M132-02 Numbers and Ops for K-8 Teachers (Spring 2020)

CRN 33038

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or my office door for the most recent

Overview

This course is for prospective elementary school teachers. The purpose of this course is to prepare students to be competent in teaching the major concepts and practical skills related to the real number system with the four arithmetic operations. Strategies and instructional activities are used and discussed to provide a linkage between what the prospective teachers study, and what and how they will teach. It provides the opportunity to discuss appropriate activities, strategies and programs in teaching areas related to problem solving, and to the use of whole numbers, rational numbers, and real numbers.

Catalog description: Offered autumn and spring. The study of number and operations for prospective elementary and middle school teachers, including whole numbers, decimals, fractions, percent, integers, operations, numeration systems, and problem solving. 3 credits.

Prerequisites: M 095 or M 115, or ALEKS placement ≥ 4.

Textbook and materials

Required: Beckmann, S., et.al., Mathematics for Elementary Teachers (with activities) (5th ed.). Additional readings are assigned and available via Moodle or handouts, or through holds at the Mansfield Library.

Materials: You may want to keep a journal of key ideas and new concepts that you want to remember for your experience as a teacher. It is well documented that you will “lose” about 80% of what you learn and are exposed to in this class, so capturing important information in a written format will help you recall them later when you’re preparing for your students. Many students may find graph paper useful as well.

Course Requirements

mathematician: someone who studies, teaches, or is an expert in mathematics. (Cambridge Dictionaries Online)

A mathematician, like a painter or poet, is a maker of patterns. If [a mathematician’s] patterns are more permanent than theirs, it is because they are made with ideas.

G.H. Hardy, A Mathematician’s Apology

By virtue of being in this class, we are mathematicians. Compared to others we know in the field, we may not feel we are experts, but to current and future students, we are viewed as such. As a future elementary mathematics expert, it is expected you will be a student of mathematics: learning the intricacies, patterns, and connections of elementary mathematics. As a future teacher of mathematics, it is not enough to know what your students need to know. You are expected to know and be able to articulate:

• where this knowledge derives from
• how this knowledge is used in their future.
• how your students build this knowledge internally.
• what mistakes students make, and what thinking or content errors these mistakes represent.
Course Objectives

To help meet this need for effective teaching knowledge, students successfully completing this course will begin their personal development of a profound understanding of fundamental mathematics by:

1. Developing as a mathematician and teacher with the ability to explain reasoning (both verbally and in writing) while solving problems, and participating with confidence in mathematical activity.

2. Viewing mathematics as the human activity of structuring the world, by demonstrating knowledge of the historical development of number and number systems including contributions from diverse cultures and its use in describing the world around us.

3. Become a more-central participant in the community of mathematics teachers.

4. Develop a meaning of addition, subtraction, multiplication, and division and provide multiple models for whole number operations and their applications.

5. Recognize commutativity, associativity, distributivity, identities, and inverses as properties of operations on a given domain and appreciate that a small set of rules governs all of arithmetic.

6. Recognize the meaning and use of place value in efficiently representing whole numbers and finite decimals, comparing and ordering numbers, and understand the relative magnitude of numbers.

7. Demonstrating proficiency in and understanding of multi-digit computation using standard and alternative/invented algorithms, mental mathematics, and computational estimation. Explain the difference in understanding required for various algorithmic processes.

8. Analyzing integers and rational numbers, their relative size, and how operations with whole numbers extend to integers and rational numbers.

9. Evaluating 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 student learning.

Tentative Schedule

The schedule presented is subject to change as needed to meet the needs of the class and its objectives. It may change upon announcement in class or on Moodle.

Week 1  Why teach math? Begin cleaning out the mental and emotional closets...

Week 2-3  Problem-solving

Week 3-4  What is number?

Week 4  Exam

Week 5-9  Math and Algorithms: Integers, addition, subtraction, and multiplication

Week 9  Exam

Week 10-13  Fractions & Division

Week 13  Exam (Tentative)

Week 14-15  Other topics and additional coverage as needed
**Course Grade**

Your grade will be apportioned and assigned according to the following weights:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Fraction of grade</th>
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</thead>
<tbody>
<tr>
<td>1. Exams (three planned)</td>
<td>4/9</td>
</tr>
<tr>
<td>2. Final Exam (May 4, 8-10 am)</td>
<td>1/6</td>
</tr>
<tr>
<td>3. Class Attendance/Participation/Homework</td>
<td>7/18</td>
</tr>
<tr>
<td>4. Fractions Competency (available around week 10)</td>
<td>Final grade 10% lower if not passed prior to finals week.</td>
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Attending and participating in all classes and timely completion of all assignments is the *minimum* expectation for this class, and at best shows “average” student performance (a grade of “C”). The instructor reserves the right to consider the student’s entire “body of evidence” of work when assigning final course grades.

**Exams**

We have three exams scheduled in this course plus a comprehensive final project presentation. Due to the interconnected nature of mathematics, all exams may have a comprehensive focus. Exams may be in any format deemed appropriate to the content and nature of the class, including written or oral, individual or group formats.

The **Final Exam** presentations for the class are scheduled in LA235 for Monday, May 4 from 8-10 am. We may also use the last day of class depending on time requirements. Scheduling will be announced in class.

**Fractions Competency**

Fractions are one of the least understood areas among American elementary teachers, and the source of some of the most frustration from students and teachers alike. To begin to address this, students are expected to pass a fractions competency exam. It will cover basic operations on fraction (including mixed numbers), including estimation and representation.

Failure to pass the competency exam with a score of 9/10 or higher will have their final grade in the class lowered by 10%. This exam will be administered through the Math Learning Center (basement of Math Building) at your convenience during their regular hours of operation, and is typically made available around week 10. You may have one attempt per day until it is passed through the last day of regular class.

**Class Attendance/Participation/Homework**

Mathematics is a community activity. This class will have multiple in-class individual and group activities, and you are expected to participate fully. Attendance will be kept to monitor presence, level, and quality of activity. You are responsible for all assignments and tasks in class, whether you are in attendance or not. After completing these activities, you will be expected to answer questions and reflect on your experience. If you are not in attendance, your reflection on the experience will not be accepted.

Additional homework may be assigned as an extension or preparation for topics covered in class, as a method to engage students with interesting material that is not covered in class, and as preparation for exams. It may be assessed by collecting and grading, as completion grades, or through Moodle or in-class quizzes. I will answer questions and provide solutions to homework as requested.

**Classroom behavior**

All students in this course are expected to be respectful of other participants, the instructor, and of the learning environment. In the support of free and open academic inquiry, civil behavior is required. This includes but is not limited to:

- restricting comments to current topics in the course
- refraining from disparaging or insulting remarks directed at or about others (present or not)
- silencing cell phones and other extraneous electronic devices
- limiting comments and conversations with classmates to a very quiet minimum
As a general rule, if the behavior will add to the learning environment, it is acceptable. If it disrupts the learning environment, it is not. Students are expected to be well-motivated and constructive in their pursuit of learning in the instructional situation. Expected student conduct is outlined in the Student Code of Conduct.

**Notices and Disclaimers**

**Class Communication**

Outside of regular class time, all communication with students as a group or individually will be through your university email account or Moodle. Be sure and check these accounts regularly.

**Important dates**

- **February 3**  Last day to drop the course without instructor permission using Cyberbear.
- **March 24**  Last day to drop with “W” on transcript or change credit options with instructor and advisor approval.
- **May 1**  Last day to drop with “WP” or “WF” on transcript or change credit options with instructor, advisor and Dean approval. Last day of spring instruction.

**Passing credit**

You must earn a C- or better in this course to pass the requirement in the School of Education. You may change to Credit/No Credit up the last day of the class. Credit will be awarded to students earning a D- or better. However, if you choose this option the grade cannot be counted towards the School of Education requirement nor the University of Montana graduation requirement.

**Access and Accommodation**

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors and Disability Services for Students (DSS). If you think that you may have a disability adversely affecting you academic performance, and you have not already registered with DSS, please contact DSS in Lommassen 154. I will work with you and DSS to provide an appropriate accommodation.

**Copyright and Fair-Use**

Materials used in connection with this course may be subject to copyright protection under Title 17 of the United States Code. Under certain Fair Use circumstances specified by law, copies may be made for private study, scholarship, or research. Electronic copies should not be shared with unauthorized users. If a user fails to comply with Fair Use restrictions, that user may be liable for copyright infringement.

**Academic Dishonesty**

Dishonesty includes plagiarism, cheating and any conscious act by a student that gives him or her undue advantage over fellow students. Plagiarism is copying or using the ideas of another without giving proper credit through the use of quotation marks, footnotes, or other forms of reference. Cheating involves making unauthorized use of answers to examinations, tests, quizzes, in-class work, or homework assignments, as well as copying from fellow students or submitting work that has been done by someone else. Taking photos of tests and/or texting information from the test is also considered cheating.

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. All students need to be familiar with the Student Conduct Code. The Code is available for review online at http://life.umt.edu/vpsa/student_conduct.php
Safety

Please note the evacuation plan posted in this college classroom in the event of fire, tornado, or other disaster. If you see other hazards, please let us know. Additional information regarding UM’s safety policies can be found in the university catalog.

Basic Needs

Here are some information in case you or another student you know faces challenges securing food or housing. There are some campus resources that might be helpful:

Food Pantry Program  UM offers a food pantry that students can access for emergency food. The pantry is open on Tuesdays from 9 to 2, on Fridays from 10-5. 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 pantry’s website (https://www.umt.edu/uc/food-pantry/default.php) 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 for UM students at risk of homelessness or food insecurity here: http://www.umt.edu/asum/agencies/renter-center/default.php and here: https://medium.com/griz-renter-blog. 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 for TRiO services online here: http://www.umt.edu/triosss/apply.php#Eligibility.

Disclaimer

Information contained in this syllabus was, to the best knowledge of the instructor, considered correct and complete when distributed for use at the beginning of the class. However, this syllabus should not be considered a contract between University of Montana and the student. The instructor reserves the right, acting within the policies and procedures of UM, to make changes in courses content or instructional technique without notice or obligation. If extenuating circumstances exist in a particular student’s situation the instructor reserves the right to make modifications based on the needs of individual students, in accordance with university policy.