

Math 460: Information and Coding Theory, Spring 2024 Syllabus

1 Course Details

1.1 Course Meetings

Course Instructor: Dr. Jeff Shriner (jeffrey.shriner@colostate.edu)

MWF: 1:00pm -- 1:50pm, ENG E206

1.2 Office Hours

Office hours will be held MW 10am -- 11am in my office, Weber 017A.

1.3 Communication

E-mail is the best way to contact me outside of class. You can expect a response within 24 hours on weekdays which either answers your question, or to set up a further meeting to discuss your question. You, in turn, are also expected to check your university email and our Canvas course regularly and respond in a timely manner.

1.4 Prerequisites

This course requires the prerequisite courses of MATH 360 or MATH 366; DSCI 369 or MATH 369.

1.5 Textbook

We will use the textbook "[A Course in Algebraic Error-Correcting Codes](#)"¹, by Simeon Ball.

1.6 Course Website

We will use [Canvas](#)² for all course materials and grades. This is a great place to stay organized and know what is due when.

1.7 Course Ethos

Roughly speaking, mathematics is composed of two essential components:

- creative ideas, and
- effective communication.

¹link.springer.com/book/10.1007/978-3-030-41153-4

²canvas.colostate.edu/

In this course, we will work to learn content while valuing both of these components, which means you should expect to ask (and be asked) lots of questions, explain thought processes and ideas through discussion and writing, and be stretched to think about problems you may have not seen before. Not only are these components the essence of mathematics, but they are also skills that will continue to help you succeed after graduation!

We will also acknowledge that making mistakes is a necessary component in learning something new, and that everyone has valuable insights that can help deepen our understanding of a concept.

1.8 Course Structure

Research shows that people learn mathematics best when they are actively engaged in the material with their peers. In other words, you learn by doing and interacting, not by watching. Therefore, our course is not comprised solely of lecture content, but instead provides multiple opportunities for individual and group work in which you will be actively engaged, solving problems, and understanding connections.

You will be encouraged to read sections from our textbook before class. A small time investment can make a big difference! Being exposed to the material before class allows us to dedicate more of our time together to digging deeper, asking and answering questions, and working together to better understand the course content. Class time is intended to deepen and extend aspects of the text, not to replace it.

1.9 Course Content

From the course catalog: Entropy, mutual information, channel capacity, channel coding theorem, syndrome decoding, BCH codes, recent developments.

1.10 Technology

You should have access to technology to explore ideas inside and outside of class. We will mostly focus on using Sage³. You should bring a laptop or tablet to class in order to access this technology; if this is not possible, please come speak with me about alternate options.

2 Assignments and Assessments

The only effective way to learn mathematics is to think about lots and lots of problems. We will work many problems collaboratively in class, and refine your solutions to them individually outside of class. This process will help prepare you for the three in-person assessments we will have during the semester. In general, late work is not accepted. Please do communicate with me if you have circumstances that will make it difficult to meet a deadline; the outcome is typically better if you communicate an issue before something is due.

2.1 Written Practice Portfolio

Working practice problems together will be a regular part of our course meetings. In class, our goal will be to work collaboratively to establish the main ideas of solutions to these problems, but not necessarily to write polished solutions. You

³www.sagemath.org/

will be expected to write up complete solutions to these problems individually in a single document (your portfolio) using L^AT_EX. Your portfolio will be collected three times during the semester (once before each midterm).

2.2 In-class Activities

Most Fridays will be reserved for activities using technology. You will include outputs and summaries from these activities in your portfolio.

2.3 In-class Assessments

We will have three in-class exams. The exams will take place during our normal scheduled class time. Assessments will be written so that technology is not required. The exam dates are listed on the tentative schedule provided in Canvas, but are subject to change.

2.4 Poster Project

You will complete one project on a topic related to our course. The project will include producing a poster and a short paper. Posters may be completed in groups of 2 to 3, but papers should be written individually. The projects are an opportunity to learn something new in greater depth and develop skills at communicating and writing mathematics. They will give us exposure to many interesting topics that we do not have time to cover in class. Further details regarding suggested topics, due dates, etc. will be provided on Canvas.

3 Grades

3.1 A Note On Academic Integrity

We learn best together, which is why there is a large amount of collaboration built into our course structure. However, there is a difference between learning together and using someone else's work. If you are wondering if you crossed the line, ask yourself "Could I start over and redo this on my own, and would it basically look like this?" If not, then you are submitting someone else's work (plagiarism). Copying solutions from the internet also constitutes plagiarism. Because "post-and-solve" resources (such as Chegg.com and Slader.com) do not typically follow our "learn together" philosophy, you should not use these resources to post or view problems from our course. We take academic integrity seriously, so all cases of plagiarized work (including work receiving aid from any "post-and-solve" resources) will receive a 0 and will be submitted to the SRC.

3.2 Letter Grades

Overall grade percentages will be calculated based on the following weighting:

- Exams (45%)
- Portfolio (30%)
- Poster Project (25%)

Letter grades will be assigned according to a scale no stricter than the following:

A+ [98, 100]

A	[90, 98)
B+	[88, 90)
B	[80, 88)
C+	[78, 80)
C	[70, 78)
D	[60, 70)
F	[0, 60)

4 Course and University Policies and Standards

4.1 COVID-19 Resources

For the most up-to-date information regarding COVID-19 at CSU, see [here](#)¹. You can also find the FAQ for students who may become ill with COVID at [this document](#)².

4.2 Basic Needs Security

Any student who faces challenges securing their food or housing can receive support from the [Rams Against Hunger program](#)³. Services include a food pantry, a meal-swipe program, pocket pantries, and in-person assistance with navigating federal aid eligibility. The RAH page includes numerous resources as well as county, state and federal programs which are described and linked. Furthermore, please notify the instructor if you are comfortable in doing so.

4.3 Classroom Behavior, Respect for Diversity and Inclusion

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail 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 differences of race, color, culture, religion, creed, politics, veteran's status, sexual orientation, gender, gender identity and gender expression, age, disability, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. For more information, see the policies on classroom behavior and the student code at [the catalog](#)⁴ and at [the SRC](#)⁵.

We acknowledge that many students have had experiences that have left them feeling excluded from the field of mathematics. We also acknowledge that students from minority groups have been disproportionately impacted. We are

¹covidrecovery.colostate.edu/

²safety.colostate.edu/wp-content/uploads/2020/04/FAQ-Provost-4-10-20-1.pdf

³lsc.colostate.edu/slice/slice-engagement/rams-against-hunger/

⁴catalog.colostate.edu/general-catalog/policies/students-responsibilities

⁵resolutioncenter.colostate.edu/student-conduct-code/

making this explicit statement because this unfortunate reality is inconsistent with the truth that you can be successful in mathematics, regardless of your race, ethnicity, gender, or sexual orientation. We are committed to decolonizing mathematics into a field where every student feels supported in accomplishing the hard work necessary to become better problem solvers. We learn more by listening to diverse perspectives, and we hope you will be ready and willing to share yours in this course.

Here are several resources that highlight the past and current contributions to the mathematics community from underrepresented groups:

1. [Meet A Mathematician](#)⁶
2. [Mathematically Gifted and Black](#)⁷
3. [Lathisms](#)⁸
4. [Indigenous Mathematicians](#)⁹
5. [Spectra](#)¹⁰
6. [Association for Women in Mathematics](#)¹¹
7. [Mathematicians of the African Diaspora](#)¹²

4.4 Accommodation for Disabilities

If you are a student who will need accommodations in this class due to a disability or chronic health condition, I will need an accommodation letter from the Student Disability Center (SDC) before they are implemented. Please meet with me during my office hours to give me the letter and/or to further discuss your needs.

If you do not already have these letters, please contact the SDC as soon as possible to initiate the accommodation process. The SDC is located in room 121 of the TILT building. Contact them at 970-491-6385 or visit [the SDC website](#)¹³.

4.5 Student Parents/Guardians/Caregivers

I realize that student parents/guardians and caregivers face distinctive challenges in succeeding academically, and I'm committed to supporting those of you who are parents to achieve our course's learning outcomes. If you encounter challenges in meeting course expectations, please contact me as soon as possible. We'll develop a plan together so you can be successful in the course.

4.6 Student Case Management

[Student case management](#)¹⁴ is available to help students with extenuating life circumstances and connect them with resources. In some cases, after you and I discuss your situation, I may request verifiable documentation for class

⁶sites.google.com/view/meetamathematician/home

⁷mathematicallygiftedandblack.com/

⁸www.lathisms.org/

⁹www.indigenoumathematicians.org/

¹⁰lgbtmath.org/

¹¹awm-math.org/

¹²www.mathad.com/home

¹³disabilitycenter.colostate.edu/

¹⁴studentcasemanagement.colostate.edu/

absences from the SCM office if you request considerations for absences or missed coursework.

4.7 Mental Health and Wellness

CSU is a community that cares. You are not alone. CSU Health Network Counseling Services has trained professionals who can help. Your student fees provide access to a wide range of support services. Call Counseling Services at (970) 491-6053, and they will work together with you to find out which services are right for you. Visit [counseling services](#)¹⁵ to learn more and [mental health resources](#)¹⁶ for additional student mental health and well-being resources. If you are concerned about a friend or peer, use Tell Someone by calling (970) 491-1350 or visiting [Tell Someone](#)¹⁷ to share your concerns with a professional who can discreetly connect the distressed individual with the proper resources. Rams Take Care of Rams. Reach out and ask for help if you or someone you know is having a difficult time.

4.8 Religious Observances and Class Attendance

CSU has a legal obligation to accommodate students' absences due to religious observances. For such an accommodation, it is the student's responsibility to complete the Religious Accommodation Request Form at the beginning of each semester and submit the request via the Office of the Vice President for Student Affairs website. The Dean of Students will communicate with the instructor regarding the student's absence and the student is instructed to discuss how best to ensure an accommodation related to class conflicts. For religious observances that cannot reasonably be anticipated at the beginning of the semester, students must follow the procedure above as soon as possible after the course conflict is identified. If a student knows that a particular course or section of the course will have multiple conflicts with his or her religious obligations, the student is advised to locate another course section or defer taking the course to a different semester. In the event of a conflict in regards to this policy, individuals may appeal using established CSU procedures. Instructors are advised to provide reasonable accommodations to ensure compliance with CSU's obligations. See more details regarding attendance policies at [the catalog](#)¹⁸.

4.9 Discrimination and Harassment

CSU is committed to providing an environment that respects the dignity and worth of every member of its community. CSU strives to create and maintain a work and study environment that is fair, inclusive, and responsible so that each member of the CSU community is treated with dignity and respect and is rewarded for relevant considerations such as ability and performance. CSU has adopted a comprehensive policy to define the types of conduct that are prohibited and to prevent harm arising from discrimination, harassment, sexual harassment, sexual misconduct, domestic violence, dating violence, stalking, and retaliation. Conduct that is discriminatory or harmful under the policy inhibits the achievement of the stated goals. All students, faculty, staff, and other persons having business with CSU are expected to know and follow this policy.

¹⁵health.colostate.edu/about-counseling-services

¹⁶health.colostate.edu/mental-health-resources/

¹⁷supportandsafety.colostate.edu/tell-someone/

¹⁸catalog.colostate.edu/general-catalog/academic-standards/academic-policies/

Details regarding what is involved in bringing a complaint and the procedures for informal and formal resolution are available from the Office of Support and Safety Assessment for student-to-student behavior and the Office of Equal Opportunity for matters involving non-students such as faculty, staff, affiliates, or visitors and matters involving a student and non-student person. See more details at [the catalog](#)¹⁹.

4.10 Academic Integrity and the Honor Code

This course will adhere to the CSU Academic Integrity Policy as found in the Colorado State University General Catalog and the Student Conduct Code. At a minimum, violations will result in a grading penalty in this course and a report to the Office of Conflict Resolution and Student Conduct Services. See more details at [the catalog](#)²⁰ and [TILT](#)²¹.

¹⁹catalog.colostate.edu/general-catalog/policies/discrimination-harassment/

²⁰catalog.colostate.edu/general-catalog/policies/students-responsibilities/#academic-integrity

²¹tilt.colostate.edu/Integrity/Pledge