“The status quo is unacceptable”

So concluded the Common vision for undergraduate mathematical sciences programs in 2025 project. This project brought together five professional groups from the mathematical sciences: the American Mathematical Association of Two-Year Colleges (AMATYC), the American Mathematical Society (AMS), the American Statistical Association (ASA), the Mathematical Association of America (MAA), and the Society for Industrial and Applied Mathematics (SIAM). Together they produced a devastating critique of contemporary pedagogical practice in the mathematical sciences, and a compelling call to action to do something about it.

The mathematician Paul Lockhard (2009, p. 21) is even more blunt:

Everyone knows that something is wrong. The politicians say, “we need higher standards.” The schools say, “we need more money and equipment.” Educators say one thing, and teachers say another. They are all wrong. The only people who understand what is going on are the ones most often blamed and least often heard: the students. They say “math class is stupid and boring,” and they are right.

That’s why we’re here.
We’re here because we are not satisfied with the status quo, in which¹:

- Each year only about 50 percent of students earn a grade of A, B, or C in college algebra (Ganter & Haver, 2011).
- Women are almost twice as likely as men to choose not to continue beyond Calculus I, even when Calculus II is a requirement for their intended major (Bressoud, 2011).
- Students of color are vastly underrepresented in the cadre of bachelor’s degrees awarded in the mathematical sciences (www.nsf.gov/statistics/nsf07308/content.cfm?pub_id=3633&id=2).

We’re here because we know that we can do better:

- Students in classes with traditional lecturing are 1.5 times more likely to fail than students in classes with “active learning” (Freeman et al., 2014)
- On average, student performance increases by just under half a SD with active learning compared with lecturing (Freeman et al., 2014)
- Students in inquiry-based math courses experience greater gains in understanding, confidence, persistence, and positive attitude about mathematics, as compared to student in classes with traditional lecturing (Laursen, Hassi, Kogan, & Weston, 2014)

Changing the status quo is a moral and ethical imperative. Mathematical literacy is a civil right (Moses & Cobb, 2001). Students deserve better from the mathematical sciences.

Changing the status quo is an existential imperative. Simply put, mathematics needs students (Gutiérrez, 2006). We maintain the status quo at our own peril.

¹ Excerpted and summarized from p. 3 of Saxe, K., & Braddy, L. (2012). A common vision for undergraduate mathematical sciences programs in 2025.
Learning outcomes/course objectives

The main outcome of the course is that participants will **develop as reflective mathematics educators**. Development involves the acquisition of knowledgeable skill, but it’s much bigger than simply knowledge. Development involves **becoming** a member of a community, and thus it affects not simply what we **know**, but also who we **are**. Therefore, development cannot be reduced to an enumerated list of learning outcomes nor can it be standardized across participants.

We develop as members of a community as we participate in the practices of that community. Thus, rather than thinking about the course in terms of **outcomes** to be attained, it is better to think about the course in terms of **practices** to participate in. During the course, participants will:

- Reflect on and discuss philosophies of mathematics, perspectives on learning, and models for teaching college mathematics, with a focus on recent efforts to reform teaching college mathematics as advocated by the AMS, MAA, College Board of Mathematical Sciences, and mathematics education research.
- Participate in teaching practice by:
  - Facilitating classroom activities and reflecting on the experience
  - Develop artifacts of practice, including artifacts that can be used in future teaching, and a coherent teaching philosophy that can be used when applying for academic jobs
- Consider the purposes and uses of multiple types of assessments, and explore ways to use assessments to support learning

## Administrative things

**Class time:** Tues 1:00-3:30 PM

**Location:** MATH 305

**Text:**

1. Collected readings, which will be posted in PDF form on the course website.

**Final exam period:** Thursday May 7, 1:10–3:10 PM
Assignments

Weekly readings and other preparatory activities
In a seminar course, it is vital that you do the preparatory work before class. Often this will consist of reading, but sometimes it will involve engaging in other activity. In general, you should plan to spend about 3 hours per week on the readings and other preparatory activities.

Teaching Experiences
Participants will choose a focal area (e.g., Calculus, Discrete Math, Contemporary Math, Abstract Algebra, etc...) and collaborate with one or two peers to facilitate classroom activities from that content area with the class. Each teaching experience will have a different pedagogical focus. Each will be accompanied with self- and peer-assessment/feedback. We will discuss the expectations for teaching experiences in more detail in class.

Artifacts of practice
Participants will create practical artifacts that can be used in future teaching experiences. We will discuss the expectations for each artifact in class.

Feedback and grading
There are no quantitative grades here. I will provide descriptive feedback on most assignments.

Rather than assigning different grades for different qualities of work, my expectation is that everyone will get an “A.” I will work with each of you to make sure you arrive at “A-quality work.” You will revise your work, possibly multiple times, until you do.

A note on timing
In general, you should plan to spend approximately 3 hours each week outside of class on work for this course. Deadlines are in place to keep everyone on track, but if something is not reasonable for you we can negotiate it.
Policies

**Communicating:** Email is the best way to reach me. UM policy states that I must use your UM email account when I correspond with you. Please email me from your UM account—that makes it easy to follow the policy! Even if you don’t, I still have to reply to your UM account.

**Attendance/participation:** You are preparing for a profession in which timeliness and attendance are strict and non-negotiable. In addition, we will do important activities each day. For these reasons, I expect that you attend every class. Things come up, and I understand that. If you know you are going to miss class, please make arrangements with me before hand. If you miss a class that you didn’t expect to, please contact me as soon as you can so we can arrange a makeup activity.

**Classroom and testing accommodations:** The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you have a disability that adversely affects your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

**Cultural and family leave:** UM has a Cultural and Ceremonial Leave Policy: The official policy is: "Cultural or ceremonial leave allows excused absences for cultural, religious, and ceremonial purposes to meet the student's customs and traditions or to participate in related activities. To receive an authorized absence for a cultural, religious or ceremonial event the student or their advisor (proxy) must submit a formal written request to the instructor. This must include a brief description (with inclusive dates) of the cultural event or ceremony and the importance of the student's attendance or participation. Authorization for the absence is subject to approval by the instructor. Appeals may be made to the Chair, Dean or Provost. The excused absence or leave may not exceed five academic calendar days (not including weekends or holidays). Students remain responsible for completion or make-up of assignments as defined in the syllabus, at the discretion of the instructor.”

This is Fred again. Please know that I understand that you are a human and that you have a life and responsibilities outside of this course. I will work with you to make sure that you can participate in or attend to any out of class responsibility you have.

**Academic honesty:** All students need to be familiar with the Student Conduct Code. You can find it in the “A to Z Index” on the UM home page. All students must practice academic honesty.
Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University.

**Food and housing insecurity**

Any student who faces challenges securing food or housing, and believes that this could affect their performance in this course, is urged to contact any or all of the following campuses resources:

*Food Pantry Program*

UM offers a food pantry that students can access for emergency food. The pantry is open on Tuesdays from 12 to 5 PM and Fridays from 10 AM to 5 PM. The pantry is located in UC 119 (in the former ASUM Childcare offices). Pantry staff operate several satellite food cupboards on campus (including one at Missoula College). For more information about this program, email umpantry@mso.umt.edu, visit the UM Food Pantry website (www.umt.edu/pantry) or contact the pantry on social media (@pantryUm on twitter, @UMPantry on Facebook, um_pantry on Instagram).

*ASUM Renter Center*

The Renter Center has compiled a list of resources (https://medium.com/griz-renter-blog) for UM students at risk of homelessness or food insecurity. Students can schedule an appointment with Renter Center staff to discuss their situation and receive information, support, and referrals.

*TRiO Student Support Services*

TRiO serves UM students who are low-income, first-generation college students or have documented disabilities. TRiO services include a textbook loan program, scholarships and financial aid help, academic advising, coaching, and tutoring. Students can check their eligibility (www.umt.edu/trioss/apply.php) for TRiO services online. If you are comfortable, please come see members of the teaching team. We will do our best to help connect you with additional resources.