

type than the earlier editions. The author has added problem sets, many new topics and references from the ten years since the second edition appeared. Problems and references are drawn from research journals in the biological sciences, which a physicist might not ordinarily peruse. The introduction to each chapter has been expanded to explain the *raison d'être* for the selection of topics and the major points in the chapter. The exposure this offers to each topic is comprehensive and alerts the reader to further applications and complications.

Among the more notable additions are the inclusion of counter currents—currents that flow parallel to a membrane surface—a topic of relevance to flow along renal tubules, the villi of small intestines and the conservation of heat in body extremities; coverage of the controversy over the possible physiological effects of weak external electric and magnetic fields; discussion of waves in excitable media, including their relationship to the electrical behavior of heart cells; a detailed discussion of chromosome damage; and of the risks associated with radiation exposure. There are expanded sections on magnetic resonance imaging, image quality and noise, the biological effects of ultraviolet radiation, the stopping of charged particles and radon.

This book could be used as the basis for an undergraduate course. It is also a comfortable way to put a biological spin on physics applications ordinarily taught in junior- and senior-level courses. For example, a course on static and dynamic electricity could include the detection of very weak electric fields by sharks and rays, an introduction to the magnetic field generated by an axon potential or the flow of charged particles across a cell membrane. In a course on modern physics, one could add a discussion of nuclear medicine or MRI. In a study of the radioactive decay law, one could show the effect of the logistic equation on exponential growth and the concept of doubling time for the growth of an organism.

The author is very thorough: The chapter on nuclear medicine includes an expository section on the mechanisms of localizing a pharmaceutical. And he has made a supreme effort to include the most recent research results in a wide variety of naturally occurring physical and physiological phenomena. I was quite surprised to find a very recent reference to the work of biologists who are measuring the ability of birds to sense magnetic cues during migration. And did you know that the single-domain magnets manufactured by magnetic bacteria are helpful in cali-

brating an atomic force microscope?

Problems at the end of each chapter span a wide range of phenomena, such as fibrillation, mutation rates, cerebral edema and kidney function. In addition to providing physics majors with enjoyable examples from physiology, biochemistry and biomechanics, Hobbie's book also teaches the biology associated with each topic.

The text requires a year of calculus. For the physicist hoping not to be left behind in the current redirection of relevant science, this book is a perfect fit.

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The Internet for Scientists

▶ Kevin O'Donnell
and Larry Winger
Harwood Academic, Amsterdam,
1997. 309 pp. \$45.00 hc (\$14.50 pb)
ISBN 90-5702-221-4 hc
(90-5702-222-2 pb)

The World Wide Web for Scientists and Engineers: A Complete Reference for Navigating, Researching and Publishing Online

▶ Brian J. Thomas
SPIE, Bellingham, Wash., 1998.
357 pp. \$34.00 pb
ISBN 0-8194-2775-6

It strikes me as somewhat ironic that there is such a bull market in printed how-to books explaining the Internet and its use. One of the design criterion of the World Wide Web was that it have a simple (point-and-click) interface, so that training would be minimal. These days, once one launches a Web browser, a vast quantity of very useful information on how to surf the Web, locate pertinent sites and create one's own pages is readily available. Furthermore, most of this information can be obtained free! So why is there this need to resort to *printed* instructions? Nevertheless, the book publishers have inundated the market with printed materials offering self-help for Web surfers, and bookstores have greatly profited. Not to be left out of this deluge, two recent publications offer assistance for the would-be Web surfers in science and engineering—*The Internet for Scientists* by Kevin O'Donnell and Larry Winger and *The World Wide Web for Scientists and Engineers*

by Brian Thomas.

The Internet for Scientists is the more basic of the two, discussing all of the major Internet functions: e-mail, news groups, telnet, gopher and the Web. By tackling all of these topics, the authors never get too detailed, which is fine for the absolute beginner. However, it is difficult to imagine that there are many scientists in 1998 who are beginners on the Internet. The chapter on e-mail, in particular, seems unnecessary, since this tool is already ubiquitous in the sciences and the discussion here is so basic. The chapter on discussion groups is much better and does point out the value of the limited-access electronic mailing list. A number of discussion groups for the many scientific disciplines are listed, though perhaps the largest list in chemistry, the computational chemistry list (see <http://ccl.osc.edu/chemistry.html>), is absent. Considering the exceptionally poor signal-to-noise ratio of the news groups, which is only hinted at here, the 76 pages devoted to them seems a waste of time. The Web is discussed in a cursory sense, providing enough information to get one started but not enough to actually create a Web page. A list of URLs is presented, with emphasis on sites that provide even more links and missing such major sites as the Los Alamos National Laboratory's preprint archive, the American Chemical Society and the American Physical Society. A saving grace to this book is its lighthearted, humorous tone.

The World Wide Web for Scientists and Engineers, advertised as a companion to *The Internet for Scientists*, touches upon most of the Internet tools, but, as the title states, focuses on the Web. A short discussion of the general operation of the Web is followed by a very nice primer on how to author a Web page. This is not just your standard guide to tags, but also presents tips on how best to present information, warnings about differences among the browsers and a precautionary note concerning the use of Java. Kudos go to the nice discussion of how to handle multiple file formats (which are also discussed in some detail) using multipurpose Internet mail extensions (MIME types) and thereby extending the power of the Web as a publication medium. (It should be noted that, contrary to what is stated in the book, MIME types are not interpreted just on the basis of the file extension—this is done only when accessing a file on the local disk—but rather are sent by the Web server along with the file.) The author discusses the use of the Web as a publication medium for scientists, pointing out the Los Alamos preprint archive as an example. Be-

fore giving a large list of URLs (including the most important content sites), he discusses the major search engines, pointing out their pros and cons. The URL list and the many screen shots beg for a CD-ROM version of the book. Unlike the O'Donnell and Winger book, Thomas's prose is pretty dry.

Clearly, the stronger book is *The World Wide Web for Scientists and Engineers* because of its emphasis on the Web. With the Web now the dominant Internet resource, the decision to devote only the last quarter of *The Internet for Scientists* to the Web makes the book an anachronism less than a year after publication. In fact, both books suffer from this problem. The Internet is a rapidly changing environment, and any printed book will quickly become outdated. For example, both books discuss the use only of Netscape Navigator (and, in *The Internet for Scientists*, version 2 at that!). Thomas opts not to discuss Microsoft's Internet Explorer because of its small market share, a situation that has decidedly changed, while O'Donnell and Winger omit it for political reasons—they feel that Bill Gates is wealthy enough, an opinion I am sure keeps Gates awake at night.

For those starting to author on the Web, *The World Wide Web for Scientists and Engineers* is a fine primer. True novices will find *The Internet for Scientists* of some use. But anyone who has spent some time on the Web will probably have already bookmarked free sites covering these topics and will find little to justify the acquisition of yet more paper.

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The Quantum Beat: The Physical Principles of Atomic Clocks

Fouad G. Major
Springer-Verlag, New York, 1998.
475 pp. \$49.95 hc
ISBN 0-387-98301-5

Throughout history, the precision of clocks was an indicator of the level of a society's technological development. Furthermore, precision clocks and their use connected the then state-of-the-art of science with the ability to exploit technology for major national goals. This was true for the "clockwork of the heavens" that governed ancient Egyptians, the conquests of the Arabs and the discoveries of early European explorers, as it was true for the chronometers that were essential for the exploits of Captain James Cook, and

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