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Sinopsis

The direct sum behaviour of its projective modules is a fundamental property of any ring. Hereditary Noetherian prime rings are perhaps the only noncommutative Noetherian rings for which this direct sum behaviour (for both finitely and infinitely generated projective modules) is well-understood, yet highly nontrivial.

This book surveys material previously available only in the research literature. It provides a re-worked and simplified account, with improved clarity, fresh insights and many original results about finite length modules, injective modules and projective modules. It culminates in the authors' surprisingly complete structure theorem for projective modules which involves two independent additive invariants: genus and Steinitz class. Several applications demonstrate its utility.

The theory, extending the well-known module theory of commutative Dedekind domains and of hereditary orders, develops via a detailed study of simple modules. This relies upon the substantial account of idealizer subrings which forms the first part of the book and provides a useful general construction tool for interesting examples.

The book assumes some knowledge of noncommutative Noetherian rings, including Goldie's theorem. Beyond that, it is largely self-contained, thanks to the appendix which provides succinct accounts of Artinian serial rings and, for arbitrary rings, results about lifting direct sum decompositions from finite length images of projective modules. The appendix also describes some open problems.

The history of the topics is surveyed at appropriate points.