

# MATH 535 Number and Number Sense Summer, 2014

## *Instructors:*

Dana Johnson    David Lutzer    Margie Mason    George Rublein    Eric Shippee  
dtjohn@wm.edu    djlutz@wm.edu    mmmaso@wm.edu    gtrubl@wm.edu    ewship@wm.edu

## *Instructional Assistant:*

Kathryn Brewer  
kabrewer@email.wm.edu

## *Overview*

The goal of this course is to provide teachers with the content knowledge and pedagogical content knowledge needed to foster the development of number and number sense throughout the primary grade levels. The key components of number and number sense include deep understanding of and proficiency with whole numbers and fractions. In addition, an awareness of the uses of numbers in the world around us, a good sense of approximation, estimation, and magnitude, the concept of numeration, and an understanding of comparisons and equivalence of different representations and forms of numbers will be included.

## *Course Outline*

### A. Problem-Solving Strategies and Mathematical Reasoning

1. Polya's Taxonomy
2. Heuristics
3. Using Estimation

### B. Whole Numbers, Fractions, Decimals, and Percents

1. Whole Numbers: Properties
2. Estimating and Rounding
3. Factors, Primes, and Composites
4. Fractions: Meanings, Models, and Operations
5. Least Common Multiple and Greatest Common Factor
6. Percents
7. Equivalent Relationships Among Fractions, Decimals, and Percents
8. Numerical Expressions and Order of Operations
9. Place Value
10. Powers of 10

### C. Other Topics

1. Using Signed Numbers
2. Comparing and Ordering Signed numbers
3. Operations with Signed Numbers
4. Squares
5. Square Roots and Other Irrational Numbers
6. Sets of Numbers and Number Systems

## **Student Requirements:**

- Attend all classes and actively participate in class activities
- Complete written assignments
- Answer a variety of questions on the pre/post test and final examination
- Conduct a Lesson Study based on Number and Number Sense topics each semester. The details may be found near the end of this syllabus. A first draft of the lesson for your Fall Lesson Study should be included in your portfolio.
- Compile a Portfolio (due August 1, 2014)
- Do a presentation at the fall conference on October 21, 2014, based on something you learned in MATH 535 or EDUC V63.
- Provide a final self-evaluation and reflection.

**Course Assignments/Activities:**

All written assignments should demonstrate professionalism in quality, organization, and knowledge of subject matter. In order to ensure that the work is free of spelling, grammatical, and typographical errors, proofread your work prior to submission.

<u>Assignments</u>	<u>Points</u>
A. Attendance and participation (10 pts / day + final)	90 points
B. Daily Homework (10 points / day)	80 points
C. Examination	100 points
D. 2 Lesson Studies (one each semester)	100 points
E. Conference Presentation, handout, & Reflection	30 points
F. Final Reflection	10 points
G. Portfolio (joint for MATH 535 & EDUC V63)	15 points
<b>TOTAL</b>	425 points

Letter Grade	Percent
A	94 -100
A -	90 - 93
B+	88 - 89
B	84 - 87
B -	80 - 83
C+	78 - 79
C	74 - 77
C -	70 - 73
D+	68 - 69
D	64 - 67
D -	60 - 63
F	<60

## Portfolio

You should submit a portfolio that represents a sample of what you have learned in MATH 535. This portfolio is due electronically (through email to [mmaso@wm.edu](mailto:mmmaso@wm.edu) and [dtjohn@wm.edu](mailto:dtjohn@wm.edu) or on a CD) by Friday, August 1, 2014. If a CD is used, hand deliver or mail to Tidewater Team, College of William and Mary, School of Education, P.O. Box 8795, Williamsburg VA 23187-8795.

It should contain:

- A Table of Contents
- Artifact Introduction page (one per artifact)
- Artifacts
- Reflection

### Artifact Introduction Page

For each piece/artifact selected for inclusion:

1. Label which Mathematics Specialist Competency/Competencies\* it represents
2. Describe what it is and why you chose it (e.g., what is special about it or what quality of being a good math teacher/math specialist it illustrates)
3. Critique the work, focusing on its strengths and weaknesses and what you can do to improve it. (Nothing is ever perfect. There is always room for improvement.)
4. Tell what you learned from doing it

### Artifacts

You may choose any pieces of work you have completed for MATH 535 Number and Number Sense. All the specified Math Specialist Competencies\* must be addressed by at least one artifact (one artifact may cover more than one competency). Also, be sure to demonstrate your ability to teach mathematics to diverse populations, including special education and gifted students. You may choose to include some or all of the following assignments from this course:

- Homework problems
- Lesson Plan Outline
- A Lesson plan
- Conference Presentation
- Classwork assignments

### Reflection

Think about and reflect on the entire MATH 535 Number and Number Sense course and then write about each of the following:

1. Pick one area of mathematics you worked on in this course and explain what you have learned about it.
2. What worked for you in this course such as a teaching technique, a particular activity, or assignment? Why or how?
3. Pick one issue about student learning that you were thinking about during the course and explain what you learned.
4. Likely there are issues, mathematical or pedagogical, that came up for you during the courses and that still puzzle or concern you. Pick one of these issues, explain what it is, and describe your current thinking about it.

5. Use the following scale to evaluate your experiences over this course and provide a statement in justification of your rating.  
Extremely valuable      Valuable      Somewhat valuable      Not at all valuable
6. Describe any outcomes that are a result of this course.
7. Please complete this statement:  
“As a result of this courses’ experiences(s), I ....”

**\*Mathematics Specialist Competencies\***

Please be sure to represent each of the following competencies in your portfolio for MATH 535 Number and Number Sense.

1. Understanding of the knowledge, skills, and processes of the Virginia Mathematics Standards of Learning and how curriculum may be organized to teach these standards to diverse learners;
2. Understanding of a core knowledge base of concepts and procedures within the discipline of mathematics, including the following strands: number systems and number theory; geometry and measurement; statistics and probability; and functions and algebra;
3. Understanding of the sequential nature of mathematics and the mathematical structures inherent in the content strands;
5. Understanding of and the ability to use the five processes – becoming mathematical problem solvers, reasoning mathematically, communicating mathematically, making mathematical connections, and using mathematical representations – at different levels of complexity;
9. Understanding of and the ability to select, adapt, evaluate and use instructional materials and resources, including professional journals and technology;
10. Understanding of and the ability to use strategies for managing, assessing, and monitoring student learning, including diagnosing student errors;
11. Understanding of and the ability to use strategies to teach mathematics to diverse learners;

### **Lesson Study**

Form a group of four students to participate in the Lesson Study. Following the Lesson Study Template: Planning Tool for Teachers, collaboratively create a lesson. One or two members of the team should teach the lesson while the other team members observe. If it is impracticable to observe in person, the lesson may be taped and viewed during the debriefing. (The focus of observations is on the student’s actions, thoughts, and reactions, not on the teacher(s) teaching.) As soon as possible after teaching, the group should meet to revise the lesson based on the observations. Then the revised lesson is taught by a different member or members of the group to a different group of students with the remainder of the lesson study group observing. The lesson study group debriefs the lesson a second time and prepares a final revision based on this second teaching.

Turn in a rough draft of your first lesson plan as part of your portfolio due August 1.  
Turn in one copy of the Lesson Study Group Report for the Fall Lesson Study no later than your January Study Group Meeting. Turn in one copy of the Lesson Study Group Report for the Spring Lesson Study no later than your May Study Group Meeting.

## Lesson Study Group Report

Title of Lesson: \_\_\_\_\_

Level of Lesson: \_\_\_\_\_

Members of the Lesson Study Team: \_\_\_\_\_

Date of 1<sup>st</sup> Presentation of Lesson: \_\_\_\_\_ Teacher: \_\_\_\_\_

Location: \_\_\_\_\_ Audience: \_\_\_\_\_

Date of 2<sup>nd</sup> Presentation of Lesson: \_\_\_\_\_ Teacher: \_\_\_\_\_

Location: \_\_\_\_\_ Audience: \_\_\_\_\_

What changes were made between the 1st teaching and the 2nd lesson? Why were these changes made? How successful were the changes?

What changes were made for the final revision? Why were these changes made?

Attach the original lesson plan, the first revision, and the final revision.

Each lesson study group member should turn in the Individual Lesson Study Reflection for your Fall Lesson Study no later than your January Study Group Meeting and the Individual Lesson Study Reflection for your Spring Lesson Study no later than your May Study Group Meeting.

### Individual Lesson Study Reflection

(Each participant should turn in this reflection individually.)

- 1) Briefly describe your lesson study experience:
- 2) What did you learn from participating in Lesson study?
- 3) What do you think worked well with this Lesson study?
- 4) What do you think could be improved upon with the Lesson study?
- 5) Do you have any comments or concerns that you would like to address?
- 6) Please complete the following statement: "As a result of Lesson study I..."