

Northern Michigan University
Mathematics and Computer Science Department
Mathematics for the Elementary School Teacher I
MA 150-01 (80408) MWRF 10:00 – 10:50, WS 3806

Instructor: Dr. Carol Bell

Office: Jamrich 2212

Office Phone: (906) 227-1603

email: cbell@nmu.edu

Office Hours: MWRF 11:00 – 12:00, 2:00-3:00, or by appointment

***"Walk-in's" are welcome as long as I do not have a prior commitment. E-mail is a good way to contact me to ask questions or voice your concerns related to the class.

Prerequisites: A grade of "C" or better in MA 100 or equivalent recommendation on the mathematics placement exam.

Course Description: This course is designed to examine elementary school mathematics from an advanced standpoint. The emphasis is on the development of the system of real numbers and the language, models, concepts, and operations associated with it. Quantitative thinking skills are developed through applications and problem solving situations. In this course, the students will:

- A. compare the characteristics of different numeration systems from a historical perspective;
- B. examine the structure and properties of whole numbers, integers, rational numbers, and real numbers;
- C. develop concrete and conceptual models for each of the operations and their algorithms;
- D. focus on problem solving and a variety of strategies for solving problems;
- E. develop skills for applying number theory to elementary school mathematics;
- F. use mental computation and estimation in appropriate situations;
- G. use technology as a tool in problem solving;
- H. extend the process of mathematical proof through logical, intuitive reasoning.

Text and Other Requirements:

- *Mathematics for Elementary School Teachers* (ISBN-13: 978-0-321-44804-0), Fourth Edition, by O'Daffer, Charles, Cooney, Dossey, & Schielack; Pearson Addison -Wesley, 2008.
- A scientific calculator may be useful for solving some of the problems. No cell phone calculators.
- A stapler for assignments that have more than one page.

Classroom Laptop and Cell Phone Use:

Refrain from using your laptop for instant messaging, e-mailing, surfing the Internet, playing games, writing papers, doing homework, etc. during class time. Acceptable uses of your laptop include taking notes and working on assigned in-class activities, projects, and discussions that may be enhanced by laptop use. It is easy for your laptop to become a distraction to you and to those around you, including me. If you use your laptop during class, you will be expected to email me the notes you typed in class at the end of the class period (I will not ask for them but will keep records of those who do/do not). Cell phones should never be used during class time.

Course Goals: You will develop more competence with respect to the abilities articulated in the program standards outlined in the *Principles and Standards for School Mathematics* published by the National Council of Teachers of Mathematics. That is:

- **Mathematical problem solving:** You will become a more powerful and more confident problem-solver.

- **Mathematical reasoning and proof:** Your ability to use reasoning – deductive, inductive, and intuitive – will grow, and you will be able to explain your solution paths.
- **Mathematical communication:** You will appreciate the role of discussion in learning mathematics, and you will appreciate the value of vocabulary and notation as tools, which makes communication easier.
- **Mathematical connections:** You will be more aware of connections between various mathematical topics and of connections between mathematics and other areas.
- **Mathematical representation:** You will increase your ability to represent problems in effective ways.

There are three important levels of mathematics competency required for you to become an excellent elementary mathematics teacher. The three levels are identified below.

Level 1 – Mechanical Ability (Can you **do** it?)

For example, can you solve this proportion for the missing term? $\frac{x}{13} = \frac{1}{2}$

Level 2 – Comprehension (Do you know **why**?)

For example, would the previous proportion help you solve the problem of how many female ducks there are in a flock of 13 ducks if you know that 1 out of every 2 ducks in this flock is a female?

Level 3 – Communication (Can you **explain** it to your students?)

For example, do you know the rules and vocabulary, and can you apply them accurately to teach someone to solve the word problem above who does not already know how?

Learning Outcomes:

Upon successful completion of this course, a student should be able to:

1. compare the characteristics of different numeration systems;
2. learn the structure and properties of whole numbers, integers, rational numbers, and real numbers;
3. develop concrete and conceptual models for each of the operations and their algorithms;
4. use different problem-solving strategies to solve problems;
5. develop skills for applying number theory to elementary school mathematics;
6. use mental computation and estimation in appropriate situations;
7. apply the process of mathematical proof through logical, intuitive reasoning.

Evaluation of these learning outcomes will be done through assignments and exams.

Assessment Format: Described below are the components on which you will be assessed throughout the semester. Hard copies of all assignments will be handed out in class, but you can also download an electronic version from EduCat.

- **Assignments (40%):** Assignments from the concepts discussed in class will be given regularly. Most assignments will emphasize mathematical thinking (conceptual understanding) and writing. All work should be neatly written, clear, and organized. Those that are not will be disregarded and not graded. Paper pulled from a spiral notebook must have jagged edges removed. Be sure to staple your pages together – no folding down corners, no paper clips, and no paper-made staples. The instructor reserves the right to make you re-submit your written work, if it is not legible and organized. Past-due assignments will be penalized 50% and will be accepted only up to two class periods after the original due date.

- **Examinations (60%):** All exams will consist of questions from the material discussed in class. A university-approved excuse is required for rescheduling any exam. Make-up exams are not given so failure to notify me of your absence prior to the exam will result in a score of 0. Half the raw score on the final exam may be substituted for the lowest exam score. Students with disabilities should work with Disability Services to arrange for taking exams. The final exam date and time are noted below and are also available online.

Monday, December 5, 10:00 – 11:50

Grading Scale (%): Your course grade will be based on the weights listed above under the Assessment Format. Percentages and corresponding grades are listed below.

100 – 95.0: A	86.4 – 82.5: B	76.4 – 72.5: C	66.4 – 62.5: D
94.9 – 89.5: A-	82.4 – 79.5: B-	72.4 – 69.5: C-	62.4 – 59.5: D-
89.4 – 86.5: B+	79.4 – 76.5: C+	69.4 – 66.5: D+	59.4 – 0: E

Attendance: You are strongly encouraged to attend each class. The objective is to increase your mathematics knowledge base and that is very difficult to do if you are not attending and participating. Much of what you learn will evolve from in-class explorations, experiences, and discussions. Each student, present or not, is responsible for all directives announced in class.

NMU's Non-Discrimination Statement

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Anyone having civil rights inquiries may contact the Equal Opportunity Office, 502 Cohodas Hall, telephone number 906-227-2420.

Disability Services

If you have a need for disability-related accommodations or services, please inform the Coordinator of Disability Services in the Dean of Students Office at 2001 C. B. Hedgecock Building (227-1700 or disserv@nmu.edu). Reasonable and effective accommodations and services will be provided to students if requests are made in a timely manner, with appropriate documentation, in accordance with federal, state, and University guidelines.

Important Deadlines

- Last day to drop with 90% refund (no grade): Thursday, September 1, 5:00pm
- Last day to drop with "W" grade (no refund): Friday, October 28, 5:00pm

There is a lot of evidence that a very beneficial way of learning mathematics is to learn to talk about mathematics. Study groups are a great way to learn mathematics! Collaboration on assignments is suggested and recommended.