

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 323 (MATH 345).

TEXTBOOKS

[G] **P. Grillet**, Abstract Algebra, 2nd edition, Springer (2007).

[L] ALGEBRA, by **S. LANG**, Third Edition, Graduate Text in Mathematics, 211, Springer.

[H] ALGEBRA, by **T. HUNGERFORD**, Graduate Text in Mathematics, 73, Springer.

SYLLABUS

Week	Section – [G]	Material - [G]
1	III.1-III.2	Rings and homomorphisms
	III.4	Domains and Fields
2		Group rings and monoid rings
	VII.4	Localization
3	VIII.1	Basic definitions of modules
	VIII.2	The group of homomorphisms
4	VIII.3	Direct products and sums of modules
	VIII.4	Free modules and projective modules
5	VIII.6	Modules over principal rings
6	VIII.6	Modules over principal rings (cont.)
		The snake lemma
7	XI.5-8	Tensor products and flatness
8	X.4	Injective modules
9	III.11	Noetherian rings and modules: basic criteria
10		Associated primes
11	VII.1	Primary decomposition
		Hilbert's basis theorem
12		Nakayama's lemma
13		Indecomposable modules
14-15	IX.1-2	Semi-simplicity
	IX 3-5-6	Semi-simple rings and structure results

GRADING POLICY

THW 1: Sections III.1 – XI 5-8 (25 problems – [G] & [H])	25	-
Midterm Exam: Sections III.1 – XI 5-8 (Duration = 6 hours)	50	75
THW 2: Sections X.4 – IX3-5-6 (25 problems – [G] & [H])	25	-
Final Exam: Sections X.4 – IX.3-5-6 (Duration = 6 hours)	50	75
TOTAL		150