San José State University
Department of Elementary Education

# EDTE 232, MATHEMATICS: TEACHING COMMON CORE GRADES 4-8

**Summer 2013**


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| **Instructor:** | Patricia Swanson |
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| **Office Hours:** | 4:00pm - 5:00pm (TBA) |
| **Class Days/Time:** | June 18-21, 24-26; 9:00am - 4:00pm |
| **Classroom:** | SH 335 |


## Course Description

This course focuses on mathematical knowledge for teaching $4^{th}$ -$8^{th}$ grade Common Core content standards and mathematical practices. The course is designed for practicing teachers. Coursework will emphasize the development of mathematical knowledge and the use of "high leverage" mathematical practices in classroom teaching (Ball, 2011). The purpose of this course is to support and enhance teachers' classroom instruction of mathematics at their grade level, and develop an understanding of key mathematics concepts preceding and following their grade level.

This course focuses primarily in the Common Core domains of number, operations, proportional relationships, and algebraic thinking (functions, expressions and equations). A companion course EDTE 233, designed to support classroom implementation of Common Core standards during the academic year, will address the domains of measurement, geometry, statistics, and probability.

Within the context of the rigorous content and mathematical practices outlined by Common Core standards, this course emphasizes the critical need for teachers to enhance all students' access to and interest in mathematics, enabling all students to learn mathematics well. Consequently, a primary goal of this course is to increase teachers' interest in and understanding of mathematics, such that their knowledge and enthusiasm for the subject infuses their classroom teaching.

Two key features of effective mathematics teaching will be embedded throughout the course: developing students' academic language within mathematics and addressing the social-emotional dimensions of teaching and learning mathematics.

Language is an essential tool enabling students to both learn and do mathematics. In this course we will focus on simultaneous teaching of mathematics content and the language of mathematics. Practical strategies for teaching vocabulary in context, using language frames, structuring group and paired work and efficiently using manipulative materials will be addressed for their potential to foster conceptual understanding and the use of academic language in mathematics.

Finally, mathematics, and how it is taught, has the power to shape students' self-efficacy, resiliency, and beliefs about themselves and their intelligence. In no other subject is the interaction of social-emotional factors so tied to learning and disposition to learn. In this course we will examine the social and emotional dimensions of teaching and learning mathematics and develop strategies to enhance students' productive disposition towards learning and doing mathematics.

## Course Goals and Student Learning Objectives

1) Students will demonstrate both conceptual understanding and the ability to teach essential Common Core content and mathematical practices for students' in $4^{th}$ through $8^{th}$ grade.

2) Students will demonstrate the ability to strategically integrate pedagogical strategies, curricular activities, and management systems introduced in class with the existing mathematics programs used in their district.

3) Students will demonstrate the ability to design and implement mathematics lessons reflecting a variety of pedagogical strategies and designed to enhance access to learning in academically and linguistically diverse classrooms.

4) Students will develop classroom organizational systems and instructional plans to foster cooperative skills, organize and maintain efficient use of manipulatives, and enhance meaningful communication in the mathematics classroom. Specific emphasis will be placed on materials, methods, and instructional strategies that provide second language learners with access to grade appropriate mathematics content while fostering the development of both oral and written English language skills.

5) Students will demonstrate the ability to use pedagogical strategies that foster the development of social and emotional learning skills within the context of teaching and learning mathematics. Specifically, students will learn to 1) foster self-awareness and resiliency when faced with challenging mathematics tasks 2) teach norms for group interaction and mathematical discourse, 3) model a growth mindset, develop multidimensional mathematics tasks, and recognize a variety of intellectual aptitudes relevant to doing mathematics, and 4) teach study skills that promote goal setting, planning, and self regulation in the mathematics classroom.

6) The following "high leverage" practices (Ball, 2011) will be taught and practiced throughout the course:

a. Choosing and using mathematical tasks that entail complex mathematical work and build basic skills
b. Choosing examples
c. Teaching and using academic language
d. Leading a productive whole-class math discussion
e. Responding productively to students "errors"
f. Using homework equitably
g. Using specific mathematically-focused positive reinforcement
h. Using public recording (posters, whiteboard)
i. Diagnosing common patterns of student thinking (and not-so-common)
j. Assessing students' mathematical proficiency and teaching responsively

*An underlying focus of this course will be on preparing teachers to work in culturally, linguistically, and academically diverse classrooms.*

## Required Texts/Readings

### Textbook

Van de Walle, J.A., Karp, K. S., Bay-Williams, J. M. (2013). Elementary and Middle School Mathematics (eighth edition). New York, NY: Addison Wesley Longman. **&** Field Experience Guide

Common Core State Standards Initiative. *Standards for Mathematical Practice* and *The Standards >> Mathematics (available online @* www.corestandards.org/the-standards/mathematics)

### Other Readings

**All other readings, required or suggested, are on course e-reserves at MLK library and can be accessed from your computer. http://library.sjsu.edu** (services tab, course reserves, type professor's name)

## Classroom Protocol

Please arrive to class on time and notify the instructor if you will be absent.
For information on students' rights, responsibilities and grievance procedures, *Please refer to "Policies and Procedures" in the University Schedule of Classes.*

## Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. Information on add/drops are available at http://info.sjsu.edu/web-dbgen/narr/soc-fall/rec-324.html . Information about late drop is available at http://www.sjsu.edu/sac/advising/latedrops/policy/ **.** Students should be aware of the current deadlines and penalties for adding and dropping classes.

## Assignments and Grading Policy

Assignments total 100 points. Assignments are graded on quality and completeness. Late assignments will be reduced 10% from the total point value. A grade of C or higher is required.

**Grading**

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| 90 -100 points | A |
| 80 - 89 points | B |
| 70 - 79 points | C |

A brief description of each assignment, its value, and related learning objectives is provided below.

**Active Informed Participation** (10 points) (obj. 1-6)
Participation in class discussion, actively involved in mathematics activities

**School/Technology Scavenger Hunt** (5 points) (obj. 4)
Investigate school mathematics resources, manipulatives, and web-based resources

**Analysis of Sample CCSSM Balanced Assessment Task** (10 points) (obj. 1 & 6j)
Describe your assigned assessment task. Analyze the skills required to complete the task; describe the mathematical properties embedded in the task; describe the mathematical uses and applications; identify the mathematical representations. (obj. 1)
Examine the student work sample from the task. Assess the student's mathematical proficiency and write what you would say to provide the student with feedback and guide further learning. Describe the mathematical practices you will need to teach to prepare students for tasks like this.
(obj. 6j)

**High Leverage Practices** (35 points) (obj. 1 & 4-6)
In class modeling (in grade level groups) of high leverage mathematical practices. Credit based upon self-assessment, group feedback, and instructor observation. (CR/NC)

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| Teaching Cooperative Norms (obj. 4 & 6d) | 5 |
| Leading a Mathematics Discussion (obj. 6d) | 5 |
| Modeling Computational Algorithms (obj. 6a) | 5 |
| Teaching and Using Academic Language (obj. 4 & 6c) | 5 |
| Responding to Student Work (obj. 6e+j) | 5 |
| Teaching Study Skills (obj. 5) | 5 |
| Designing Equitable Homework Policies (obj. 6f) | 5 |

**Mathematics Unit Outline** (20 points) (obj. 1-6*: Signature Assignment*)
Integrate Common Core content and practices and instructional strategies learned in this course with the grade level mathematics text used by your district. Create an integrated instructional unit that significantly enhances the student text, making mathematics conceptually strong, accessible, and engaging to a wide range of learners.
1. Choose one of the content areas covered in your Van de Walle text.
2. Find the corresponding chapter(s) in a grade level mathematics text and compare it to the Van de Walle chapter. Write a 1-2 page analysis identifying the strengths and weaknesses of the student text and the adaptations and additions you will need to

make to teach Common Core content well, using strategies and activities that make mathematics accessible and promote strong conceptual understanding.

3. Create a 5-day instructional sequence that combines your selected math program/text with specific instructional strategies and mathematics content learned in this course (utilizing Van de Walle, and/or ideas presented in class.)

*Use your Van de Walle book to research the big ideas and the suggested instructional sequence for your content area*. Decide on essential competencies for your students and craft learning objectives. How will you teach essential mathematics ideas to promote conceptual understanding, procedural competence, and problem solving? For each day you should identify the academic language and specific instructional strategies you will use to scaffold language development for English language learners. Your unit outline should provide a clear teaching sequence with a brief description of the specific activities (appropriately cited) that you will use. Finally, include the formative and summative assessments will you use to assess student learning throughout the unit.

**Final** (20 points) (Obj. 1-6)
The final will include 20 multiple choice and short answer questions. It is comprehensive, covering content and pedagogical practices addressed in the course.

## University Policies

### Credit Hour Policy

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of forty-five hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities including but not limited to internships, labs, clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

### Academic integrity

Students should know that the University's Academic Integrity Policy is availabe at http://www.sa.sjsu.edu/download/judicial_affairs/Academic_Integrity_Policy_S07-2.pdf. Your own commitment to learning, as evidenced by your enrollment at San Jose State University and the University's integrity policy, require you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The website for Student Conduct and Ethical Development is available at http://www.sa.sjsu.edu/judicial_affairs/index.html.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include in your assignment any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Policy F06-1 requires approval of instructors.

**Campus Policy in Compliance with the American Disabilities Act**

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the DRC (Disability Resource Center) to establish a record of their disability.

*Note: The following Schedule provides a preliminary outline of topics and assignments. This schedule may be modified by the instructor as necessary.*

# EDTE 232 MATHEMATICS: TEACHING COMMON CORE GRADES 4-8
## Course Schedule

| Day | Date | Topics, Readings, Assignments, Deadlines |
|---|---|---|
| 1 | | **Multiplication**<br>Introduction and Review of the Course<br>Mathematics Proficiency: Grades 4-8, What does the research say?<br>The Mathematical Knowledge for Teaching and Common Core<br>Issues of Language and Productive Disposition<br><br>Beginning the Year: Classroom Community and Knowing Your Students<br>Developing Course Norms/Classroom Norms<br>Social and Sociomathematical Norms (Yackel & Cobb, 1996)<br>* Skillbuilders<br>(CC mathematical practice #3: Construct viable arguments and critique the reasoning of others)<br><br>Multiplication: The Meaning of the Operation<br>Multiple Representations<br>Area Models: From Rectangles to Calculus<br>*Exploration with Color Tiles: Prime, Composite, and Square Numbers<br>*From Factoring Whole Numbers to Factoring Polynomials (Card Matching)<br>*Teaching Computational Algorithms Conceptually (multi-digit multiplication)<br>Planning for Integration with District Adopted Text<br><br>Number Talks: Multiplication<br>• *High Leverage Practice: "Talk Moves" and Leading a Mathematics Discussion*<br><br>Mastering Basic Facts: Strategies and Strategy Selection<br>Basic Fact Remediation: Key Instructional Practices<br>The Distributive Property for Basic Facts and Mental Math<br>(CC mathematical practice #7: Look for and make use of structure)<br><br>Balanced Assessment of Common Core Standards<br><br>*Role Play: Fostering Growth Mindset<br>*High Leverage Practice: Teaching Study Skills* |

| Day | Date | Topics, Readings, Assignments, Deadlines |
|---|---|---|
| | | *Reading:*<br>Elementary and Middle School Mathematics, "Helping Children Master the Basic Facts," pp. 171-191.<br><br>Chapin, S. H., O'Connor, C., Anderson, N. C. (2003). *Classroom discussions: Using math talk to help students learn*. Sausalito, CA: Math Solutions Publications.<br>(Chapters 1 & 2) |
| 2 | | **Division**<br>Building Classroom Community<br>*Master Designer: "Explain by telling how<br>"Ask questions"<br>(CC mathematical practice #6: Attend to precision)<br>For Cooperative Skillbuilders see Course Handouts (on reserve)<br><br>Division: The Meaning of the Operation<br>* Exploration with Counters and Base 10 Blocks<br>*Story Problems and the Remainder Dilemma<br>(CC mathematical practice #2: Reason abstractly and quantitatively)<br><br>Teaching "Long Division" Conceptually<br><br>• *High Leverage Practice: Teaching Computational Algorithms*<br><br>**Integers**<br>Integers: Whole Numbers and Their Opposites: Developing Academic Language<br>Multiple Representations: Number Lines and Zero Pairs<br>*Exploration: Modeling Operations with Bugs on Number Lines<br>*Modeling Operations with Two Color Counters<br>(CC mathematical practice #4: Model with mathematics)<br><br>• *High Leverage Practice: Teaching and Using Academic Language*<br>*(Integer Posters)*<br><br>*Required Reading and Viewing*<br>Video Case "Defending Reasonableness: Division of Fractions" and Commentary pp. 40-53. Link:<br>http://www.sjsu.edu/atn/services/webcasting/events/mathideas.html |

| Day | Date | Topics, Readings, Assignments, Deadlines |
|---|---|---|
| | | *Recommended Reading:*<br>Elementary and Middle School Mathematics, "Integers"<br>*For specific Integer lessons see also:*<br>Swanson, P. E. (2010). The intersection of language and mathematics. *Mathematics teaching in the middle school, 15, 516-523.*<br>Echevarría J., Vogt, M., & Short, D. (2010). *The SIOP model for teaching mathematics to English Learners.* Boston, MA: Pearson. (Chapter 7 Lesson and Unit Design for SIOP Mathematics Lessons, Grades 6-8 [Integers], pp. 102-115) |
| 3 | | **Fractions**<br>Building Conceptual Understanding of Fractions<br>An Instructional Sequence for Building Understanding<br>* Extending the Burns Fraction Kit<br>Exploring Multiple Representations for Fractions (area, set, measurement models)<br>* Contextualized Problem Solving with Children's Literature<br>(CC mathematical practice #1: Make sense of problems and persevere in solving them.)<br><br>• *High Leverage Practice: Responding to Student Work*<br><br>Comparing Fractions and Reasonable Estimation<br>*Benchmark Fractions, Number Lines, and Estimation<br>(CC mathematical practice #2: Reason abstractly and quantitatively.)<br><br>**Using Cooperative Groupwork**<br>Groupwork in Heterogeneous Classrooms<br>Management through Norms and Roles<br>Addressing Classroom Status Issues<br>"Groupworthy" Mathematics Tasks<br>*Groupwork Simulation<br><br>• *High Leverage Practice: Teaching Cooperative Norms*<br><br>• *Due: School/Technology Resources Scavenger Hunt*<br><br>*Reading:*<br>Elementary and Middle School Mathematics, "Developing Fraction Concepts," pp. 290-314; "Developing Strategies for Fraction Computation," pp. 315-337 |

| Day | Date | Topics, Readings, Assignments, Deadlines |
|---|---|---|
| | | *Recommended Reading:*<br>Lamon, S. J. (2005). *Teaching fractions and ratios for understanding,* 2nd ed. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.<br>National Mathematics Advisory Panel. (2008). *Foundations for success: The final report of the National Mathematics Advisory Panel.* Washington, DC: U.S. Department of Education.<br>Cohen, E. G. (1994). *Designing groupwork: Strategies for the heterogeneous classroom*. New York, NY: Teachers College Press. |
| 4 | | **Decimals and Percents**<br>Decimals: Base 10 Fractions<br>Multiple Representations: Grids, Circles, and Money<br>Making Sense of Decimal Computation<br>(CC mathematical practice #2: Reason abstractly and quantitatively.)<br>Benchmark Decimals<br>*Making Mathematics Relevant: Calculating Basketball Shooting Averages<br>Linking to Percents<br>*"Counting on" with benchmark Decimals and Percents<br><br>Jigsaw Teaching: Multiple Representations for Rational Numbers<br>* Making Fraction, Decimal, Percent Cards<br><br>*Groupwork Simulation: *If the World Were a Village:* Using Pie Graphs to Compare Data<br>(A task that "entails complex mathematical work and builds basic skills")<br><br>*Reading:*<br>Elementary and Middle School Mathematics, "Developing Concepts of Decimals and Percents," pp. 338-356. |
| 5 | | **Rates & Proportional Relationship**<br>Ratios: Comparing Two Quantities<br>Additive versus Multiplicative Thinking<br>*Flower growth<br>(CC mathematical practice #1: Make sense of problems and persevere in solving them.)<br><br>Slope & Proportional Ratios<br>*Right Triangle Exercise (slope as a constant, proportional ratio)<br>Constant/Direct Variation: A Key Idea ($y=kx$) |

| Day | Date | Topics, Readings, Assignments, Deadlines |
|---|---|---|
| | | Proportional Ratios and Constant Rates<br>Similarity and Slope<br><br>*Groupwork Simulation: Making Variables Concrete: Measuring Rates<br>*Exploration: Interpreting Lines: Independent and Dependent Variables – Personal Graphs<br>(CC mathematical practice #4: Model with mathematics.)<br><br>• *Due: Analysis of CCSSM Assessment Task*<br><br>• *High Leverage Practice: Designing and Equitable Homework Policy*<br><br>*Reading:*<br>Elementary and Middle School Mathematics, "Proportional Reasoning"<br><br>*Recommended Reading:*<br>Lamon, S. J. (2005). *Teaching fractions and ratios for understanding,* 2nd ed. Mahwah, NJ: Lawrence Erlbaum Associates, Inc. |
| 6 | | **Growing Patterns and Algebraic Functions**<br>Language and Multiple Representations<br>*Building, Describing, Quantifying, and Graphing Growing Patterns<br>(CC mathematical practice #8: Look for and express regularity in repeated reasoning.)<br>*Linking Representations<br>Guess My Rule? (table to equation)<br>Making Story Problems (equations and story problems)<br>Card Match-Linking Contextual Problems, Function Tables, Equations and Graphs.<br>Linking Back to the Text: Integrating Conceptual and Procedural Understanding<br><br>Problem Solving Groupwork: "Bulging Backpacks"<br>*Exploring Linear Relationships with Graphing Calculators<br>(CC mathematical practice #5: Use appropriate tools strategically.)<br><br>Variables: An Introduction to Algebra Blocks<br><br>• *Unit Outline Due* |

| Day | Date | Topics, Readings, Assignments, Deadlines |
|---|---|---|
| | | *Reading:*<br>Elementary and Middle School Mathematics, "Algebraic Thinking: Generalizations, Patterns, Functions," pp. 258-389.<br><br>*Recommended Reading:*<br>Moses, R. P., & Cobb, C. E., Jr. (2001). *Radical equations: Math literacy and civil rights*. Boston, MA: Beacon Press. |
| 7 | | **Algebraic Expressions**<br>Modeling Algebraic Expressions with Algebra Blocks<br>*Linking concrete materials to algebraic concepts and notational systems<br>(CC mathematical practice #7: Look for and make use of structure.)<br><br>Modeling Algebraic Equalities<br>* Balance Scale and Algebra Blocks<br>* Mathematical Tug-of -War<br>(CC mathematical practice #4: Model with mathematics.)<br><br>Jigsaw Planning: Unit Outline Sharing and Feedback<br><br>Wrapping-Up: Taking It Back to the Classroom<br><br>• *Final* |