MATH 551 Abstract Algebra

1. 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. MATH 450 IS RECOMMENDED

2. TEXTBOOK

ALGEBRA, by Serge LANG, Revised Third Edition

3. SYLLABUS

Week	Section	Material
1	II.1	Rings and homomorphisms
	II.2	Commutative rings
2	II.3	Group rings and monoid rings
	II.4	Localization
3	III.1	Basic definitions of modules
	III.2	The group of homomorphisms
4	III.3	Direct products and sums of modules
	III.4	Free modules and projective modules
5	III.7	Modules over principal rings
6	III.7	Modules over principal rings (cont.)
	III.9	The snake lemma
7	XVI.1-2 (-3)	Tensor products (and flatness)
8	XX.4	Injective modules
9	X.1	Noetherian rings and modules: basic criteria
10	X.2	Associated primes
11	X.3	Primary decomposition
	IV.4	Hilbert's basis theorem
12	X.4	Nakayama's lemma
13	X.7	Indecomposable modules
14	XVII.2	Semisimplicity
	XVII.4	Semisimple rings
15	XVII.	Structure results (Exercises 1-6, p. 661)

4. GRADING POLICY

Take-home Exam 1	II.1 – III.9	100
Take-home Exam 2	XVI.1 – XVII.	100