# BOOK REVIEWS

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**Post-Use Review: Classical Mechanics.** John R. Taylor. 580 pp. University Science Books, Sausalito, CA. Price: $86.50 ISBN 1-891389-22-X. (Gayle Cook, Reviewer.)

I have used a pre-publication edition of this book for two quarters, at Cal Poly (California Polytechnic State University, San Luis Obispo). The courses are called Phys 302 and 303: parts I and II of a junior-level class in Analytical Mechanics.

I find this to be a superb text. The clarity and readability of the book is so much better than anything else on the market, that I confidently predict it will soon be the most widely used book on the subject. I judge it to be at least 10 times better, maybe more, than the other two popular classical mechanics books on the market right now: the book by Fowles, which students say is too terse to understand, and the book by Marion and Thornton, which students say is so wordy and lengthy that they feel quickly lost.

Some of the things I especially like about Taylor's book are the following:

(1) The chapter on projectile motion (Chapter 2), which includes very clear treatments of linear and quadratic air resistance.
(2) The introduction to calculus of variations and Lagrangian mechanics very early on (starting in Chapter 6). After all, this is the basis for the whole subject of Particle Physics, Feynman path integrals, and so on.
(3) The introduction to Hamilton's equations, in Chapter 13. It is the basis for quantum mechanics.
(4) The chapter on nonlinear systems (Chapter 12), which my students say is sexy: meaning they found it stimulating and modern. (At least, I *think* that is what they mean)
(5) The chapters are often self-contained. You do not need to follow the order of chapters in the book all the time, but can skip around. In fact I recommend this, as you will see.
(6) Chapter 11, on coupled oscillations, is very clear and necessary.
(7) The problems are reasonable. I felt that Taylor sometimes gave too many hints, but my best students told me the exercises at the end of the chapters were still challenging, so I must be wrong.
(8) The addition of computer based problems is apt right now. Personally I had some trouble with a few students who claimed not to know how to use Maple (my personal favorite), Mathematica, MathCad, MatLab or even Excel. I think we are in a period of transition, as students learn to use these programs more confidently. But the students need to learn these skills, and an introduction in a course such as Classical Mechanics is very appropriate.

I made some mistakes when I tried to teach this course. I would like to share these with the reader.

(i) I started too slowly. I covered the material in Chaps. 1, 3, 4, and 5 (Newton's laws, conservation laws) in too much detail. My students were bright; they knew about conservation laws, and I insulted them by belaboring these chapters. I now believe Taylor intended them as a review of the introductory course, to be read very quickly. The book is great this way: if the student needs a review, it is there.
(ii) I paid less attention to the chapter on coupled oscillations (Chap. 11) than I should have. I really like this chapter, and will spend more time with it next time.
(iii) In the future I will cover Chaps. 1–5 rapidly, with an emphasis on rotational motion (which we do not treat in sufficient depth in the introductory sequence). Then to Lagrangian mechanics, and to Hamilton's equations. These chapters are basic. Then to coupled oscillations, nonlinear systems and beyond.

I have discussed this book with several of my colleagues, and all agree it is a great improvement on anything available until now. My colleagues have come up with some interesting ideas. Most say it is difficult to teach Classical Mechanics, because the students regard the subject as dry. You can tell them it is fundamental to everything else—quantum mechanics, particle physics, and so on—but this means little to them as undergraduates. They will only appreciate the beauty of it, and the correspondence with quantum mechanics, etc., in graduate school.

In summary: I have found Taylor's book to be really fine—much better than anything else on the market for this course. It is clear and readable. I will use it in the future for any analytical mechanics class I teach, unless something truly remarkable turns up.

I would like to thank my colleaque Chance Hoellwarth for his insights and suggestions about this book, which he also supports strongly.

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## BOOKS RECEIVED

**Atomic Structure and Lifetimes: A Conceptual Approach.** Lorenzo Curtis. 267 pp. Cambridge U.P., New York, 2003. Price: $110.00 (cloth) ISBN 0-521-82939-9; $60.00 (paper) ISBN 0-521-53635-9.

**Capture Dynamics and Chaotic Motions in Celestial Mechanics.** Edward Belbruno. 211 pp. Princeton U.P., Princeton, NJ, 2004. Price: $49.95 ISBN 0-691-09480-2.

**Chaos and its Reconstruction.** Edited by G. Gouesbet *et al.* 320 pp. Nova Science Publishers, New York, 2003. Price: $69.00 ISBN 1-59033-805-7.

**Condensed Matter Theories, Vol. 18.** Edited by M. de Llano *et al.* 515 pp. Nova Science Publishers, New York, 2003. Price: $149.00 ISBN 1-59033-779-4.

**Consistent Quantum Theory** (paperback edition). Robert B. Griffiths. 391 pp. Cambridge U.P., New York, 2002. Price: $50.00 (paper) ISBN 0-521-53929-3.

**Douglas Rayner Hartree: His Life in Science and Computing.** Froese Fischer. 224 pp. World Scientific, River Edge, NJ, 2003. Price: $67.00 ISBN 981-238-577-0.

**The Future of Theoretical Physics and Cosmology: Celebrating Stephen Hawking's 60th Birthday.** Edited by G. W. Gibbons *et al.* 879 pp. Cambridge U.P., New York, 2003. Price: $60.00 ISBN 0-521-82081-2.

**A Garden of Quanta: Essays in Honor of Hiroshi Ezawa.** Edited by J. Arafune, *et al.* 502 pp. World Scientific, River Edge, NJ, 2003. Price: $118.00 ISBN 981-238-445-6.

**Gauge Theories in Particle Physics, Vol. II: QCD and the Electroweak Theory** (third edition). I. J. R. Aitchison and A. J. G. Hey. 454 pp. Institute of Physics Publishing, Philadelphia, 2004. Price: $45.00 (paper) ISBN 0-7503-0950-4.

**Geometry and Integrability.** Edited by Lionel Mason and Yavuz Nutku. 153 pp. Cambridge U.P., New York, 2003. Price: $45.00 (paper) ISBN 0-521-52999-9.

**Gravitational N-body Simulations: Tools and Algorithms.** Sverre Aarseth. 413 pp. Cambridge U.P., New York, 2003. Price: $100.00 ISBN 0-521-43272-3.

**Guide to LATEX** (fourth edition). Helmut Kopka and Patrick W. Daly. 597 pp. (plus CD-ROM). Addison-Wesley, Boston, 2004. Price: $49.99 (paper) ISBN 0-321-17385-6.

**Handbook of Nuclear Chemistry, Vols. 1–5.** Edited by A. Vértes *et al.* 2444 pp. Kluwer Academic Publishers, Norwell, MA, 2003. Price: $1575.00 ISBN 1-4020-1305-1.

**Introductory Muon Science.** Kanetada Nagamine. 208 pp. Cambridge U.P., New York, 2003. Price: $100.00 ISBN 0-521-59379-4.

**Invitation to Contemporary Physics** (2nd edition). Q. Ho-Kim, N. Kumar, and C. S. Lam. 482 pp. World Scientific, River Edge, NJ, 2004. Price: $103.00 (cloth) ISBN 981-238-302-6; $41.00 (paper) ISBN 981-238-303-4.

**The Kinetic Theory of Gases: An Anthology of Classic Papers with Historical Commentary.** Stephen G. Brush. 647 pp. Imperial College Press, London, 2003. Price: $98.00 (cloth) ISBN 1-86094-347-0; $48.00 (paper) ISBN 1-86094-348-9.

**Laser Safety.** Roy Henderson and Karl Schulmeister. 459 pp. Institute of Physics Publishing, Philadelphia, 2004. Price: $99.00 ISBN 0-7503-0859-1.

**The Life and Science of Léon Foucault: The Man Who Proved the Earth Rotates.** William Tobin. 338 pp. Cambridge U.P., New York, 2003. Price: $60.00 ISBN 0-521-80855-3.

**Nonlinear Science: Emergence and Dynamics of Coherent Structures** (second edition). Alwyn Scott. 480 pp. Oxford U.P., New York, 2003. Price: $69.50 ISBN 0-19-852852-3.

**Physics for Scientists and Engineers: A Strategic Approach (with Modern Physics).** Randall D. Knight. 1441 pp. Addison-Wesley, San Francisco, 2004. Price: $133.00 ISBN 0-8053-8960-1.

**Practical Holography** (third edition). Graham Saxby. 482 pp. Institute of Physics Publishing, Philadelphia, 2004. Price: $85.00 (paper) ISBN 0-7503-0912-1.

**Quantum Field Theory in Condensed Matter Physics** (second edition). Alexei M. Tsvelik. 360 pp. Cambridge U.P., New York, 2003. Price: $60.00 ISBN 0-521-82284-X.

**Readable Relativity** (reprint). Clement V. Durell. 146 pp. Dover, Mineola, NY 2003. Price: $10.95 (paper) ISBN 0-486-43257-2.

**Relativistic Numerical Hydrodynamics.** James R. Wilson and Grant J. Mathews. 216 pp. Cambridge U.P., New York, 2003. Price: $90.00 ISBN 0-521-63155-6.

**Remarkable Physicists: From Galileo to Yukawa.** Ioan James. 389 pp. Cambridge U.P., New York, 2004. Price: $85.00 (cloth) ISBN 0-521-81687-4; $30.00 (paper) ISBN 0-521-01706-8.

**Similarity in Diversity.** Edited by S. Fujita *et al.* 362 pp. Nova Science Publishers, New York, 2003. Price: $89.00 ISBN 1-59033-780-8.

**Sneaking a Look at God's Cards: Unraveling the Mysteries of Quantum Mechanics.** Giancarlo Ghirardi. 488 pp. Princeton U.P., Princeton, NJ, 2004. Price: $35.00 ISBN 0-691-04934-3.

**Symmetries in Physics: Philosophical Reflections.** Edited by Katherine Brading and Elena Castellani. 445 pp. Cambridge U.P., New York, 2003. Price: $100.00 ISBN 0-521-82137-1.

**Theoretical Concepts in Physics** (second edition). Malcolm Longair. 569 pp. Cambridge U.P., New York, 2003. Price: $120.00 (cloth) ISBN 0-521-82126-6; $60.00 (paper) ISBN 0-521-52878-X.

**Theory and Computation in Hydrodynamic Stability.** W. O. Criminale, T. L. Jackson, and R. D. Joslin. 441 pp. Cambridge U.P., New York, 2003. Price: $90.00 ISBN 0-521-63200-5.

**The Theory of Complex Angular Momenta** (translation). Vladimir Gribov. 297 pp. Cambridge U.P., New York, 2003. Price: $90.00 ISBN 0-521-81834-6.

**Undulators, Wigglers and their Applications.** Edited by Hideo Onuki and Pascal Elleaume. 438 pp. Taylor and Francis, New York, 2003. Price: $192.00 ISBN 0-415-28040-0.

**Universe on a T-Shirt: The Quest for the Theory of Everything.** Dan Falk. 246 pp. Arcade Publishing, New York, 2002. Price: $24.95 ISBN 1-55970-707-0.