

Contents

1. Modules, vector spaces, and algebras	1
2. Submodules; intersections and sums	8
3. Morphisms; exact sequences	15
4. Quotient modules; basic isomorphism theorems	32
5. Chain conditions; Jordan-Hölder towers	45
6. Products and coproducts	56
7. Free modules; bases	77
8. Groups of morphisms; projective modules	96
9. Duality; transposition	115
10. Matrices; linear equations	126
11. Inner product spaces	147
12. Injective modules	163
13. Simple and semisimple modules	172
14. The Jacobson radical	185
15. Tensor products; flat modules; regular rings	194
16. Tensor products; tensor algebras	217
17. Exterior algebras, determinants	235
18. Modules over a principal ideal domain; finitely generated abelian groups	263
19. Vector space decomposition theorems; canonical forms under similarity	289
20. Diagonalisation; normal transformations	318
Index	358