Book Reviews

Introduction to Nuclear Engineering. Raymond L. Murray. Prentice-Hall, New York, 1954. xiii + 418 pp. Illus. $7.

The present-day writer of a textbook on nuclear engineering is handicapped, at the outset, because what he writes is determined not only by what is relevant and to the point, but also by what has been declassified and by what parts of this highly compartmentalized art are familiar to him. To write a textbook on nuclear engineering in the face of such handicaps requires a great deal of courage. One cannot help but admire Murray for collecting so much declassified information in a single volume of 418 pages.

Introduction to Nuclear Engineering is an outgrowth of a course of lectures that the author has given during the past 3 years to undergraduate nuclear engineering students at North Carolina State College. The tone of the book consequently reflects the current philosophic viewpoint in American engineering education—that the aim of undergraduate engineering education is to produce a large number of fairly competent practitioners rather than a smaller number of extremely skilled ones. Thus, the book is largely descriptive rather than analytic. For example, in the chapter on the design of liquid-metal cooled natural uranium reactors, the fine details have to be glossed over, even though the success of an actual design calculation must depend on such details.

What a student who reads Murray's book learns is how the expert in the field goes about dealing with various aspects of nuclear engineering; he hardly becomes an expert himself. Within this over-all limitation this will prove to be a useful book. It touches upon the basic sciences—nuclear physics, metallurgy, and heat transfer—necessary for an understanding of reactors. There are chapters on the "unit operations" of nuclear engineering—shielding, waste disposal, radiation detection and control, and isotope separation. There is an appendix on reactor theory as well as chapters on neutron experiments and the use of isotopes. Of particular interest are the chapters on specific reactor designs—on the water boiler and on several solid-fuel uranium reactors—and there is a table that gives design data for many of the existing reactors.

The choice of pedagogic material in a field that has grown up in such an unusual way as nuclear energy is very much a reflection of the viewpoint of the author. There is little educational tradition to guide him. Murray's choice and therefore, by implication, his *definition* of nuclear engineering can hardly be criticized. I would have liked a chapter on nuclear engineering gadgetry—canned rotor pumps, remote handling equipment, and the like—and in general, greater emphasis on the chemical aspects of nuclear reactors.

On the whole, the organization of the material is adequate. The chapters on specific reactor design are placed, somewhat oddly, in the middle of the book rather than after all the unit operations have been covered. This means that reactor design is conceived mainly as including reactor statics, choice of materials, and heat transfer. Such aspects of design as control and shielding are not included in the reactor-design chapters.

Nevertheless, the chapters on reactor design are illuminating, especially since they are the first accounts to appear in the open literature of how the conflicting design requirements imposed by considerations of heat transfer, nuclear physics, and materials limitations are resolved in a practical design. If the book were classified, the author could have indicated in greater detail how well the methods of design really work. As it is, the reader must be left with a slightly uneasy feeling that the chosen examples always come out "just right."

The book is written with a fair degree of authority. The most significant misstatement that I noticed is in the discussion of the temperature effect in natural-uranium reactors. The temperature effect on the resonance capture in a natural-uranium reactor is, contrary to the statement in the book, hardly affected by the neutron temperature; it is almost entirely determined by the fuel temperature.

Writing a textbook on nuclear engineering under present-day handicaps is an extraordinarily difficult task. Although Murray's book cannot be considered definitive, even in terms of what it is intended to be, an elementary textbook, it nevertheless contains much interesting material and ought to prove to be a useful introduction to nuclear engineering.

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Principles of General Ecology. Angus M. Woodbury. Blakiston, New York, 1954. viii + 503 pp. Illus. $6.

This is the third American textbook on ecology to appear in 5 years, but in some ways it appears to antedate its successors. While here and there traces of recent thought are evident, the statement in the introduction that the "eco-system approach . . . is used by some geographers and is the one utilized in this work" is on the whole unfulfilled. The book follows the conventional pattern of organization: part I, "General considerations"; part II, "The physical environment" (7 chapters, on soils, water, radiant energy, gravity and periodicities, climate, and physical adaptations); and part III, "Biotic interrelationships" (16 chapters).

The emphasis is on upland terrestrial ecology (indeed, it has been facetiously described as the "ecology of Utah"). Most of the statements about conditions in the ocean are misleading when they are not erroneous, and, although this might be forgiven on the ground