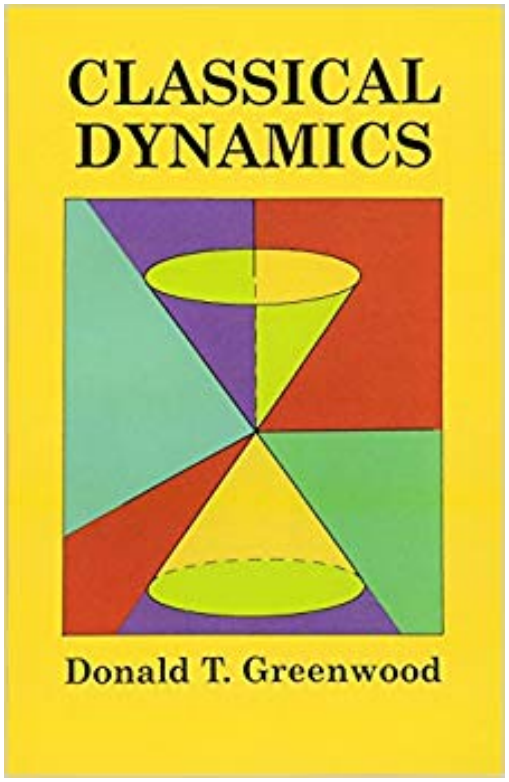
Classical Dynamics (Dover Books on Physics) *by* Donald T. Greenwood



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Since Lagrange laid the foundation of analytical dynamics some two centuries ago, the discipline has continued to evolve and develop, embracing the theories of Hamilton and Jacobi, Einstein's relativity theory and advanced theories of classical mechanics.This text proposes to give graduate students in science and engineering a strong background in the more abstract and intellectually satisfying areas of dynamical theory. It is assumed that students are familiar with the principles of vectorial mechanics and have some facility in the use of this theory for analysis of systems of particles and for rigid-body rotation in two and three dimensions.After a concise review of basic concepts in Chapter 1, the author proceeds from Lagrange's and Hamilton's equations to Hamilton-Jacobi theory and canonical transformations. Topics include d'Alembert's principle and the idea of virtual work, the derivation of Langrange's equation of motion, special applications of Lagrange's equations, Hamilton's equations, the Hamilton-Jacobi theory, canonical transformations and an introduction to relativity.Problems included at the end of each chapter will help the student greatly in solidifying his grasp of the principal concepts of classical dynamics. An annotated bibliography at the end of each chapter, a detailed table of contents and index, and selected end-of-chapter answers complete this highly instructive text.

Reviews of the Classical Dynamics (Dover Books on Physics) *by* Donald T. Greenwood

Vizil
It is a classical and well-known book for linear dynamic. It is not for undergrad students.
Jothris
Excellent problem sets with solutions following each chapter. Highly recommended for Physics/Engineering undergrads in preparation for coursework in quantum mechanics and gauge theory. The book also serves as a handy reference for related advanced engineering requirements in your chosen curriculum including professional development. Thank you.
Alister
Bought this book as an extremely inexpensive supplement to a book on intermediate dynamics I am studying right now.
This author is an authority on the field, and the book contains what I need: examples and extra work.
Kegal
Wonderful textbook, great price.
If you like Dynamics, buy this book, you won't regret it.
Kison
Very interesting and well written! I enjoyed it and found it very helpful.
Banal
It appears as if writing a great Mechanics text is as difficult as writing a great Electromagnetism text ! A surfeit of material makes for difficulty in what to include, as well as what to omit. Happily, Greenwood has presented the student with a well-written, almost-advanced, textbook. At a comparable level to Goldstein's Classical Mechanics text, yet, less-advanced than Scheck. There is much which recommends this book:
(1) Greenwood is pedagogic: Many Examples--solved in detail--amplify the discussion (for instance, the example, Page 62--particle affixed to rotating cylindrical tube--is presented on more than one occasion, by differing methods--read page 62 and page 75.). Therein lies one of his strengths, a 'spiral' approach to the material: Earlier examples reappear later in the text, as more advanced methods are presented.
(2) The mathematics held at a fairly pedestrian level--Boas, for instance, would provide ample preparation. A course in elementary mechanics
is prerequisite, for which Griffiths and Synge is the prime reference (as Greenwood notes). As with Goldstein, the first chapter provides summary
of elementary mechanics.
(3) You will gain improved outlook on the difference between virtual and actual displacement. You will gain an understanding of generalized coordinates. Stability--you get it more than once (first, elementary, page 32; then, again with gyroscopes--section 3-3, page 127). " Spiral "
(4) I highlight the discussion of Impulsive motion (pages 104-121). This is an exceptional exposition.

A beautiful example (page 116)--four rods, four masses, struck at one point--is worth exploring-- as the author does, in more than one way.
(5) Hamilton--Chapter Four--is explained as lucidly as any other text. I found the discussion of Legendre Transformation less confusing than others.
The Least Action Principle (pages 174-178) while brief, is lucid. Continuing the theme of chapter four, chapter five dives into Hamilton-Jacobi.
An exceptional section,separability and partial differential equations, is a welcome addition. And, with it, another attack on Kepler's problem (page 209). You met Kepler often previously in the text, now you get another--more advanced--outlook. Spiral approach.
(6) Canonical Transformations. Excellent solved examples to assist in digesting this material. (For instance, pages 219 and 223). The mass-spring
system, in multiple guises, is utilized throughout the text. Again, Spiral ! The entire Chapter is an exceptionally lucid exposition. Poisson Brackets
need not appear mysterious, read pages 241-247. The chapter concludes with--another--approach to Liouville's Theorem. You get it more than once.
(7) Finally, Special Relativity. You will get a no-nonsense, elementary discussion. Not befuddled with mysterious 'imaginary' units of time.
An accurate explication of invariant intervals, proper time and accelerated motion (hyperbolic--see pages 315-320). A very good discussion of the conception of Newtonian 'Force' and its 'shortcoming' in Special Relativity is offered. (pages 305-306). Nothing need be re-learned later.
(8) Concluding, Answers to most Problems are included. If not, then hints are supplied. Again, excellent pedagogy. Some of the problems are
quite easy, some are challenging. Greenwood's solved examples--throughout--are exceptional and explicit.
This is a text for students. An excellent addition to the literature. Worth perusing.
If Goldstein gets confusing at any juncture, I recommend study of Greenwood.
If Greenwood is less theoretical than is your ilk, I suggest review of Goldstein.
Eayaroler
This is an advanced dynamics textbook for engineers.
It has excellent organization.
It focus on Lagrangian and Hamiltonian mechanics.
The explanation is overall clear, with many examples.
Chronologically, "Classical Dynamics" was Donald Greewood's second major publication on Analytical Dynamics, covering more advanced topics than the ones in "Principles of Dynamics," whose first edition preceded "Classical Dynamics" by some 12 years.
"Classical Dynamics" is a somewhat more readable text, but just like its companion book, it fails to address issues like how one can use Lagrange's equations (or Hamilton's, for that matter) to correctly account for the effects of nonlinear dissipative forces. Also, its treatment of velocity-dependent potentials could be substantially extended, as could the chapter on Relativity.
On the other hand, the chapters on variational principles, the Pprinciple of Least Action, Hamilton's mechanics, and, above all, canonical transformations are an absolute "must-read"!
An updated, extended second edition would be most welcome now.

Chaotic Dynamics: Theory and Practice (NATO Science Series B: Physics) by T. Bountis
Engineering & Transportation
Schaum's Outline of Engineering Mechanics Dynamics (Schaum's Outlines) by Charles L. Best,W.G. McLean,Merle Potter,E. W. Nelson
Science & Math
The Principles of Statistical Mechanics (Dover Books on Physics) by Richard C. Tolman
Science & Math
Global Analysis: Differential Forms in Analysis, Geometry, and Physics (Graduate Studies in Mathematics) by Thomas Friedrich,Ilka Agricola
Science & Math
Extra Dimensions in Space and Time (Multiversal Journeys) by Farzad Nekoogar,Lawrence Krauss,Itzhak Bars
Science & Math
Hamilton-Jacobi Theory in the Calculus of Variations: Its Role in Mathematics and Physics by Hanno Rund
Science & Math
A First Course in Dynamics: with a Panorama of Recent Developments by Boris Hasselblatt
Engineering & Transportation
Analytical Mechanics of Space Systems (AIAA Education Series) by H. Schaub;J. Junkins
Science & Math
Generalized Hamiltonian Formalism for Field Theory: Constraint Systems by Gennadi A Sardanashvily