections 7.2.4, 7.2.6, and 7.2.7.

Chapter 8

Omit Sections 8.2.3 and 8.2.4. Include most of Sections 8.3-8.5, shortening the discussions of higher orders, renormalization, etc. (pp 298-304). Possibly omit Beyond the Standard Model (pp 316-319), W Helicity Measurements (pp 322-323), and Extended ESWB Sectors (pp 336-339). Include most of Section 8.6 except for 8.6.5, 8.6.6, and the calculation of Δm_K (pp 346-350).

Chapter 9

Include most of Chapter 9 except for A Comment on Phases (p 378), and Sections 9.1.3, 9.1.4, 9.2.5, 9.5.4, and 9.5.5.

Chapter 10 Include Sections 10.1.1, the beginning of 10.2 (through 10.2.1), and possibly the beginning of Section 10.4 (through 10.4.1).

Appendix

Mainly for reference.