## BOOK REVIEWS

*Introduction to quadratic forms.* By O. T. O'Meara. (Die Grundlehren
der mathematischen Wissenschaften, Vol. 117.) Springer, Berlin;
Academic Press, New York; 1963. xi+342 pp. $12.00.

The arithmetic theory of quadratic forms, one of the most vener-
able subjects of present-day mathematics, may well appear to consist
of a collection of scattered results from elementary number theory on
such questions as the representation of integers by squares—at least
this is the impression one obtains after reading Dickson's *History*,
for example. Thus, completely apart from any other merits O'Meara's
*Introduction to quadratic forms* may possess or lack, its appearance
should cause pleasant surprise among many classically-trained mathe-
maticians, not excluding quadratic formalists themselves, who will
find that so orderly and unified a body of material can be presented
from such an apparent assortment of facts.

This unification is not, however, the only novelty of the book.
O'Meara, assuming as prerequisite a knowledge of first-year algebra
and elementary topology, presents his subject within the framework
of abstract algebra, thereby providing both greater clarity and gen-
erality; for example, $p$-adic numbers enter as a natural outgrowth of
valuation theory, rather than as the formal power series with com-
plicated rules of operation used by Jones in *The arithmetic theory of
quadratic forms*, or as the frightful systems of congruences modulo
prime powers used by Watson in his *Integral quadratic forms*.
Furthermore, being able to quote from linear algebra, O'Meara can
use the language of inner-product spaces, thus avoiding the cumber-
some double-summations of the forms themselves. But the most
striking point of all is the author's realization that the only suitable
way to approach the subject, even in the case of forms having rational
coefficients, is via algebraic number theory, a fact he exploits to the
fullest.

In this "modern" approach, O'Meara is following the example set
by Eichler in *Quadratische Formen und orthogonale Gruppen*, but the
two books are hardly comparable, even apart from the discoveries of
the eleven years between their dates of publication. Eichler has gone
less deeply into matters of classification and has instead included
analytic theory; he has written a work that is extremely condensed
and hardly self-contained, neither of which can be said for the book
under review. It should be hurriedly pointed out that the words
"modern" and "abstract" are here being used without praiseworthy