

Contents

<i>Introduction</i>	<i>page</i>	<i>xi</i>
I Artin rings		1
1 Finite length modules		1
2 Right and left minimal morphisms		6
3 Radical of rings and modules		8
4 Structure of projective modules		12
5 Some homological facts		16
Exercises		23
Notes		25
II Artin algebras		26
1 Artin algebras and categories		26
2 Projectivization		32
3 Duality		37
4 Structure of injective modules		39
5 Blocks		43
Exercises		45
Notes		47
III Examples of algebras and modules		49
1 Quivers and their representations		49
2 Triangular matrix rings		70
3 Group algebras		79
4 Skew group algebras		83
Exercises		94
Notes		99
IV The transpose and the dual		100
1 The transpose		100
2 Nakayama algebras		111
3 Selfinjective algebras		122

4	Defect of exact sequences	128
	Exercises	133
	Notes	135
V	Almost split sequences	136
1	Almost split sequences and morphisms	136
2	Interpretation and examples	147
3	Projective or injective middle terms	153
4	Group algebras	158
5	Irreducible morphisms	166
6	The middle term	173
7	The radical	178
	Exercises	185
	Notes	189
VI	Finite representation type	191
1	A criterion	191
2	Nakayama algebras	197
3	Group algebras	200
4	Grothendieck groups	206
5	Auslander algebras	209
	Exercises	219
	Notes	221
VII	The Auslander–Reiten–quiver	224
1	The Auslander–Reiten–quiver	224
2	Auslander–Reiten–quivers and finite type	232
3	Cartan matrices	241
4	Translation quivers	248
	Exercises	253
	Notes	256
VIII	Hereditary algebras	257
1	Preprojective and preinjective modules	258
2	The Coxeter transformation	269
3	The homological quadratic form	272
4	Regular components	277
5	Finite representation type	288
6	Quadratic forms and roots	294
7	Kronecker algebras	302
	Exercises	309
	Notes	311
IX	Short chains and cycles	313
1	Short cycles	313

2	Modules determined by composition factors	320
3	Sincere modules and short cycles	323
4	Modules determined by their top and socle	326
	Exercises	332
	Notes	333
X	Stable equivalence	335
1	Stable equivalence and almost split sequences	335
2	Artin algebras with radical square zero	344
3	Symmetric Nakayama algebras	352
	Exercises	362
	Notes	364
XI	Modules determining morphisms	365
1	Morphisms determined by a module	365
2	Modules determining a morphism	370
3	Classification of morphisms	379
4	Rigid exact sequences	385
5	Indecomposable middle terms	389
	Exercises	399
	Notes	405
	<i>Notation</i>	406
	<i>Conjectures</i>	409
	<i>Open problems</i>	411
	<i>Bibliography</i>	413
	<i>Relevant conference proceedings</i>	420
	<i>Index</i>	421