

Northern Michigan University
Mathematics and Computer Science Department
Mathematics for the Elementary School Teacher II
MA 151-01 (80444) MWRF 10:00 – 10:50, WS 3806

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Office Hours: MWRF 11:00 – 12:00, 1:00-2:00, 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 150 (Mathematics for the Elementary School Teacher I).

Course Description: This second mathematics course for prospective elementary teachers is designed to examine the areas of probability, statistics, geometry, and logical reasoning. Geometry is developed informally through identifying and characterizing, drawing, constructing, and measuring shapes. Transformational geometry and proofs, both informal and formal, are also included in the course.

In this course the students will:

- A. study experimental probability and develop the concepts of theoretical probability and simulation;
- B. make and use various statistical tables and graphs to describe and summarize data;
- C. examine the clustering and dispersion of data and relate these to the "normal" distribution;
- D. study plane and three-dimensional figures and their properties;
- E. develop logical arguments and formal proof through inductive and deductive reasoning;
- F. develop the concept of congruence and similarity;
- G. use and analyze transformations;
- H. understand the metric system and develop skill in using it;
- I. concretely examine perimeter and area and to solve problems involving them;
- J. concretely examine the concepts of surface area and volume of three-dimensional object and solve problems involving the concepts;
- K. develop the Pythagorean relationship and the distance and midpoint formulas;
- L. solve problems in probability, statistics and geometry.

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 or graphing calculator for solving some of the problems.
- A protractor and compass.
- 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. Identify and categorize plane and three - dimensional figures, based on their properties.
2. Apply logical arguments and formal proofs through the use of inductive and deductive reasoning.
3. Use the definitions of congruency and similarity to compare and contrast pairs of objects.
4. Combine and apply different types of transformations to a geometric figure and predict the result.
5. Develop proficiency in using both the metric and English systems of measurement, and be able to convert between the two.
6. Concretely examine perimeter and area and solve problems involving these properties.
7. Concretely examine the concepts of surface area and volume of three-dimensional objects and solve problems involving them
8. Use the Pythagorean Theorem discovered in the study of right triangles to develop the distance and midpoint formulas. Apply these formulas to find the lengths of objects superimposed on a coordinate system.
9. Demonstrate an understanding of experimental probability and apply the concepts of theoretical probability and simulation to the design and solution of probability problems.

10. Make and use various statistical graphs to describe and summarize data.
11. Examine the clustering and dispersion of data and relate these to the “normal” distribution.
12. Solve problems in probability and statistics.

Evaluation of these learning outcomes will be done through assignments, quizzes, 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.

- **Problem Sets (20%):** Exercises from the concepts discussed in class will be assigned regularly. 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.
- **Projects (30%):** Throughout the semester you will be given several projects that emphasize mathematical thinking (conceptual understanding) and writing.
- **Quizzes (10%):** All quizzes will consist of questions based on concepts discussed in class, and often consist of questions from assigned problems in the text. Quizzes will be unannounced. There are no make-ups for the quizzes. Your lowest quiz grade will be dropped.
- **Examinations (40%):** All exams will consist of questions from the material discussed in class. A university-approved excuse is a 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. The final exam date and time are noted below and are also available online.
Section 01 (10:00 – 10:50 class) Wednesday, December 9, 10:00 – 11:50

Testing Room Policy for Students:

1. Testing room (JXJ 2201) hours are strictly Monday-Friday from 8:00 am - 12:00 pm and 1:00 pm - 5:00 pm. Your exams will be taken away at 12:00 pm and 5:00 pm, whether you are finished or not. If there is a 2 hour time limit, you need to come at least 2 hours prior to closing for lunch and/or the day. Exams will not be given to you if you come later than that.
2. The testing room is for make-up exams only. You must have a legitimate reason as to why you cannot make the regularly scheduled exam.
3. Students with disabilities should work with the instructor and Disability Services to arrange for taking exams.

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

Northern Michigan University does not unlawfully discriminate on the basis of race, color, religion, sex, national origin, age, height, weight, marital status, familial status, handicap/disability, sexual orientation, or veteran status in employment or the provision of services, and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford individuals with disabilities an equal opportunity to participate in all programs and activities.

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. Hedgcock 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 100% refund (No grade): Tuesday, September 1, 5:00pm
- Last day to drop with "W" grade: Friday, October 30, 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.