We are a community.

We explain, argue, and persuade
We collaborate
We critique
We hold each other accountable

We are mathematicians.

We wonder and ask questions
We create and use models, tools, and strategies to mathematize the world
We are sense-makers
We experience confusion, anxiety, and joy

We are teachers.

We approach pedagogical interactions as teacher-learners
We find the right models, tools, and strategies to help people learn
We seek to foster wonder, perplexity, and understanding
We’re not afraid of a little confusion or anxiety
We treat all learners as people and promote their development as people
About the course

This course is animated by a deceptively simple question:¹

“Who knows mathematics well enough to teach third grade?”

The answer is, very few of us. Teaching is an extraordinarily intellectually demanding profession, and it requires a special kind of knowledge. With respect to math, we call this knowledge mathematical knowledge for teaching, or MKT.

As shown in the graphic below², MKT involves both subject matter knowledge (knowledge about math content) and pedagogical content knowledge (knowledge about teaching math). Both of these are special for teachers. It’s not enough to know math the way a research mathematician might or an engineer might.

Because MKT is special to teaching, this course is especially for teachers.

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Learning outcomes/course objectives

Upon successful completion of this course students will:

Develop as a mathematician and a teacher
1. View mathematics as the human activity of structuring the world
2. Participate with confidence in mathematical activity
3. Become a more-central participant in the community of mathematics teachers

Have subject matter knowledge
4. Understand the meanings and uses of whole numbers, integers, and fractions, as well as representations of those numbers (including place value, decimal [base-10] notation, and fraction notation, all from a units perspective)
5. Understand the meanings of addition, subtraction, multiplication, and division; Understand the connections between these operations, concepts, and procedures—including explaining how standard US algorithms work.
6. Solve problems involving numbers and operations
   - Use models and number-sensible strategies to solve problems
   - Perform U.S. traditional algorithms for operations on whole numbers, fractions, and numbers in decimal notation
   - Explain their reasoning, both verbally and in writing, while solving problems.

Have pedagogical content knowledge
7. Have a working knowledge of how students learn number and operations in formal education
   - Understand the the role of “preformal” models, tools, representations, and strategies in teaching-learning mathematics.
   - Evaluate student work regarding numbers and operations, determine the mathematical reasoning and strategies used, and recognize some common mistakes, including the reasoning that makes these mistakes sensible
   - Formulate feedback and identify instructional activities to further students’ learning
Administrative things

**Class time:** MWF 8:00-8:50

**Location:** LA 235

**Text:** *Mathematics for Elementary School Teachers with Activities (5th Ed.),* by Sybilla Beckman

**Supplies:** You do not have to bring the book to class everyday. Please bring a calculator and/or a laptop, tablet, or smart phone if you can.

**Final exam period:** Wednesday May 6, 10:10–12:10, LA 235

**About the final exam:** We will engage in a summative activity during the University-scheduled time. The final exam schedule is set by the university schedule and the time cannot be changed. Please make your travel arrangement based on the scheduled final exams.

**Help! / Office hours**

Teaching-learning is collaborative endeavor, and seeking and providing help is a joint responsibility that is shared by all members of the community. I will seek to recognize when you need help, and I will do my best to provide you with help as much as I can. You should also seek to recognize when your colleagues need help, and try your best to provide it. Finally, you should seek help for yourself as much as you can.

I schedule my **office hours** so that they are convenient for students in M132. My office hours are:

- Mondays, 9:00 – 10:00 in the lounge outside of the Heart and Soul Café in the LA building (right after class, outside of our classroom)
- Wednesdays, 1:00 - 2:00 in the second-floor study lounge of the education building.

I hope you will join me! You can also **drop by** my office anytime. My office is in the Math building on the oval, Math 201. You can also use this link to **set up a meeting any time** that is convenient for you: [http://www.fapeck.com/meeting](http://www.fapeck.com/meeting).

In addition, **free drop-in tutoring** is available in the Math Learning Center on the oval, in the Math Building room 011.
Assignments

In-class: group work
Teaching and learning are collaborative enterprises, and so is mathematics. Most of our work in class will be collaborative in nature.

Out-of-class: practice, extension, and preparation activities
Practice, extension, and preparation activities include math problems, analyses of student work and other artifacts of teaching practice, and readings with guiding questions. They will be assigned after each class, and should be done before the subsequent class. Plan to spend about 1 hour per class on practice, extension, and preparation activities.

Portfolios
Neither group work, nor practice & extension activities, are graded. At the end of each unit, you will choose the best pieces and assemble these pieces into a portfolio of work that demonstrates your mastery of the unit objectives. Your grade will be based on these portfolios. I will provide detailed instructions for each portfolio when it is assigned.
Long-term projects
There will be two semester-length projects. The first involves mathematical modeling: using the mathematical tools of the course to make sense of the world. The second involves reading and summarizing a teacher-focused book about how students learn number and operation. I will give you more information about these projects during the semester.

Weekly self-assessment
Each week you will complete a brief self-assessment of your participation in mathematical and pedagogical activity for the week.

A note on timing
Math has nothing to do with speed! None of the above will be timed. Deadlines are in place to keep everyone on track, but if they are not reasonable for you, we can negotiate them. You should plan to spend approximately 3-4 hours each week outside of class on work for this course.
Feedback and grading

Mathematics is both an activity that you do and content that you learn. Your grade in this class is based both on what you do (your participation in course activity, 50%), and what you learn (your mastery of mathematical knowledge for teaching, 50%), as described below.

Participation in course activity (Objectives 1-3; 50%)
We develop as people through our participation in activity. In our class, you will develop as a mathematician and a teacher as you participate in mathematical and pedagogical activity. To be an active participant, you should:
(a) be present,
(b) be prepared (by completing out-of-class activities), and
(c) be productively engaged in our course activities and discussions.

Mastery of mathematical knowledge for teaching (Objectives 4-7; 50%)
Rather than accumulating points for “correctness,” your grade will be based on the extent to which you demonstrate mastery on the course objectives for MKT (objectives 4-7). At the end of each unit, you will assemble a portfolio of work that demonstrates your mastery of the unit objectives.

I expect that you will demonstrate mastery of every objective. Portfolios that do not demonstrate appropriate mastery will be returned with feedback, and you will be expected to revise the portfolio and resubmit it, possibly multiple times, until the work in the portfolio demonstrates appropriate mastery.

Final grade
I will determine your course average by weighting your activity score and content score 50% each. Then, your letter grade is assigned based on your course average:

<table>
<thead>
<tr>
<th>Activity score (50%)</th>
<th>Content score (50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>93 - 100%</td>
<td>A</td>
</tr>
<tr>
<td>87 - 89.9%</td>
<td>B+</td>
</tr>
<tr>
<td>80 - 82.9%</td>
<td>B</td>
</tr>
<tr>
<td>77 - 79.9%</td>
<td>C+</td>
</tr>
<tr>
<td>70 - 72.9%</td>
<td>C</td>
</tr>
<tr>
<td>67 - 69.9%</td>
<td>D+</td>
</tr>
<tr>
<td>60 - 62.9%</td>
<td>D</td>
</tr>
<tr>
<td>Below 60%</td>
<td>F</td>
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</tbody>
</table>
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 beforehand. 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.
Grading: You must earn a grade of C- or better in this course to fulfill the requirement in the College of Education. You may change to CR/NC up to the last day of class and you will receive credit with a grade of D- or better. However, if you choose this option the grade cannot be counted toward the College of Education requirement nor the UM graduate requirement.

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.