KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 695 (READING AND RESEARCH I) – SEMESTER 052
DR. JAWAD ABUIHLAIL

1. DESCRIPTION: Fractional Ideals, Valuation Domains, Prüfer Domains, Dedekind Domains, Krull Domains, Coherent Domains, h-local Domains, Matlis Domains, Reflexive Domains, Finitely Generated Modules, Finitely Presented Modules, Projective Modules, Projective Dimension, Flat Modules, Divisible Modules, Injective Modules.

2. TEXTBOOK: L. Fuchs & L. Salce, "*Modules over Non-Noetherian Domains,*" Mathematical Surveys and Monographs: **84**. American Mathematical Society (2000).

3. SYLLABUS:

Ch.	Title	Week	MATERIAL
I.	**COMMUTATIVE DOMAINS AND THEIR MODULES**	1	Fractional Ideals Lemmas on Hom and Ext The Exchange Property
II.	**VALUATION DOMAINS**	2	Fundamental Properties of Valuation Domains Ideals of Valuation Domains
III.	**PRÜFER DOMAINS**	3	Fundamental Properties and Characterizations Prüfer Domains of Finite Character
		4	The Class Semigroup Bézout Domains
IV.	**MORE NON-NOETHERIAN DOMAINS**	5	Krull Domains Coherent Domains
		6	h-local Domains Reflexive Domains
V.	**FINITELY GENERATED MODULES**	7	Cyclic Modules Finitely Generated Modules
		8	Finitely Presented Modules Finitely Generated Modules over Valuation Domains
VI.	**PROJECTIVITY AND PROJECTIVE DIMENSION**	9	Projective Modules Projective Dimension
		10	Projective Dimension over Valuation Domains Global Projective Dimension of Prüfer Domains
		11	Modules of Projective Dimension One Flat Modules
VII.	**DIVISIBLE MODULES**	12	Divisible Modules h-Divisible Modules. Matlis Domains
		13	Divisible Modules over Valuation Domains Categories of Divisible Modules
IX.	**INJECTIVE MODULES**	14	Injectivity Indecomposable Injectives
**	**EXERCISES & PROBLEMS**	15, 16	

4. GRADING POLICY:

Take-home Exam 1	Chapters 1-4	120
Take-home Exam 2	Chapters 5-6	100
Take-home Exam 3	Chapters 7,9	060
Research Project		120

5. MAIN REFERENCES:

1. M. Atiyah & I. Macdonald, *Introduction to Commutative Algebra*, Addison-Wesley (1969).

2. N. Bourbaki, *Commutative Algebra*, Springer –Verlag (1989).

3. M. Fontana, J. Huckaba, I. Papick, *Prüfer Domain*, Marcel Dekker (1997).

4. R. Gilmer, *Multiplicative Ideal Theory*, Marcel Dekker (1972).

5. I. Kaplansky, *Commutative Rings*, University of Chicago Press (1974).

6. H. Matsumura, *Commutative Ring Theory*, Cambridge University Press (2004).