



蘇州大學  
Soochow University

# MAT 301 Modern Abstract Algebra

Summer 2023

**Course Credits:** 4

**Contact Hours:** 55 hours

**Instructor:** TBA

**Email:** TBA

## COURSE OBJECTIVES

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This course is an introduction to abstract algebra, which is the study of algebraic structures. This course covers properties of integers, sets, groups, permutation groups, cyclic groups, Lagrange's Theorem, subgroups, normal subgroups, quotient groups, external direct product of groups, homomorphism and isomorphism of groups, and introduction to rings and fields. The focus will be on the development of abstract algebraic concepts and techniques, as well as their applications to various mathematical fields.

Upon Completion of this Course, students will be able to:

1. Understand the basic definitions and concepts of algebraic structures such as groups, rings, fields, and modules.
2. Learn the fundamental properties of algebraic structures such as subgroups, subrings, quotient groups, and homomorphisms.
3. Develop problem-solving skills through the study of abstract algebraic concepts and their applications.
4. Explore applications of abstract algebra in various mathematical fields

## PREREQUISITES

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N/A

## GRADING

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Grades will be determined by accumulating points, with 100 points being the maximum, as follows:



ITEM	POINTS
Quizzes	20 Points
Midterm 1	20 Points
Midterm 2	20 Points
Final Exam	40 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F.$$

We reserve the right to make adjustments to the overall grading policy.

## COURSE MATERIALS

### Required Texts:

J. Gallian, *Contemporary Abstract Algebra*, 7th edition.

### Recommended (Optional) Texts or Other Materials:

None

## COURSE TOPICS

MODULE	TASKS
Module 1	<b>Topics:</b> Topic 1: Overview of Algebraic Structures Topic 2: Sets, Functions and Relations Topic 3: Groups Topic 4: Subgroups and Cosets <b>Assessments:</b> Quiz#1
Module 2	<b>Topics:</b> Topic 5: Homomorphisms and Isomorphisms Topic 6: Quotient Groups Topic 7: Rings Topic 8: Subrings and Ideals <b>Assessments:</b> Quiz#2



Module 3	<b>Topics:</b> Topic 9: Extensions of Fields Topic 10: Algebraic and Transcendental Elements Topic 11: The Minimum Polynomial, Basic Theorem on Field Extensions Topic 12: Vector Spaces <b>Assessments:</b> Midterm#1
Module 4	<b>Topics:</b> Topic 13: Linear Independence, Basis Topic 14: Dimension and Linear Transformations Topic 15: Galois Theory: Preamble Topic 16: Multiple Roots, Root Field <b>Assessments:</b> Midterm#2
Module 5	<b>Topics:</b> Topic 17: Extension of a Field, Isomorphism Topic 18: Galois Theory: The Heart of the Matter Topic 19: Field Automorphisms, The Galois Group Topic 20: The Galois Correspondence, Fundamental Theorem of Galois Theory <b>Assessments:</b> Final Exam

## ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

## LEARNING REQUIREMENTS



- 1) Late assignments are not acceptable and are subjected to grade deductions.
- 2) Assignments submitted in the wrong format will be counted as not submitted.
- 3) Failure to submit or fulfill any required course component results in failure of the class.
- 4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
- 5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

### **TECHNOLOGY POLICY**

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

### **ACADEMIC INTEGRITY POLICY**

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

### **DISABILITY ACCOMMODATION**

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents



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professors from seeing you have learned the course material.