

MATH 444
ABSTRACT ALGEBRA
CSULB
FALL 2025

SCOTT CRASS
FO3-232
scrass@csulb.edu
OFFICE: TUE/THU 11-11:45

Overview

If math is about anything, it's about structure. How do we capture the *structure of symmetry*? This task quickly leads to the profound and abstract notions of *group* and *ring*. Our exploration of these concepts will develop the beginnings of group and ring theory. Although we'll study many concrete examples, these subjects involve a high degree of abstraction. Historically, their development led to a revolution in mathematical thought. Perhaps we'll sense some of this revolutionary character as well.

Text

J. Osoinach, *Discovering Abstract Algebra*

Coursework

Classroom exploration and discovery. The course's focus is on the discovery of mathematical results through a process of active and collaborative learning. By formulating queries that lead to exploratory activity, we'll study abstract algebra in a way that authentically captures mathematical experience. Our text promotes such an inquiry-driven approach and we'll use it to guide discussions both in and out of class. The key to benefiting from this style of learning is to be engaged during class sessions and to work on material outside of class. Collaboration with a partner or two can significantly enhance understanding.

Exams. There will be three **take-home exams** that you submit to a class drop box. Some exam items will be taken from assigned exercises. You may collaborate with a partner and turn in joint work. Submissions that are written in correct LaTeX will receive a 5% bonus.

Evaluation

Exam 1 25%
Exam 2 35%
Exam 3 40%

Here's a *rough* indication of how grades will be assigned. These are **minimum** standards. The actual boundaries between grades might be lower than these, but won't be higher.

85-100% A
75-85% B
65-75% C
50-65% D

To each individual part of your work I assign a mark 0-10. See below for an *indication* of what these marks mean.

- 10 Clear, elegant, mathematically correct; shows depth of understanding, insight
- 9 Clear, shows understanding and some elegance and insight; mathematically correct
- 8 Mathematically correct; little elegance and insight
- 7 Mostly mathematically correct; little elegance and insight
- 6 Some significant misconceptions
- 5 Quite significant misconceptions (with honest effort, this is about as low as it goes)
- 0-4 Deep misconceptions—shows little effort.

Key to comments on marked papers

- a This needs a supporting **argument**.
- a? What's the **argument**—the line of reasoning—here?
- d **Describe** what's going on here.
- e **Explain** what you're doing here.
- h? **How** did you get this?
- i **Illustrate** what your talking about—give an example, a picture, etc.
- p A **picture/diagram** would help here.
- s This is not a **sentence**.
- w **Wording** is awkward, confusing, etc. Meaning is unclear.
- y? **Why** is this so? What's the connection to what you've already said?
- ! Very nice. Something especially clear, insightful
- ? What this means or what you're doing is **unclear**. Where does this come from?
- X Something's wrong here—in concept or calculation.
- ✓ This is right—you have the idea.

Fine Print

Values The CNSM is committed to providing a safe and positive learning environment and has established a zero-tolerance policy for any sexual/gender-based misconduct, including, but not limited to sexual harassment, assault, dating violence, stalking for all faculty, staff, and students.

As members of The Beach community, we practice tolerance and denounce hate and prejudice. Our classroom will strive to be a place of mutual respect where the focus is on learning and student success.

Basic needs program If you are having trouble affording enough food to eat, don't have a safe and reliable place to sleep, and/or experiencing an emergency or crisis we are here to help. We are the Basic Needs Program and we have emergency services and resources to assist you. To learn more about our programs and services you can visit our website at csulb.edu/basicneeds.

Disability Students may ask their University at any time for a reasonable accommodation. It is the faculty member's responsibility to immediately refer this student to Disabled Student Services for assistance, including a review of appropriate medical documentation. DSS will work with the faculty member to determine the appropriate accommodation.

Withdrawal A copy of the School of Natural Sciences withdrawal policy is available from the Department Office. Note that it's different from the University withdrawal policy and the deadlines are earlier. Deadlines to which you should pay particular attention to appear below. Withdrawals from this course will be allowed only in accordance with University and College policies. Please be aware of the more specific and restrictive withdrawal policy for the College of Natural Sciences and Mathematics.

Weeks 1-2. Withdrawals will not appear on the student's permanent record.

Weeks 3-8. Withdrawals are permissible only for serious and compelling reasons. Academic progress unsatisfactory to the student is considered a serious and compelling reason during this period. Instructor and Department Chair signatures on the drop form are required.

Weeks 9-12. Withdrawals are permissible for serious and compelling reasons, but during this period, unsatisfactory academic progress is not considered a serious and compelling basis to drop a course. Circumstances must be shown that preclude the student from attending class or from any effective opportunities to study. In addition to the normal withdrawal form, a special form must be completed, and instructor and department chair signatures are required.

Weeks 13-15. Withdrawals are permissible only for serious accident or illness and involve a total withdrawal from the University. Detailed written documentation must accompany withdrawal forms. Instructor, chair, and college dean signatures are required.

Cheating/Plagiarism Cheating and plagiarism are in violation of the California Administrative Code, Title 5, Section 41301. CSULB has adopted a specific policy with respect to the violations of this nature (see the Bulletin or Schedule of Classes). Any student in violation of this code and policy in any assignment or examination related to this course shall be subject to the options specified in the policy statement. This may result in the student receiving a failing grade in the course or, in certain circumstances, being expelled from the University.