COURSE IMPLEMENTATION DATE: May 1994
COURSE REVISED IMPLEMENTATION DATE: September 2006
COURSE TO BE REVIEWED: November 2009
(Four years after UPAC final approval date) (MONTH YEAR)

OFFICIAL COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.
Shaded headings are subject to change at the discretion of the department and the material will vary - see course syllabus available from instructor

FACULTY/DEPARTMENT: **Science, Health & Human Services / Mathematics & Statistics**

MATH 439		**3**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS

Modern Algebra
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course is a detailed study of some of the fundamental structures of modern algebra: groups, rings and fields, which are core to much of mathematics and have applications in physics and other sciences. The emphasis will be on the logical development of the subject, and the study of fundamental examples. Precise thinking, writing, and the ability to abstract are essential.

PREREQUISITES: **Math 221 or MATH 339**
Effective September 2007, the prerequisites will be: Math 339 with a C or better
COREQUISITES:

SYNONYMOUS COURSE(S)
(a) Replaces: _____ *(Course #)*
(b) Cannot take: _____ *(Course #)* for further credit.

SERVICE COURSE TO: _____ *(Department/Program)* _____ *(Department/Program)*

TOTAL HOURS PER TERM: **60**
STRUCTURE OF HOURS:

Lectures:	**60**	Hrs
Seminar:		Hrs
Laboratory:		Hrs
Field Experience:		Hrs
Student Directed Learning:		Hrs
Other (Specify):		Hrs

TRAINING DAY-BASED INSTRUCTION
LENGTH OF COURSE: _____
HOURS PER DAY: _____

MAXIMUM ENROLLMENT: **36**
EXPECTED FREQUENCY OF COURSE OFFERINGS: **annually**

WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)	☐ Yes	☐ No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department)	☐ Yes	☒ No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:	☐ Yes	☒ No

AUTHORIZATION SIGNATURES:

Course Designer(s): Greg Schlitt/Robin Endelman
Chairperson: Gillian Mimmack *(Curriculum Committee)*
Department Head: Gillian Mimmack
Dean: Jacalyn Snodgrass
UPAC Approval in Principle Date:
UPAC Final Approval Date: November 25, 2005

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

This course extends Math 339, studying the fundamental structures of modern algebra (groups, rings and fields) and applications of those structures (primarily within mathematics). Students in this class will be exposed to algebraic structures in more detail, and learn the theory behind the constructions and applications encountered in Math 339.

Students in this course will learn the systematic development of the subject, and become familiar with the techniques used in abstract algebra. Thus, students successful in this course will be able to:

1) give precise definitions of the major constructions in modern algebra;
2) build examples and counterexamples to demonstrate algebraic properties;
3) construct and present logical arguments (proofs) in the theories of groups, rings, and fields.

Students will gain sufficient understanding and familiarity with algebraic structures to be able to use the constructions and theories in other sciences (for example physics, chemistry).

This course will further prepare students for a graduate program in mathematics or other field of science, or for a profession which uses mathematics or requires the ability to recognize patterns or abstract structure.

METHODS:

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

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Credit can be awarded for this course through PLAR (Please check:) ☒ Yes ☐ No

METHODS OF OBTAINING PLAR:

Please check online at http://www.ucfv.ca/math/challenge.htm for the departmental challenge policy.

TEXTBOOKS, REFERENCES, MATERIALS:

[Textbook selection varies by instructor. An example of texts for this course might be:]

The textbook is chosen by a departmental curriculum committee. Recommended text is:
Papantonopoulou, A. (2002) Algebra Pure and Applied. Prentice Hall.

SUPPLIES / MATERIALS:

Chalkboard with chalk (several colours)

STUDENT EVALUATION:

[An example of student evaluation for this course might be:]

Assignments	25%
Term tests	35%
Final exam	40%

Students must obtain at least 40% on the final exam in order to receive credit for this course.

COURSE CONTENT:

[Course content varies by instructor. An example of course content might be:]

Groups:

Review of basic definitions and examples (topics covered in Math 339).

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.

Review of group actions, orbits, stabilizers, Burnsides theorem (topics covered in Math 339), towards Sylow's Theorems.

Conjugacy classes, the Class equation.

Sylow's Theorems.

Rings and Fields:

Review of basic definitions and examples (topics covered in Math 339)

Maximal and prime Ideals, homomorphisms, and quotient rings and fields.

Integral domains, field of quotients.

Euclidean domains, principal ideal domains, and unique factorization domains.

Separable and normal field extensions, Fundamental Theorem of Algebra, Splitting fields, field isomorphisms.

Finite fields; structure and subfield structure.