

# **MATH 1500: Number Concepts for Elementary/Middle School Teachers**

Tuesday/Thursday 10 – 11:40 a.m., Spring 2012

**Instructor:** Dr. Theresa J. Grant

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## **Office Hours (available to ALL Math 1500 students):**

Theresa Grant (4427 Everett Tower): Wednesdays 10:45 – 11:45 a.m. & Thursdays 12 – 1 p.m.

Jane-Jane Lo (4425 Everett Tower): Tuesdays 9 – 10 a.m. & Wednesdays 2:30 – 3:30 p.m.

Sara Main (4410 Everett Tower): Mondays 10:45 – 11:45 a.m. & Tuesdays 4 – 5 p.m.

Instructors are also available by appointment.

## **Overview and Course Description**

This course is designed to provide you with opportunities to develop the mathematical understandings crucial to the teaching of number concepts in the elementary grades. As future teachers you need to have a deeper understanding of the mathematical procedures and rules that are central to elementary mathematics in order to more effectively help children learn mathematics with understanding. Thus you will revisit mathematical ideas from the school curriculum with an eye toward understanding those ideas as teachers. Many of the activities are based on activities from innovative elementary and middle school curricula. Learning and teaching with innovative materials is intended to help you to enrich your conceptions of what mathematical understanding entails, and what it means to learn and teach mathematics for understanding.

## **Course Format and Participation**

This is a laboratory-oriented course in which you will often investigate mathematics collectively (with a partner, in small groups, or whole class). Whole class discussions of different solutions to a problem and the mathematics underlying these solutions will play a central role in this course. Though these discussions will take different forms on different occasions, it will always be the case that your ideas, strategies and questions will guide the discussion. Thus, as a class, we will examine each other's thinking and come to a better understanding of the mathematics by doing so. Given the student-centered nature of this course, attendance and participation is of the utmost importance. [See attendance policy on the next page.] Satisfactory participation means that you are willing to share your thought process, questions and solutions with the class (even when you don't think you have "the right answer"), that you support your classmates by listening and thoughtfully reacting to their ideas, and that you attempt all of the homework before class so that you can actively participate in our discussions. Consistent and productive participation in class (see rubric on last page) will be considered in determining final grades in borderline cases assuming the student has a solid passing grade in the class.

## **Course Prerequisites**

- Students must have successfully completed Math 1100 or achieved a satisfactory score on an appropriate placement exam (ACT, SAT, WMU placement exam). Those not meeting the course prerequisites will be automatically dropped from the course by the Mathematics Department.
- Enrollment is limited to those whose curricula include either Elementary or Special Education.

## **Required Course Materials (available at the bookstore)**

- **NEW Coursepack** for Math 1500 available at the bookstore [Coursepack# **WMSP12-175**].

NOTE: If there are no coursepacks at the Bernhard Center bookstore you must:

- (1) Fill out an MTO (Made To Order) form at the Information Desk of the bookstore,
- (2) PAY for the order at that time, and then (3) pick it up after 10:00 a.m. the next day.

**Accommodations**

Any student with a documented disability (e.g., physical, learning, psychiatric, vision, hearing, etc.) who needs to arrange reasonable accommodations must contact the professor and the appropriate Disability Services office at the beginning of the semester. If you believe you need some type of accommodation due to a disability and haven't yet talked with the Disabled Services for Students (DSS) office, their contact information: 2210 Wilbur Ave (across from Rood before the Health Center, above the Day Care Center); 269-387-2116; www.wmich.edu/disabilityservices

**Policy on Incompletes and Hardship Withdrawals**

Three conditions must be met for an incomplete: (1) you must have completed most of the coursework; (2) your current grade must be a DC or better; and (3) circumstances beyond your control prevent the completion of the coursework on time. All incomplete grades must be approved by the Chair of the Mathematics Department. Please note a major change in WMU policy on hardship withdrawals: <http://www.wmich.edu/wmu/news/2011/06/037.html>

**Academic Integrity**

You are responsible for making yourself aware of and understanding the policies and procedures in the Undergraduate and Graduate Catalogs that pertain to Academic Honesty. These policies include cheating, fabrication, falsification and forgery, multiple submission, plagiarism, complicity and computer misuse. [The policies can be found at <http://catalog.wmich.edu> under Academic Policies, Student Rights and Responsibilities.] If there is reason to believe you have been involved in academic dishonesty, you will be referred to the Office of Student Conduct. You will be given the opportunity to review the charge(s). If you believe you are not responsible, you will have the opportunity for a hearing. You should consult with your instructor if you are uncertain about an issue of academic honesty prior to the submission of an assignment or test.

**E-mail Policy**

The only email address that I will use to communicate with you is the one associated with a BroncoNet ID. You can access this email account or get instructions for obtaining a BroncoNet ID at GoWMU.wmich.edu. [Typical form of account name: [firstname.middlename.lastname@wmich.edu](mailto:firstname.middlename.lastname@wmich.edu)

**Radio Devices:** ALL radio devices (cellphones, i-Pods, MP3 players, laptops, etc.) must be turned OFF during classes and exams. Violation of this policy during an exam is considered cheating.

**Grading Policy** If all course requirements are met, grades will be assigned according to the scale:

93 – 100%	A	77 – 81%	CB	60% - 65%	D
88 – 92%	BA	71 – 76%	C	Below 60%	E
82 – 87%	B	66% - 70%	DC		

NOTES: You must attain at least a C (71% or higher) in this course in order to take Math 1510 and Math 2650. If you intend to pursue the Elementary Mathematics Minor, you must attain at least a B (82% or higher) in all elementary mathematics courses: Math 1500, 1510, 2650 & 3520.

**Course Requirements**

The following is a tentative outline of the required graded assignments and their weights:

- Exams ≈ 40% of final grade
- Comprehensive Final ≈ 30% of final grade
- Other Assignments ≈ 30% of final grade  
(e.g. reading reflections, homework, quizzes, etc.)

### Attendance Policy & Related Responsibilities

As much of the course content is presented in a small-group, problem-solving format, daily attendance is required. Not only do excessive absences suggest a lack of professionalism and commitment, but they also guarantee that you will not attain the objectives of this course. Your final grade will be lowered by one letter if you have more than two absences, excused or non-excused. If you have excessive absences (more than 4 for the semester), you will not receive higher than a C regardless of your performance on assignments and exams. [Exceptions are made in rare circumstances.] Attendance will be taken at the beginning of class. If you are late, or need to leave early, it is your responsibility to notify me. If you arrive late or leave early more than twice, each tardy or early leave will count as half an absence.

#### In the event that you must be absent from class, it is your responsibility to:

- 1) let me know before the missed section (or soon after), either by phone or email;
- 2) find out if homework was collected, and if so, turn in ASAP (see Assignment section below)
- 3) obtain the notes and homework assignment from a peer;
- 4) review those notes and complete the homework;
- 5) after you have reviewed the notes and worked on homework, you should see me to discuss any questions you have about the material.

### Course Notebook

We recommend that you organize your work for this course in a notebook (e.g. one-inch three-ring binder) that includes the following sections: 1) In-class & Post-class Notes, 2) Homework, and 3) Reading Notes and Reflections. Your aim should be to make your notebook into a resource that will serve you over time. Items within your notebook will be assessed through various means. Therefore, it is critical to always bring your notebook to class with you, to keep up on your daily work and to seek help when you don't understand an assignment. Here are suggestions for each section of your notebook.

**In-class & Post-class Notes:** It is not uncommon for students to have difficulty taking notes on the important points raised during class discussions. For this reason **we strongly recommend that you take at least 10 minutes after each class to capture important mathematical ideas that have been discussed during class.** This will help to solidify your understanding, and highlight areas/issues about which you still have questions.

**Homework:** In general, we did not provide enough room for you to do the homework on the coursepack pages. Therefore, it is recommended that you copy each problem into your notebook before solving the problem.

**Reading Notes:** Your notes on readings should include a minimum of 3-5 main points from each reading, along with whatever explanation or examples necessary to make these notes useful. For all readings, be sure to indicate the page numbers and book or unit where the readings can be found. On occasion you may be asked to write a reflection on a particular question or on a group of readings. These reflections should also be kept in this section.

### Assignments (Homework, Reading Reflections, etc.)

All work will be submitted at the **beginning** of the class period on which it is due. **Any work not submitted at that time is considered late and will not receive full credit.** An assignment will be accepted late with a penalty of a 10% reduction for each 24-hour period it is late, *provided* that the assignment has not already been discussed in class or returned to the class.

### Quizzes and Exams

Quizzes cannot be made up. Make-up exams will only be given under extreme and unavoidable circumstances, and must be taken before graded exams are returned to the rest of the class.

## Tentative Daily Schedule

DATE	Homework DUE (may be collected)
January 10	<b>Bring Coursepack to Class</b>
12	<b>Read:</b> <i>Teaching Children Mathematics (CP 129 – 139)</i> <b>WN-1:</b> Reflecting on Class & the Reading / Renaming Numbers <b>WN-2:</b> Exploring Odd + Odd = Even
17	<b>Read:</b> <i>Developing Mathematical Arguments, pt 1 (CP 140 – 146)</i> <b>Read:</b> <i>How Many Steps to 10,000? (CP 147 – 148)</i> <b>WN-3:</b> Generating Diagrams to Solve Problems
19	<b>Read:</b> <i>Subtraction Glossary</i> <b>WN-4:</b> Exploring the Number Line <b>WN-5:</b> Exploring Stories and Diagrams
24	<b>Read:</b> <i>Reasoning and Proof in Math, Part 1 (CP 149 – 151)</i> <b>WN-6:</b> Finishing Students' Subtraction Strategies <b>WN-7:</b> Subtraction Strategies
26	<b>Read:</b> <i>Helping Students Develop Representation-Based Proof and Developing Teachers' Computational Fluency (CP 152 – 155 &amp; 156 – 160)</i> <b>WN-8</b> Using an Estimate as a Starter <b>WN-9</b> Exploring Addition
31	<b>WN-10:</b> Equivalent Expressions <b>Read:</b> <i>Images of Multiplication (CP 162 – 163)</i> <b>WN-12</b> Exploring Multiplication Stories and Diagrams <b>Read:</b> <i>CP-101: Integer in Two Ways</i> <b>CP 102:</b> Integer in Two Ways #3
February 2	<b>Glossary Entry for Multiplication:</b> read and complete <b>Read:</b> <i>Multiplying by Multiples of Ten (CP 164)</i> <b>WN-14:</b> Multiplication Strategies <b>CP 103:</b> Integer in Two Ways #4
7	<b>Read:</b> <i>Reasoning and Proof in Mathematics, Part 2 (CP 165 – 168)</i> <b>WN-17</b> Equivalent Expressions
9	<b>Read:</b> <i>Two Kinds of Division; and The Relationship Between Multiplication &amp; Division (CP 169 – 171)</i> <b>Glossary Entry for Division:</b> read and complete <b>WN-19</b> Exploring Division
14	<b>Read:</b> <i>What Do You Do with the Remainders? (CP 172)</i> <b>WN-22</b> More Practice with Division <b>CP 104:</b> Integer in Two Ways #7
16	<b>Handout:</b> Stories & Diagrams <b>CP 105:</b> Integer in Two Ways #8
21	<b>Prepare for EXAM 1</b>

23	<b>FR-1:</b> Fractions on the Number Line <b>Read:</b> CP 106 & 107, <i>Fraction Balance (Directions)</i> <b>CP 108:</b> Fraction Balances #1
28	<b>Read:</b> <i>Keeping Track of the Whole (CP 173 – 174)</i> <b>FR-3:</b> Exploring Fractions <b>CP 109 &amp; 110:</b> Fraction Balances #3 & 6
March 1	<b>FR-5:</b> Using Diagrams to Think About Fractions <b>FR-6:</b> What happens when you change the numbers?
13	<b>Read:</b> <i>Creating, Naming and Justifying Fractions, pt. 1 (CP 175 – 179)</i> <b>Fraction Glossary:</b> read and complete <b>FR-8:</b> Justifying Fractions <b>FR-9:</b> Fraction Comparison Extensions
15	<b>Read:</b> <i>Activities 7–9; Strategies for Comparing Fractions (CP 180 – 185)</i> <b>FR-11:</b> More Approaches to Comparing Fractions <b>FR-12:</b> Reasoning for Fraction Addition & Subtraction
20	<b>FR-13</b> Fraction Computation
22	<b>FR-15</b> Reasoning w/ Fractions in Context <b>FR-16</b> Exploring Stories & Diagrams
27	<b>Read:</b> <i>Creating, Naming and Justifying Fractions, pt. 2 (CP 186 – 188)</i> <b>FR-18</b> Operating with Fractions
29	<b>FR-20</b> Unfinished Student Division Strategies
April 3	<b>Prepare for EXAM 2</b>
5	<b>DN-1</b> Fraction Representations and Relationships <b>Read:</b> CP 117 – 119: <i>Decimal Two Ways (Directions)</i> <b>CP 120:</b> Decimal Two Ways #1
10	<b>Read:</b> <i>Extending Place Value to Thousandths and Beyond (CP 189 – 190)</i> <b>DN-2</b> Exploring Decimals <b>CP 121, 122:</b> Decimal Two Ways #2 & #3
12	<b>DN-3</b> Complete Table, Generate Patterns & Conjectures <b>DN-4</b> Finding and Ordering Decimals <b>CP 123:</b> Decimal Two Ways #5
17	<b>Read:</b> <i>Finding Decimal Equivalents of Fractions by Division; and Connecting Fractions &amp; Decimals (CP 191 – 194)</i> <b>DN-6</b> What Happens When You Change Places?
19	<b>DN-7</b> Related Decimal Problems <b>CP 124, 125:</b> Decimal Two Ways #6 & #7
<b>FINAL EXAM: Tuesday, April 24<sup>th</sup> 10:15 a.m. – 12:15 p.m.</b>	

## Class Participation Rubric

Class participation will be informally assessed on a continuing basis. Class participation grades will be based on participation in both small group and whole group settings.

A	<p><b><i>Contributing to Others' Learning</i></b></p> <p>This is the goal of the class. This does NOT mean telling or showing someone else how to do something. Sometimes it means sharing your thinking about the mathematics so that others can analyze and learn from it. Always it means listening carefully to what others are saying, connecting what you hear to your own thinking, and asking questions that will help everyone involved better understand the mathematics. The expectations for receiving this grade will increase as the semester goes on. That is, it is assumed that these are skills that you are learning so in the beginning attempts at doing this will be sufficient to earn the grade. As you learn more about student thinking and develop these skills, it will require competence in them to earn the A.</p>
B	<p><b><i>Contributing to One's Own Learning</i></b></p> <p>Here you are clearly engaged in learning the mathematics, but haven't moved outside yourself to interact well with others. It generally means doing quality work, but not being willing to share your thinking with others or not showing interest in making sense of their thinking. In the context of whole class discussion, it would mean listening and learning, but not sharing your ideas or observations with the class.</p>
C	<p><b><i>Getting By</i></b></p> <p>This involves showing up, minding your own business, and doing what you are told.</p>
D	<p><b><i>Interfering with Learning of Self or Others</i></b></p> <p>There are various ways one can do this; the most obvious are distracting group members from the task at hand or being belligerent about what one is asked to do. More subtle ways include implying someone is stupid because they don't understand a problem or telling someone how to do a problem and thus undercutting their opportunity to figure it out for themselves.</p>
F	<p><b><i>Not there</i></b></p> <p>This includes not being there physically and/or mentally. Note that whenever you are absent, it is your responsibility to make up the work, preferably <u>before</u> the next class so that you are able to participate in class. See syllabus for responsibilities associated with missing class.</p>