Supplemental Books

This list contains recommendations for a variety of classical mechanics texts. I've divided them up along the lines of the advanced topics that we have been and were unable to explore in the last few weeks of the semester.

1 Chaos & Nonlinear Dynamics

— R. E. Hilborn, "Chaos and Nonlinear Dynamics," Oxford University Press, 2000.
Been a long time since I spend any time with this book but I remembering finding parts of it interesting and Taylor recommends it.

— E. Ott, "Chaos in Dynamical Systems," Cambridge University Press, 2002.
This is more advanced than Taylor's book but contains a very nice introduction to Chaos. He studies the Logistic map in detail and discusses the issue of the density of periodic orbits in the control parameter that we touched on briefly.

— S. H. Strogatz, "Nonlinear Dynamics and Chaos," Perseus Books, 1994.
A nice introduction to chaos with many examples. Sometimes sketchy on the details but makes up for it with interesting examples. My brief discussion of synchronization of fireflies is expanded on in this book.

2 Hamiltonian Mechanics

— V. I. Arnold, "Mathematical Methods of Classical Mechanics," Springer Science, 1989.
This is a wonderful and incisive book on classical mechanics. The book demands substantially more mathematically but also exposes elegant geometry underlying mechanics.

— L. D. Landau and E. M. Lifshitz, "Mechanics," Pergamon Press, 1960 (1st edition).
A succinct classic that treats Lagrangian and Hamiltonian mechanics nicely.

— J. V. José and E. J. Saletan, "Classical Dynamics: a Contemporary Approach," Cambridge University Press, 1998.
This is a wonderful book that starts from the beginning and builds mechanics up geometrically. If you are interested in the geometrical structure of mechanics it is an essential book to have. Their treatment of Hamiltonian mechanics is quite good. The book is at a slightly more mathematically sophisticated level.

3 Continuum Mechanics

I haven't yet found *the* source that I reference. But an excellent place to begin would be Landau and Lifshitz's books:
— L. D. Landau and E. M. Lifshitz, "Theory of Elasticity," Butterworth-Heinemann, 1986.
Haven't spent much time with this book.

Kip Thorne has been working on a book that treats applications of classical physics and the sections on continuum mechanics seem nice. Furthermore, he is letting you download the draft versions for free on his course website:

http://www.pma.caltech.edu/Courses/ph136/yr2008/

Lastly Taylor has three recommendations none of which I know at all. See p748 of our text.

4 Hamilton-Jacobi Theory

Again I would recommend José and Saletan.

— C. Lanczos, "The variational principles of mechanics," Courier Dover Publications, 1970.
A nice book, although the language occasionally feels antiquated.

There is an interesting paper by a philosopher of physics on Hamilton-Jacobi theory that is slightly more mathematically demanding but gives you a nice sense of the context:
— J. Butterfield, "On Hamilton-Jacobi theory: its geometry and relation to pilot-wave theory" in 'Quo Vadis Quantum Mechanics? Possible Developments in Quantum Theory in the 21st Century,' New York: Springer, 2004. Also at: http://arxiv.org/abs/quant-ph/0210140.

5 Collision Theory

I always liked Griffiths' very succinct treatment in:
— D. J. Griffiths, "Introduction to Elementary Particles," Wiley-VCH, 2008.

But also take a look at the chapter in Taylor's book. He wrote one of the more standard graduate level texts on the subject too:
— J. R. Taylor, "Scattering Theory: The Quantum Theory of Nonrelativistic Collisions," Dover, 2006.

6 Symplectic Integrators

A fabulous introduction to this subject is given in:
— E. Hairer, C. Lubich and G. Wanner, "Geometric Numerical Integration," Spinger, 2006.
If you are currently a Berkeley student you can go to the Springer website through your campus account and download the whole book for free using SpringLink. This is well worth your time if you are interested in numerical methods.