

## Review of the book: *A survey of Computational Physics*

By R. Landau., M. Paez, and C Bordeianu

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This is a terrific book! It is very readable, and is exceptionally clear. Each chapter brings an interested reader gently into the topic being explained, and it does it quite clearly.

The first chapter discusses programming, and it gives one a good orientation for understanding many of the sections in the book. Subsequent chapters discuss topics such as differential equations, Monte Carlo simulations visualization tools, errors, and object-oriented programs, among many other topics.

I particularly liked the chapter on integration (Chapter 6). It discussed how we calculate the area under a curve, and how it is programmed. It assumes the reader has no more exposure to integration than a fundamental exposition in a second semester of calculus, and it explains the techniques transparently. The chapter on matrix operations (Chapter 8) was also very clear and precise in its discussion of how we program and calculate matrices with high performance computers. The differential equation applications chapter (Chapter 9) was quite well done, using several examples to show the techniques of programming differential equations.

The chapter on Fractals & Statistical growth (Chapter 13) discusses several applications of this relatively new area of mathematics, including plant growth (trees and ferns, the length of a coastline (British, in this case), and the deposit of particles on a surface to form a film (Ballistic Deposition). As with all chapters, it brings readers gently into the topic. The chapter on High-Performance Computing Hardware, Tuning, and Parallel Computing (Chapter 14) discusses a complex topic with clarity and insight. I really liked the section on Optimization. The quotes of Wulf, Knuth, and Voltaire were wonderful, and warn of the dangerous rush to optimization. The authors are absolutely right: clean, clear, and correct code that is totally understandable is essential to useful programming code. Chapter 19, (on Fluid Dynamics) brings me back to my undergraduate days, and explains several topics well (some of which I never studied).

The CD that accompanies the textbook shows some stunning graphics and has clear code in two Fortrans (77 and 95), Java, and MPI. The book indicates where there is an accompanying CD image or program to complement the text.

This is a great book that takes a complex subject and explains it very clearly.