

Math Math 8174 Algebraic Theories

Syllabus

Instructor

Charlotte Aten

Website: aten.cool

Email: charlotte.aten@colorado.edu

Lectures

Time: MWF 1430–1520

Location: Mathematics 350

Note that our officially listed location is Guggenheim Geography Bldg 206. This is **not** where we are meeting.

Textbooks

Algebraic Theories by Adámek, Rosický, and Vitale

A print copy can be obtained from <https://www.cambridge.org/core/books/algebraic-theories/D6055CE69E527DE387FB557DA7264E80>

An Invitation to General Algebra and Universal Constructions by George Bergman

Available online at <https://math.berkeley.edu/~gbergman/245/>

A print copy can be obtained from <https://link.springer.com/book/10.1007/978-3-319-11478-1>

Webpage

The course webpage can be found at <https://aten.cool/courses/2026/spring/8174.html>.

This is where you will find the latest version of the syllabus and lecture notes.

Prerequisites

Students taking Math 8174 should have completed the introductory graduate algebra sequence covered in Math 6130 and Math 6140 or equivalent courses.

Drop date

You can drop this course with a 100% refund any time up to and including January 23, 2026. It will also be removed from your academic record. From January 24 onward you will have to take a W on your transcript if you would like to drop the course, which is referred to as a «withdrawal». See [here](#) for more detailed information.

Course learning objectives

This course provides experiences to help strengthen the student's ability to:

- Explain the relationship between classical (universal) algebra and the categorical treatment introduced by Lawvere.
- Determine whether a category is sifted or filtered.
- Determine whether a category has reflexive coequalizers.
- Identify algebraic categories by way of perfectly presentable objects.
- Work with algebraic categories as free completions.
- Find a canonical theory for an algebraic category.
- Understand the categorical version of Birkhoff's Variety Theorem and its relationship with the classical statement.

Class structure

Lectures occur thrice a week and are 50 minutes long. On certain days the lecture will be given by students. We will arrange these days in advance as the course progresses.

Slides

I use slides in addition to writing on the board during lectures. I will post the slides I use on [the course webpage](#) some time after class. These slides are not a substitute for taking your own notes (or getting them from a friend if you miss class) and are by no means going to contain a complete description of everything I say or compute during class. They can be a helpful supplement to your own, more detailed notes, however.

Course materials

In addition to the textbooks, students should bring an ample supply of blank paper and writing utensils.

Final exam

There is no final exam in this course.

Grading

This course will be graded on the basis of short lectures which you will give at regular intervals throughout the course, the frequency of which will be determined by the number of students when the class begins. These lectures will have their topic assigned in advance and may involve filling in the details of a result from the text or solving an exercise.

For each lecture, I will assign points based on the following criteria:

- **Presentation:** How well do you communicate the idea that you're presenting. This includes things like telling us what you're going to compute before computing something, projecting so that we can hear, and responding amicably to questions.
- **Content:** How well you actually solve the exercise or prove the result in question. Only a reasonable amount of detail is expected, so focus on what is important.
- **Visuals:** How well you present your topic through slides, writing on the board, or some combination of both. If you use slides and show us a large diagram or calculation, be prepared to explain some of its finer details.

For each of these criteria I'll give an integer between 1 and 5, inclusive, with 5 the best performance and 1 the poorest performance. I'll use the numbers to compute your letter grade at the end of the course.

I am not going to take attendance as such, but failure to regularly attend will not bode well for your grade. Please let me know should extraordinary circumstances take you away from the class for a while.

Honor code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the [Honor Code](#). Violations of the Honor Code may include but are not limited to: plagiarism (including use of paper writing services or technology [such as essay bots]), cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. Understanding the course's syllabus is a vital part in adhering to the Honor Code.

All incidents of academic misconduct will be reported to Student Conduct & Conflict Resolution: StudentConduct@colorado.edu. Students found responsible for violating the [Honor Code](#) will be assigned resolution outcomes from the Student Conduct & Conflict Resolution as well as be subject to academic sanctions from the faculty member. Visit [Honor Code](#) for more information on the academic integrity policy.

Accommodation for disabilities, temporary medical conditions, and medical isolation

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the [Disability Services website](#). Contact Disability Services at [303-492-8671](tel:303-492-8671) or DSinfo@colorado.edu for further assistance. If you have a temporary medical condition, see [Temporary Medical Conditions](#) on the Disability Services website.

If you have a temporary illness, injury or required medical isolation for which you require adjustment, you should contact me as soon as reasonably possible in order to make other arrangements. I understand that it may not always be possible to let me know you'll have to turn in an assignment late in advance, but it will be easier for both of us if you can reach out sooner than later.

Accommodations for religious obligations

Campus policy requires faculty to provide reasonable accommodations for students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Please communicate the need for a religious accommodation in a timely manner. In this class, all homework, quizzes, and lectures are scheduled from the beginning of the course, so make sure to look over this document and reach out as soon as you can to resolve any scheduling conflicts. I will notify the class via email should anything in the course schedule change. See the [campus policy regarding religious observances](#) for full details.

Preferred student names and pronouns

CU Boulder recognizes that students' legal information does not always align with how they identify. If you wish to have your preferred name (rather than your legal name) and/or your preferred pronouns appear on your instructors' class rosters and in Canvas, visit the [Registrar's website](#) for instructions on how to change your personal information in university systems.

Classroom behavior

Students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote, or online. Failure to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, marital status, political affiliation, or political philosophy. Additional classroom behavior information:

- [Student Classroom and Course-Related Behavior Policy](#)
- [Student Code of Conduct](#)
- [Office of Institutional Equity and Compliance](#)

Sexual misconduct, discrimination, harassment and/or related retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits [protected-class](#) discrimination and harassment, sexual misconduct (harassment, exploitation, and assault), intimate partner abuse (dating or domestic violence), stalking, and related retaliation by or against members of our community on- and off-campus. The Office of Institutional Equity and Compliance (OIEC) addresses these concerns, and individuals who have been subjected to misconduct can contact OIEC at [303-492-2127](tel:303-492-2127) or email OIEC@colorado.edu. Information about university policies, [reporting options](#), and [OIEC support resources](#) including confidential services can be found on the [OIEC website](#).

Please know that faculty and graduate instructors must inform OIEC when they are made aware of incidents related to these policies regardless of when or where something occurred. This is to ensure the person impacted receives outreach from OIEC about resolution options and support resources. To learn more about reporting and support a variety of concerns, visit the [Don't Ignore It](#) page.

Mental health and wellness

The University of Colorado Boulder is committed to the well-being of all students. If you are struggling with personal stressors, mental health or substance use concerns that are impacting academic or daily life, please contact [Counseling and Psychiatric Services \(CAPS\)](#), located in C4C, or call [\(303\) 492-2277](tel:303-492-2277), 24/7.