MATH 551 Abstract Algebra

DESCRIPTION

Basic definitions of rings and modules, Homomorphisms, Sums and products, Exactness, Hom and tensor, Adjoint isomorphism, Free, projective and injective modules. Chain conditions, Primary decomposition, Noetherian rings and modules, Artinian rings, structure theorem. PREREQUISITE: MATH 345.

TEXTBOOK

ALGEBRA, by Serge LANG, Revised Third Edition

SYLLABUS

Section	Material	Suggested Exercises
II.1	Rings and homomorphisms	13, 14, 15, 18
II.2	Commutative rings	
II.3	Group rings and monoid rings	
II.4	Localization	
III.1	Basic definitions of modules	3, 9, 10, 11, 14, 15
III.2	The group of homomorphisms	
III.3	Direct products and sums of modules	
III.4	Free modules and projective modules	
III.7	Modules over principal rings	
III.7	Modules over principal rings (cont.)	
III.9	The snake lemma	
XVI.1-3	Tensor products and flatness	5, 9, 13
XX.4	Injective modules	23, 24, 25, 26
X.1	Noetherian rings and modules: basic criteria	7, 9, 10, 13
X.2	Associated primes	
X.3	Primary decomposition	
X.4	Nakayama's lemma	
X.7	Indecomposable modules	
IV.4	Hilbert's basis theorem	5, 8, 9, 10, 11, 18
XVII.2	Semisimplicity	3, 5, 6, 7, 9, 10
XVII.4	Semisimple rings and structure results	

SUGGESTED TOPICS (FOR Project/Oral Exam)

- Filtered and graded modules (X.5)
- The Hilbert polynomial (X.6)
- Extension of the base (XVI.4)
- Functorial isomorphisms (XVI.5)
- Simple rings (XVII.5)
- The Jacobson radical and base change (XVII.6)