# ANNOUNCEMENTS AND NEWS

## Book Reviews

**American Institute of Physics Handbook** (second edition). DWIGHT E. GRAY, Coordinating Editor. Pg. 2118+xv, McGraw-Hill Book Company, Inc., New York, 1963. Price $29.75

A new edition of an important work is always viewed with particular interest, and physicists will want to know the changes that have taken place in the American Institute of Physics Handbook since the first edition came out in 1957. The most obvious change is in size, since the present edition is about one-third larger than its predecessor. A new section of the Handbook is devoted to solid-state physics, giving belated recognition to the importance of this field of physics. Topics covered in this section include crystallographic data, electronic properties of solids, properties of the various classes of solids, imperfections, luminescence, work function, and secondary emission.

As would be expected, topics have been added and expanded to keep pace with the developments in physics in the past six years. New material is included on analog and digital computers, optical masers, intensities and line strengths of spectral lines, and energy levels of rare-earth ions. The section on nuclear physics has been materially increased, and the sections on optics and on heat have nearly doubled in size.

The coordinating editor, eight section editors, and one hundred and twenty-six contributors have obviously done an important job in assembling and reviewing the material for this edition. However, there is one detail which might make the volume more useful to the average user. The material in each section is paged separately, and the table of contents for each section is located at the front of the section, although a general index of 60 pages is located at the end of the volume. This means that the person looking for a particular piece of information must first paw through the volume to locate the section he wants, and then find the specific page. If the various sections were separated by heavy, colored pages (as in the *Handbook of Chemistry and Physics*), then the individual sections could be located more easily, and general wear and tear on the volume would be reduced.

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**Modern Viewpoints in the Curriculum.** Edited by PAUL C. ROSENBLOOM AND PAUL C. HILLESTAD. Pp. 312+xv, McGraw-Hill Book Company, Inc., New York, 1964. Price $7.50.

If professors continue rigidly to teach the same curriculum as they were taught 30 years ago, progress in human understanding would at best be slow. As everyone knows, increasing effort is being devoted to revision of the curriculum, bringing it up to date in many different subjects and at all levels from kindergarten through graduate school. In the sciences and mathematics it can be (and is) argued that such revision is badly needed, partly because of rapid developments in content over the past few decades, and partly because of the increasing need for general public understanding.

The National Conference on Curriculum Experimentation, reported in this book, covered all areas of learning; about a third of the text is concerned with science courses and the changing role of science in the educational structure. Physicists may know most of what is included about the PSSC project, but can gain insight by the coverage of similar projects in chemistry, biology, mathematics, earth sciences, English, art, classics and foreign languages. The psychological aspects of the learning process are surveyed by an expert (L. J. Cronbach, University of Illinois), many useful references are listed, and the points of view of various societies and government agencies are presented in articles by 32 participants at the conference.

The Editor and Conference Chairman, Paul Rosenbloom starts with a list of ten criteria for curriculum improvement, including intellectual structure, involvement of research scholars, developing motivation for learning, and building intuitive "feel" for the subject. Much of what follows is couched in similar broad terms, and the reader gets an over-all picture of who is doing what, rather than detailed outlines of new courses. In fact, it is clear from "Modern Viewpoints in the Curriculum" that a great deal remains to be done beyond the PSSC, SMSG and other high-school courses before the United States has an adequate structure for science and math education.

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**An Introduction to Fluid Mechanics and Heat Transfer.** J. M. KAY. Pp. 327, Cambridge University Press, Cambridge, 1963. Price $2.45 (Paperback).

This is a paperback second edition of Kay's concisely and competently written 1957 text integrating the subjects of fluid mechanics and heat transfer. It was prepared with the interests and needs of chemical and mechanical process engineers chiefly in mind, and hence will probably not be of broad interest to physicists. However, for those of the latter whose work brings them into occasional contact with the fields of fluid dynamics and fluid transfer, the book provides a very useful and compendious summary of fundamental principles and basic equations of those fields. In it one does not find more than brief discussion of the physical principles underlying most topics. Rather the author gets quickly to the main quantitative relations with a minimum of comment. From this characteristic stems its chief merits and deficiencies: It covers in twenty-three chapters a broad range of problems, but it is not the book to look to for detailed discussions of underlying molecular interpretations of transfer processes.

Kay treats all of the standard topics of fluid mechanics, such as laminar and turbulent flow, flow in pipes and channels, compressible flows with shocks, and goes on to the elements of heat transfer, including forced convection, boundary layer effects, and phase-change effects. Dimensional analysis is approached through the Pi-theorem (rather than through nondimensionalizing differential equations, which carries rather more physical meaning in all instances wherein it can be employed). Special topics that receive attention in Kay's book include behavior of solid particles in fluid flow, flow through packed beds, and heat transfer in nuclear reactors (the last a bit dated at the time of this re-edition). For those who need a compact summary of fluid mechanics and heat exchange principles in their personal library, this low-cost edition of Kay's text can be recommended.

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**Biotechnology: Concepts and Applications.** LAWRENCE J. FOGEL. Pp. 826, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1963. Price $16.50.

"Biotechnology," or as it is sometimes called in engineering circles, "Bionics," is an intradisciplinary field that deals with theoretical and practical applications of psychology, biology, and more specifically biophysics, to technology. It sets out, e.g., to investigate the nature of man–machine relationships so as to produce, in so far as it is possible, optimal performance of integrated systems composed of humans and machines. Yet it is distinct from cybernetics since "biotechnology" takes human-factors engineering into account. Further it undertakes to construct such man–machine systems. Closely coupled man–machine systems find continual application in nearly every facet of automation and more concretely in astronautics and aerospace engineering [see, e.g., S. J. Gerathewohl, *Principles of Bioastronautics* (Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1963)], which accounts, in part, for the book's appearance in a series on space technology. Nevertheless, "biotechnology" remains silent on ways of finding an economic rôle for the "human components" who do not pass the "quality control standards" for man–machine systems.

This comprehensive work, which is most definitely *not* a handbook, is divided into six nearly autonomous sections with individual bibliographies as follows: 1. "The scientific method" (60 pp.). 2. "The human information input channels" (150 pp.). 3. "Decision making" (175 pp.). 4. "The human information output channels" (75 pp.). 5. "Machine and system design" (330 pp.), and 6. "An overview of biotechnology" (10 pp.).

In general, the treatise is very carefully written and extensively documented. It should be most useful to biophysicists interested in novel applications for theory, and applied physicists concerned with control theory, human factors in space engineering, and automation. *Erratum:* everywhere read "discrete" for "descrete".

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**Heat, Thermodynamics, and Statistical Physics.** F. H. CRAWFORD. Pp. 700, Harcourt, Brace & World, Inc., New York, 1963. Price $10.00.

The main feature of this text is its attempt to bring some statistical physics into an undergraduate thermodynamics course. Although the author has designed the book for a year's course, he has made suggestions on what material may be covered in a one semester course. The organization of the text is such that there are no difficulties involved in using only these suggested sections, and so this text should also be considered suitable for consideration for a semester course.

As with most books on any subject, this one has both advantages and disadvantages, many of which vary in importance with the particular instructor's interests and ideas. In general, however, this text is well organized, clearly written, and has clear diagrams and a thorough index. Some sections are particularly thorough and well presented and are noted here. These include an unusually detailed discussion of temperature scales and precision temperature measurements, a good discussion on the mechanical equivalent of heat and, in the statistical physics section, an excellent and detailed treatment of the diatomic gas. Several thermodynamic systems are considered in addition to chemical systems. These include stretched wires, surface films, magnetic systems and paramagnetic solids. Carnot cycles are shown for an ideal gas, a two-phase system, a stretched wire, and a surface film.

The presentation of material differs from the usual presentation in only a few sections. In a change of notation from the standard texts, work is defined as positive when done on the system rather than when done by the system. The author has also chosen to define heat in terms of heat capacity rather than the more modern definition in terms of internal energy and work. In a matter of emphasis, the chapter on the equation of state and $p$-$V$-$T$ surfaces is reasonably complete but does not emphasize that these refer specifically to equilibrium states of the substance. The usual drawing of the $p$-$V$-$T$ surface for water is not included. Many physics instructors may also feel that too much space has been devoted to different cycles, engines, and refrigerators. This material is, however, easily ignored with no difficulties in later material.

A particular course in thermodynamics may take any one of several directions. Two subjects often covered in some detail in thermodynamics, but not thoroughly covered here, are chemical thermodynamics and low-temperature physics. Only bare introductions to these subjects are offered. An additional difficulty will occur in a course emphasizing heat since heat transfer is not covered. Over all, this is a good text and should be considered for one year courses in thermodynamics and statistical physics and for one semester courses in thermodynamics with an introduction to statistical physics, unless there is to be an emphasis on chemical thermodynamics and/or low-temperature physics.

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