UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DEPARTMENT: Mathematics **DATE:** May 1994

Mathematics 439	Modern Algebra	3
NAME & NUMBER OF COURSE	**DESCRIPTIVE TITLE**	**UCFV CREDIT**

CATALOGUE DESCRIPTION: This course is an introduction to the ideas of modern algebra, with emphasis on group theory. Topics include groups and symmetry, group structure (Sylow theorems, finite Abelian groups) and group actions. The basic elements of ring theory (ideals and homomorphisms, integral domains, polynomial rings, unique factorization) and field theory (characteristic, algebraic extensions) are also considered.

COURSE PREREQUISITES: Math 221

COURSE COREQUISITES: None

HOURS PER TERM FOR EACH STUDENT	**Lecture**	**60 hrs**	**Student Directed Learning**		**hrs**
	Laboratory	**hrs**			
	Seminar	**hrs**	**Other - specify:**		
	Field Experience	**hrs**			**hrs**
			TOTAL	**60**	**HRS**

UCFV CREDIT 0	**UCFV CREDIT 0**	**NON-CREDIT 0**
TRANSFER	**NON-TRANSFER**	

TRANSFER STATUS (Equivalent, Unassigned, Other Details)

UBC credits

SFU credits

UVIC units

Other

Math Curriculum Committee	J.D. TUNSTALL Ph.D.
COURSE DESIGNER	**DEAN OF ACADEMIC STUDIES**

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COURSES FOR WHICH THIS IS A PREREQUISITE:	**RELATED COURSES**

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS:A first course in Abstract Algebra, Fraleigh, (Addison-Wesley)

OBJECTIVES:

The student will be introduced to some of the core ideas of modern algebra, an important field in contemporary mathematics. The group theory portion will provide the student with sufficient background to understand and use groups as they are applied in physics and chemistry.

METHODS:

STUDENT EVALUATION PROCEDURE:

The students will be evaluated on the basis of midterm exams (approximately 40%), a final exam (approximately 40%) and assignments (approximately 20%).

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COURSE CONTENT

1. Brief review:
   - (a) Sets and subsets
   - (b) Injections, surjections, etc.
   - (c) Quotient structures
   - (d) Elementary number theory (prime numbers, congruences.)

2. Introduction to groups:
   - (a) Binary operations

(b) Groups in mathematics: symmetry, matrices, the integers, modular arithmetic, permutations.

   - (c) Group axioms
   - (d) Subgroups, quotient groups, first isomorphism theorem.
   - (e) Group actions

3. Group structure:
   - (a) Lagrange's theorem, Cayley's theorem
   - (b) Direct products
   - (c) Abelian groups (structure of finite abelian groups
   - (d) The Sylow theorems

4. Introduction to rings:
   - (a) Ideals and homomorphisms
   - (b) Integral domains and quotient fields
   - (c) Polynomial rings, unique factorization

5. Introduction to fields:
   - (a) Characteristic
   - (b) Algebraic extensions
   - (c) Finite fields