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## APPROVED COURSE

**COURSE ID**

MATH 4000/6000

**TITLES**

Course Title: Modern Algebra I

Athena Title: Modern Algebra I

**COURSE DESCRIPTION**

An introduction to abstract algebra. Course begins with arithmetic and congruence in the integers, and introduces modular arithmetic. Course then moves to the more general setting of rings, and extends concepts from the integers to polynomial rings and other rings. The concepts of ideals and quotient rings are introduced. Groups are introduced, and normal subgroups and quotient groups appear as the analogues of ring-theoretic concepts.

**ADDITIONAL REQUIREMENTS FOR GRADUATE STUDENTS**

Extra problems on weekly homework.

**GRADING SYSTEM**

A-F (Traditional)

**CREDIT HOURS AND LECTURE/LAB/DISCUSSION HOURS**

	FIXED	VARIABLE
Credit Hours	3	
Lecture Hours per week	3	

**NON-TRADITIONAL FORMAT (IF THE LECTURE/LAB HOURS OR THE LECTURE/DISCUSSION HOURS ARE FEWER THAN THE CREDIT HOURS, PLEASE PROVIDE JUSTIFICATION IN THE BOX BELOW.)**

**REPEAT POLICY**

Course cannot be repeated for credit

**EQUIVALENT COURSES**

The course will not be open to students who have credit in the following courses:

Undergraduate

Graduate

**REQUIRED PREREQUISITES**

Undergraduate:

(MATH 3000 or MATH 3300 or MATH 3300E or MATH 3500 or MATH 3500H) and (MATH 3200 or MATH 3200W or CSCI 2610 or CSCI 2610E)

Graduate:

**PREREQUISITE OR COREQUISITE COURSES**

Undergraduate:

Graduate:

**COREQUISITE COURSES**

Undergraduate:

Graduate:

**PRIMARY DELIVERY MECHANISM (SELECT ONLY ONE)**

Lecture

**COURSE WILL BE OFFERED**

Every Year – Fall Spring Summer

**EFFECTIVE SEMESTER AND YEAR OF CURRENT VERSION OF COURSE**

Fall 2024

**ADDITIONAL INFORMATION REQUIRED FOR THE SYLLABUS**

**COURSE OBJECTIVES OR EXPECTED LEARNING OUTCOMES**

The Student Learning Outcomes are as follows:

Students will acquire computational skills with modular arithmetic and polynomials, as well as with concrete example of rings and groups.

Students will master basic definitions related to abstract algebraic structures such as rings, fields, groups, ideals, and quotients.

Students will develop their abstract reasoning and proof-writing skills, enabling them to write rigorous proofs about rings and groups in both general and concrete settings.

**TOPICAL OUTLINE**

Arithmetic in  $\mathbb{Z}$  (the integers)

Congruence in  $\mathbb{Z}$  and modular arithmetic

Rings

Congruence in  $F[x]$  and congruence-class arithmetic

Ideals and quotient rings

Groups

Normal subgroups and quotient groups

*The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.*

**UNIVERSITY HONOR CODE AND ACADEMIC HONESTY POLICY**

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**UGA WELL-BEING RESOURCES**

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