

# Math 213

## Course Materials:

*A Problem Solving Approach to Mathematics for Elementary School Teachers*, Billstein, Libeskind, and Lott (on reserve in the math library and available at tutoring center in HEDCO)

*Knowing and Teaching Elementary Mathematics: Teachers' Understanding of Fundamental Mathematics in China and the United States*, Liping Ma (on reserve in the math library)

Common Core State Standards for Mathematics: <http://www.corestandards.org/Math/>

Common Core Progressions Documents: <http://ime.math.arizona.edu/progressions/>

(with a focus on progressions for Ratios and Proportional Relationships, Geometry, and Expressions and Equations)

Calculator: A standard scientific calculator is recommended. Graphing calculators (or others with greater functionality) may not be allowed on exams.

Compass, Straight Edge and Protractor: any inexpensive versions are fine.

Geogebra software: we'll be using this free downloadable software in class and for some outside work. It is very easy to install.

## Outcomes:

- 1) Provide arguments prescribed by the Common Core State Standards in Mathematics (CCSSM) justifying properties, strategies and results, in both child-appropriate and more formal adult language for concepts in Geometry, Rational and Proportional Reasoning, and Equations and Expressions
- 2) Correctly use definitions and models and use these to reason in the context of content relevant to a K-8 classroom as well as a liberal arts education.
- 3) Provide evidence of deep understanding of concepts through: correctly solving mathematical and real-world problems relating to Geometry, Ratios and Proportional Reasoning, and Equations and Expressions topics in the CCSSM; answering hypothetical questions from elementary students and troubleshooting student errors; making and proving conjectures about these topics; and identifying relationships between geometric concepts and other mathematical topics.
- 4) Read (with modest guidance) the CCSSM Progressions documents and explain the mathematical choices and the pedagogical rationale for those choices.
- 5) Engage in the Mathematical Practices listed in the CCSSM as a learner in order to identify and promote the needed content and mindset for successfully engaging students in these practices.

## Tentative Outline of Content

Week 1: Ratios, Unit rates, connection to fraction division, fractions vs. ratios, use of tape diagrams, double number lines and tables for solving proportions, recognizing features of proportional relationships in graphs and tables (see Common Core progressions)

Week 2: connections of solution strategies from week 1 to linear equations and “cross multiplying”, additional problem solving using all strategies, Linear measure, circumference, arc length (with connection to proportions)

Week 3: Reasoning about polygons, angles, and symmetry, including sum of interior and exterior angles properties of parallel lines cut by a transversal

Week 4: Triangle congruence properties including compass and straight edge constructions, construction of perpendicular lines through various points

Week 5: Angle bisectors and properties, review, exam 1

Week 6: Altitudes of triangles, properties of isosceles triangles, circles circumscribed about triangles/quadrilaterals, construction of parallel lines, similar triangles

Week 7: Equations of lines with similar triangles, properties of midpoints of triangles and similar triangles, translations, rotations, reflections

Week 8: Dilations, connections of lines, deriving formulas for area of other polygons from formula for rectangles, review, exam 2

Week 9: Pythagorean Theorem and proofs, converse, special triangles, distance formula, basic systems of linear equations

Week 10: Activities tying together systems of linear equations, area, similarity

**Accessible Education Center:** I'm happy to work with the AEC to make this course as inclusive as possible.

**Tutoring:** In addition to my office hours, the College of Education offers tutoring specific to 211/212/213 located in Learning Commons/HEDCO 110. Drop-in hours are MTWR 10am-5pm

## **Grading:**

Course grades will be based on Homework, Writing Assignments and Exams, to be weighted as follows:

Worksheets/Labs/Writing Assignments: 40%

Informal In-Class Presentations: 5%

Mid-term Exams: 15% x2

Cumulative Final Exam: 25%

Standard A/B/C/D/F grade brackets will apply. We will spend considerable class time on worksheets and discussion and presentation. If you miss a class, I will post assignments from class on Blackboard, but you must have at least 80% attendance up to that point in order to make up that assignment. Additionally, if you don't demonstrate proficiency on a particular assignment, I may offer additional attempts to do so provided your attendance is at least 80% up to that point in the term.