UNIVERSITY OF THE FRASER VALLEY

ORIGINAL COURSE IMPLEMENTATION DATE: May 1994
REVISED COURSE IMPLEMENTATION DATE: September 2019
COURSE TO BE REVIEWED: (six years after UEC approval) December 2024
Course outline form version: 09/15/14

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: MATH 439	**Number of Credits:** 3 Course credit policy (105)
Course Full Title: Group Theory **Course Short Title (if title exceeds 30 characters):**	
Faculty: Faculty of Science	**Department (or program if no department):** Mathematics & Statistics

Calendar Description:

Groups are a fundamental structure of modern algebra with many applications in the sciences. Introduces the basic examples, constructions, and theorems of elementary group theory and explores applications within mathematics and beyond.

Prerequisites (or NONE):	MATH 339 or MATH 355.
Corequisites (if applicable, or NONE):	
Pre/corequisites (if applicable, or NONE):	

Equivalent Courses (cannot be taken for additional credit)
Former course code/number:
Cross-listed with:
Equivalent course(s):
Note: Equivalent course(s) should be included in the calendar description by way of a note that students with credit for the equivalent course(s) cannot take this course for further credit.

Transfer Credit
Transfer credit already exists: ☐ Yes ☒ No
Transfer credit requested (OReg to submit to BCCAT):
☐ Yes ☒ No (if yes, fill in transfer credit form)
Resubmit revised outline for articulation: ☐ Yes ☒ No
To find out how this course transfers, see **bctransferguide.ca**.

Total Hours: 50
Typical structure of instructional hours:

Lecture hours	50
Seminars/tutorials/workshops	
Laboratory hours	
Field experience hours	
Experiential (practicum, internship, etc.)	
Online learning activities	
Other contact hours:	
	50

Special Topics
Will the course be offered with different topics?
☐ Yes ☒ No
If yes, different lettered courses may be taken for credit:
☐ No ☐ Yes, repeat(s) ☐ Yes, no limit
Note: The specific topic will be recorded when offered.

Maximum enrolment (for information only): 36

Expected frequency of course offerings (every semester, annually, every other year, etc.): Semi-Annually

Department / Program Head or Director: Ian Affleck	**Date approved:**	September 26, 2016
Faculty Council approval	**Date approved:**	October 5, 2018
Campus-Wide Consultation (CWC)	**Date of posting:**	November 16, 2018
Dean/Associate VP: Lucy Lee	**Date approved:**	October 5, 2018
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	December 14, 2018

Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Define elementary group-theoretic concepts
2. Establish elementary group-theoretic propositions and construct counter-examples
3. Construct quotient groups, perform computations there
4. Establish elementary statements about homomorphism and isomorphism
5. Compute with and establish elementary propositions about permutations
6. Employ group theoretic techniques in counting and symmetry problems
7. Employ representation techniques for finite Abelian groups
8. Use Sylow theorems to elucidate group structure based on order
9. Compute, and establish elementary propositions in the theory of one or more of the following, as time permits
    a. Symmetry and crystallographic groups
    b. Braid groups
    c. Permutation groups
    d. Series compositions of groups (solvability, nilpotency)
    e. Infinite Abelian group theory

Prior Learning Assessment and Recognition (PLAR)

☒ Yes ☐ No, PLAR cannot be awarded for this course because

Typical Instructional Methods (guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion)

The course will be primarily lecture-based and may include student presentations.

Grading system: Letter Grades: ☒ Credit/No Credit: ☐ Labs to be scheduled independent of lecture hours: Yes ☐ No ☐

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials (if more space is required, download Supplemental Texts and Resource Materials form)

	Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1.	A. Papantonopoulou	Algebra Pure and Applied	☐	Prentice Hall	2002
2.	J. Gallian	Contemporary Abstract Algebra, 9th ed.	☐	Brooks Cole	2016
3.			☐		
4.			☐		
5.			☐		

Required Additional Supplies and Materials (software, hardware, tools, specialized clothing, etc.)

Typical Evaluation Methods and Weighting

Final exam:	40 %	Assignments:	25 %	Midterm exam:	35 %	Practicum:	%
Quizzes/tests:	%	Lab work:	%	Field experience:	%	Shop work:	%
Other:	%	Other:	%	Other:	%	Total:	100%

Details (if necessary):

Typical Course Content and Topics

Groups
Basic definitions and examples
Cyclic groups, permutation groups, and Cayley's Theorem
Cosets and Lagrange's Theorem
Homomorphisms, normal subgroups and quotient groups, the Isomorphism Theorems
Direct products and the Fundamental Theorem of Finite Abelian Groups
Conjugacy classes, the Class equation, applications to symmetry and counting
Sylow's Theorems
Additional topics chosen from:

a. Symmetry and crystallographic groups
b. Braid groups
c. Permutation groups
d. Series compositions of groups (solvability, nilpotency)
e. Infinite Abelian group theory