Mathematics

Introduction to the Theory of Integration. T. H. Hildebrandt. Academic Press, New York. 1963. x + 385 pp. Illus. $14.

The author has put into the form of a textbook of some 400 pages lectures that he has delivered during a period of more than 25 years. The lectures assume familiarity with what was, roughly, the theory of functions of one real variable prior to this century. Hildebrandt has not followed the present trend in textbooks at this level, which in his opinion overlook the concrete basic ideas. His attitude is the sort that a person of his generation might well be expected to have. It is not clear whether the best students, those who now imbibe set theory with their mother's milk, will be satisfied to wait until they reach page 140 for a brief account of this topic, an account that probably contains much less than they already know and which they could have used in the earlier part. On the other hand, for the general run of beginning graduate students—a group which seems to diminish each year in comparison with the best students—there is much to be said for helping them to consolidate their knowledge before exposing them to the wealth of ideas, and the high level of sophistication, of most of contemporary mathematics.

It is therefore certainly no criticism of the book to say that the greater part is devoted to matters of very secondary interest today. That is the author's intention, and it is probably good for the student. As the text is presented, there are no surprises, the reader is never asked to fly before he can walk, and he always knows where he stands. There is not even any attempt to indulge in little side excursions to stimulate additional interest, for this would only serve to disconcert all but the most gifted readers. However, one wonders how many students will be willing to persevere without some added inducements, and probably the book needs to depend largely on a teacher's wit and sparkling eye, as the lectures themselves doubtless did for more than 25 years.

Occasionally, the book brings the reader to the boundary of present knowledge, a point from which he can embark on new research, a trial of skill that could lead to a good master's thesis, or which he can use as a point of departure in preparing for further study.

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Geometry

Foundations of Differential Geometry. vol. 1. Shoshichi Kobayashi and Katsumi Nomizu. Interscience (Wiley), New York, 1963. xii + 329 pp. Illus. $15.

This is the first volume of a two-volume work intended by the authors to provide a systematic introduction to the field as well as to serve as a reference book. However, the book is by no means elementary; it requires considerable mathematical maturity and more than a passing acquaintance with such concepts as vector spaces and matrix algebras, Lie groups and algebras, topological and group spaces, and others.

Chapter 1 is largely concerned with basic concepts and techniques (differentiable manifolds, tangent spaces, derivations and differential forms, tensor fields, Lie groups, and fiber bundles), and it contains numerous illustrations of general concepts. In particular, the early development of fundamental properties of the group of isometries of a metric space has, in addition to its mathematical interest, considerable value in helping the less mature reader appreciate the power and the beauty of the subject. Throughout the book the authors employ and expect the reader to become familiar with the several computational techniques that are common in differential geometry.

Ehresmann's connection theory is developed in chapter 2 and applied to linear, affine, and Riemannian connections in chapters 3 and 4. Chapter 5 contains introductory material on Riemannian curvature, while chapter 6 is largely concerned with transformations that preserve either an affine connection or a Riemannian metric. These chapters, which are rich in geometric content, present both classical and modern results. Brief as it is, the book contains much basic material on normal coordinates, convex neighborhoods, distance, geodesics, parallelism, completeness, holonomy groups, flat connections, and infinitesimal isometries. The last 45 pages contain seven appendixes, which cover topics not in the mainstream, and 11 brief notes, partly historical and partly supplementing the main text. The reader who is prepared to undertake a study in depth of modern differential geometry will find this book a very valuable addition to the literature.

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Nuclear Chemistry

Technique of Inorganic Chemistry. H. B. Jonassen and A. Weissenberger, Eds. vol. 2, *Nuclear Chemistry*. Noah R. Johnson, Eugene Eichler, and G. Davis O'Kelley. Interscience (Wiley), New York, 1963. xiv + 202 pp. Illus. $8.

This is a short and up-to-date introduction to nuclear chemistry. Since the techniques and data of this hybrid discipline, which bridges chemistry and nuclear physics, are rapidly evolving and changing, a concise text of this sort is very welcome. The authors are well-known nuclear chemists at the Oak Ridge National Laboratory, and they therefore present first-hand knowledge of the more technical aspects of the field.

The presentation of the theoretical background follows the standard pattern of the more comprehensive textbooks. The authors discuss radioactive decay and then give a short account of its theory, including a discussion of decay schemes. In each case, references to modern review articles or to more extensive monographic treatments (like the *Source Material for Radiochemistry*) are given. The next chapter deals with the interaction of radiations with matter, including a short account of biological effects. The energetics and mechanisms of nuclear reactions are an essential introduction to the production of radionuclides. For this purpose the bombardment facilities of nuclear chain reactors have become the most widely used tools. Most of the chemistry proper in *Nuclear Chemistry* consists of separation techniques that have some specific aspects on the tracer-level different from ordinary macroscopic