

CALIFORNIA STATE UNIVERSITY SAN MARCOS COLLEGE OF EDUCATION

EDMI 543 - Middle Level Mathematics Education

CRN 41463, 3 Units, Fall 2009

Meeting time varies (see schedule below)

Woodland Park Middle School, San Marcos

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College of Education Mission Statement

The mission of the College of Education community is to collaboratively transform public education by preparing thoughtful educators and advancing professional practices. We are committed to diversity, educational equity, and social justice, exemplified through reflective teaching, life-long learning, innovative research, and ongoing service. Our practices demonstrate a commitment to student-centered education, diversity, collaboration, professionalism, and shared governance. (Adopted by the COE Governance Community October, 1997)

Course Description and Objectives

EDMI 543 focuses on developing an understanding of theory, methodology, and assessment of mathematics in integrated and inclusive elementary and middle level classrooms. This course is aligned with the California's SB 2042 Standards.

In this course, we will reflect on what it means to teach mathematics and explore curriculum development, methods, techniques, materials, planning, organization, and assessment in various middle school curricula. Socio-political issues in mathematics education and methods of cross-culture language and academic development will also be integrated into the course. Learning to teach mathematics well is challenging and, therefore, this course will only begin your education in learning how to teach mathematics. This course is but one stage in the process of becoming a mathematics teacher.

We are expected to: (a) deepen our understanding of the mathematics taught at the middle school level, including such topics as fractions, proportions, statistics, probability, geometry, and algebra, (b) develop an understanding of the current issues and practices in mathematics education, (c) develop a familiarity with the NCTM and California learning standards, (d) develop an understanding of children's content specific thinking or the psychology of mathematical learning, (e) learn to teach content specific concepts using effective and appropriate strategies, including the educational use of technology, (f) practice how to teach for mathematical understanding, and (g) develop strategies to create a classroom environment that promotes the investigation and growth of mathematical ideas and to ensure the success of all students in multi-cultural settings.

Course Prerequisite

- Admission to the Middle Level Credential Program

Required Materials

- Van de Walle, J. A., Karp, K. M., & Bay-Williams, J. M. (2010). *Elementary and middle school mathematics: Teaching developmentally* (7th ed.). Boston: Allyn & Bacon.
- California Department of Education (2005). *Mathematics framework for California public schools: Kindergarten through grade twelve*. Sacramento, CA: Author. This document can be found at <http://www.cde.ca.gov/ci/ma/cf/index.asp>. The standards are in Chapter 2.
- National Council of Teachers of Mathematics (2000). *Principles and standards for school mathematics*. Reston, VA: Author. An overview of this document can be found at <http://standards.nctm.org/document/index.htm>

- Several other readings are required and will be available for download.

Recommended Materials

- Stein, M. K., Smith, M. S., Henningsen, M. A., & Silver, E. A. (2009). *Implementing standards-based mathematics instruction: A casebook for professional development* (2nd ed.) New York: Teachers College Press.
- Driscoll, M. (1999). *Fostering algebraic thinking: A guide for teachers grades 6-10*. Portsmouth, NH: Heinemann.
- Driscoll, M. (2007). *Fostering geometric thinking: A guide for teachers grades 5-10*. Portsmouth, NH: Heinemann.
- Lampert, M. (2001). *Teaching problems and the problems of teaching*. New Haven, CT: Yale University Press.
- STAR Test Blueprints for Standards Items: <http://www.cde.ca.gov/ta/tg/sr/blueprints.asp>

Authorization to Teach English Language Learners

The CSUSM credential program has been specifically designed to prepare teachers for the diversity of languages often encountered in California public school classrooms. The authorization to teach English learners is met through the infusion of content and experiences within the credential program as well as additional coursework. Students successfully completing this program receive a credential with authorization to teach English learners. (Approved by CCTC in SB2042 Program Standards, August 2002)

Teacher Performance Expectation (TPE) Competencies

The course objectives, assignments, and assessments have been aligned with the CTC standards for Multiple Subject Credential. This course is designed to help teachers seeking a California teaching credential to develop the skills, knowledge, and attitudes necessary to assist schools and district in implementing effective programs for all students. The successful candidate will be able to merge theory and practice in order to realize a comprehensive and extensive educational program for all students.

California Teacher Performance Assessment (CalTPA)

Beginning July 1, 2008 all California credential candidates must successfully complete a state-approved system of teacher performance assessment (TPA), to be embedded in the credential program of preparation. At CSUSM this assessment system is called the CalTPA or the TPA for short.

To assist your successful completion of the TPA, a series of informational seminars are offered over the course of the program. TPA related questions and logistical concerns are to be addressed during the seminars. Your attendance to TPA seminars will greatly contribute to your success on the assessment.

Additionally, COE classes use common pedagogical language, lesson plans (lesson designs), and unit plans (unit designs) in order to support and ensure your success on the TPA and more importantly in your credential program.

The CalTPA Candidate Handbook, TPA seminar schedule, and other TPA support materials can be found on the COE website provided at the website provided:
<http://www.csusm.edu/coe/CalTPA/ProgramMaterialsTPA.html>

CSUSM Writing Requirement

The CSUSM writing requirement of 2500 words is met through the completion of course assignments. Therefore, all writing will be looked at for content, organization, grammar, spelling, and format.

Students with Disabilities Requiring Reasonable Accommodations

Students with disabilities who require reasonable accommodations must be approved for services by providing appropriate and recent documentation to the Office of Disable Student Services (DSS). This office is located in Craven Hall 5205, and can be contacted by phone at (760) 750-4905, or TTY (760) 750-4909. Students authorized by DSS to receive reasonable accommodations should meet with their instructor during office hours or, in order to ensure confidentiality, in a more private setting.

Attendance Policy

Due to the dynamic and interactive nature of courses in the College of Education, all students are expected to attend all classes and participate actively. At a minimum, students must attend more than 80% of class time, or s/he may not receive a passing grade for the course at the discretion of the instructor. Individual instructors may adopt more stringent attendance requirements. Should the student have extenuating circumstances, s/he should contact the instructor as soon as possible. (*Adopted by the COE Governance Community, December, 1997*).

For this course, if you miss two sessions, you will not receive a grade of A. If you miss three sessions, your highest possible grade is a B. If you miss four sessions, your highest possible grade is a C+. If you miss more than four sessions, you will receive a grade lower than a C+, which is considered to be unsatisfactory in a credential program. Please discuss with me any extenuating circumstances that will cause you to miss class *prior* to your absence. Attendance will be taken at each class session.

CSUSM Academic Honesty Policy

"Students will be expected to adhere to standards of academic honesty and integrity, as outlined in the Student Academic Honesty Policy. All written work and oral presentation assignments must be original work. All ideas/materials that are borrowed from other sources must have appropriate references to the original sources. Any quoted material should give credit to the source and be punctuated with quotation marks.

Students are responsible for honest completion of their work including examinations. There will be no tolerance for infractions. If you believe there has been an infraction by someone in the class, please bring it to the instructor's attention. The instructor reserves the right to discipline any student for academic dishonesty in accordance with the general rules and regulations of the university. Disciplinary action may include the lowering of grades and/or the assignment of a failing grade for an exam, assignment, or the class as a whole."

Incidents of Academic Dishonesty will be reported to the Dean of Students. Sanctions at the University level may include suspension or expulsion from the University.

Plagiarism

As an educator, it is expected that each student will do his/her own work, and contribute equally to group projects and processes. Plagiarism or cheating is unacceptable under any circumstances. If you are in doubt about whether your work is paraphrased or plagiarized see the Plagiarism Prevention for Students website <http://library.csusm.edu/plagiarism/index.html>. If there are questions about academic honesty, please consult the University catalog.

Assignments and Requirements

Participation and Professionalism (10 points) – You are expected to actively participate in discussions, group work, presentations, and hands-on activities throughout the course. A positive professional disposition includes a willingness to consider and discuss new ideas objectively, curiosity, perseverance, and seriousness about improving one's self as a teacher. It can also include a sense of humor and social intelligence (e.g., the tact and ability to make others feel comfortable and to contribute).

Reading Accountability: Reflection Papers and Classroom Activities (25 points) – The first reflection paper pertains to your prior experience with mathematics. In addition, you need to do 4 reflection papers or activities. You will either:

- Write a "meaningful" reflection paper on (a) the text material assigned to be read for that week, or (b) a pressing issue in mathematics education per the instructor's guidelines.
- OR
- Engage in classroom activities that are designed for you to demonstrate your understanding and share your thoughts.

In your reflections, you are encouraged to make connections with your teaching/learning experience and your field experience (e.g., your observation of middle school classroom activities). You can also raise questions for discussion and/or discuss how you might specifically apply what you learned from the articles as a teacher in the classroom. Do not repeat verbatim from the readings. Other written assignments may be given that will substitute the written reflection but not the reading assignment.

Student Interviews (20 points) – You need to conduct two interviews to assess students' understanding of mathematics. Sample interview questions are provided, but you are encouraged to use your own invention. You need to choose two mathematical topics from the following five areas: (1) fractions, (2) rational numbers, (3) measurement & geometry, (4) data analysis & probability, and (5) algebra. For each student interview, you will pose mathematical problems to any one student at a predetermined grade level. The purpose is to get you to begin thinking about students' mathematical understanding, to learn how to effectively pose questions and interpret the meaning of students' responses, and to provide you with an opportunity to interact with students. For each interview, you need to submit a 2-page report. Please also include the child's written work (if available). You can work with a peer in the interviewing process, but each needs to write his/her own report. In addition, you may need to share/present your interview findings in class.

Mathematics Lesson Design (35 points). Working in small groups of 3-4 members, your team will design one single lesson (approximately 40 minutes) for a middle school mathematics class. You will present (mock teaching) your lesson in the EDM1 543 class. You are welcome to submit a draft of the lesson before the presentation. See the lesson plan grading rubric for more details.

Mathematics Learning Center Activity (10 points). The class will form groups of 4-5 members, and each group will be assigned one of the following areas in the middle school curriculum: (a) fractions, (b) rational numbers, (c) measurement & geometry, (d) data analysis & probability, and (e) algebra. Each group member needs to design a short learning activity in the assigned area and to conduct the activity in a small group setting in the EDM1 543 class. You will have 10 minutes for the presentation. In addition, you need to write a detailed description of the learning activity and provide teaching tips for your activity (so that, for example, a sub teacher can follow). You need to go through the activity checklist (will be provided in class) and ensure that the activity is appropriate and beneficial to the class. Your activity will be posted on the appropriate thread of the discussion board on WebCT, where a collection of approximately 25 learning activities will be available for your future teaching.

Detailed information about the assignments will be given in class or at the course WebCT. You need to submit the assignments (except children's work) at the course WebCT. You are responsible for ensuring that assignments are submitted correctly and on time. Late assignments may receive a reduction in points. You need to make *prior arrangements* with the instructor if you cannot submit assignments on time.

Grading Scale

Grades will be based on the following grading scale:

A = 93% - 100%	A- = 90% - 92%	B+ = 87% - 89%	B = 83% - 86%
B- = 80% - 82%	C+ = 77% - 79%	C = 73% - 76%	C- = 70% - 72%
D = 60% - 69%	F = below 60		

Lesson Design Elements

Group Members:

Elements of the learning experience

Lesson Title:

Grade Level:

Subject Matter: e.g., *Number Sense, Measurement and Geometry, Algebra and Functions, Statistics, Data Analysis and Probability, Mathematical Reasoning*

Time period for the learning experience:

California Mathematics Content Standards: *State-adopted content standards*

Lesson objective(s) based on the content standards:

Mathematical Concept(s): What are you trying to teach? What big idea(s) is/are the focus of your lesson? Do not say, "The students will _____." (That is an objective, not a concept.)

Example: In the set model for fractions, the whole is understood to be a set of objects and subsets of the whole make up fractional parts

Class Description - For the purpose of this assignment, the class description must include English Learners, Special Education students and GATE students. Individualize this section based on your own assigned classroom.

Type of class, time of year, general background of students learning in relationship to new learning (challenges and prior learning)

English Learners:

Special education:

GATE student:

Regular education:

Materials/Resources/Technology: *What does the teacher need? What do the students need? Materials should include lists of supplies that will be needed to present this lesson.*

Assessment Plan

Note: Goals/objectives that will be assessed are based on the content standards and are tied to the Big Idea(s) (concepts) in your lesson.

Types of assessment: Prior knowledge (pre assessment), Formative (progress monitoring), Summative (final product)

Description and Purpose of each Assessment Type listed above

Feedback strategies: How students will be informed of specific successes and challenges?

How general assessment results will be used to inform instruction:

Criteria for Assessment

What benchmark criteria will you use to grade the assessment? How will you know if a student has successfully completed the assessment and accomplished the learning goals? What will they do to show you they have succeeded?

NOTE: Criteria are based on the mathematics content standards and the learning goals/objectives in your lesson.

Instructional Strategies: Address the subject matter lesson objectives and developmental needs of the students described.

Instructional Strategies- <i>What the teacher does during the instruction.</i>	Student Activities – <i>What the students do during the lesson.</i>
LAUNCH How will you set up the problems or mathematical tasks? How will you motivate and focus students? What will you establish expectations?	
EXPLORE How will you help students explore the math concepts in the lesson? How will you promote students' conceptual understanding? How will you check for students' understanding? What difficulties may be seen? What questions can you ask to guide students' thinking? What are the accommodations and modifications for students who may struggle?	

<p>SUMMARIZE/SHARE</p> <p>Closure: How will you have students summarize their learning? How will you encourage students to share their learning and provide comments to other students' findings? What questions can you ask to encourage students to draw conclusions? How will you structure opportunities for students to continue developing understanding and skills after the lesson?</p>	
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Description & Purpose of Differentiated/Adapted Instructional Methods for ONE of the following students:

- *English Learner*
- *Learner with Special Needs*
 - *Learning Disability*
 - *Physical Disability*
- *GATE Student/Advanced Learners/Accelerated Learner*

Rationale for Instructional Strategies:

- 1) Why are the instructional strategies, student activities and resources appropriate for this class, based on content and student development?
- 2) How do they help the students make progress toward achieving the state adopted academic content standards in this content area?

LESSON DESIGN ASSIGNMENT GRADING RUBRIC

EDMI 543

Design Component & Criteria	Approaching	Meets (includes the criteria for Approaching)	Exceeds (includes the criteria for Approaching & Meets)
Part I. Elements of Learning Experience (4 points)			
Title, Grade Level, & Time 0.3 points	Provides a title that is related to the lesson activity; provides grade level and time allocation ...	& title addresses the math concepts in the lesson; appropriate grade level and time allocation ...	& describes where the title fits within a unit plan.
CA Standards and Lesson-specific Learning Objectives 1 point	CA Standards are identified and each is addressed in a learning objective or a set of objectives ...	& each learning objective is clearly stated in terms of what students are expected to know and do ...	& identifies which of the three facets of mathematics learning (procedural proficiency, conceptual understanding, & problem solving) each learning objective is designed to address.
List of materials 0.5 points	Provides a list of materials ...	& the materials are appropriate...	& effective materials that help achieve the learning objectives; if uncommon materials are used, describes how to obtain and/or produce them.
Math Concepts 0.5 points	Provides a description of the math concepts in the	& the description is correct and is distinct	& the description contains essential math

	lesson...	from a lesson objective...	concepts (“big ideas”).
Class Description 1.7 points	Provides the class demographic information; describes students' prior knowledge & experience...	& includes developmental needs of the students...	& includes ALL groups of students who present a different instructional challenge (ELL, Special Ed, GATE, etc.) and their particular learning needs.
Part II. Assessment Plan (5 points)			
Assessment Strategies 3 points	Provides assessment strategies for each objective ...	& articulates if each strategy is <i>formative or summative</i> (or other type) assessment; clearly describes what will be assessed and how you will conduct each of the assessment tasks ...	& provides multiple opportunities for the instructor to check for understanding.
Criteria & Rubrics 2 points	Provides rubrics for assessing student learning ...	& clearly communicates to students about the expectations ...	& justifies the use of holistic or analytical (or mixed) approach to rubric design.
Part III. Instructional Strategies (15 points)			
The Launch Phase 5 points	Provides an introduction to the lesson ...	& effective introduction that motivates students, challenging/interesting problem(s) that orient student thinking ...	& establishes expectations and provides script for teacher and times for each activity.
The Explore Phase 5 points	Describes how you will help students explore the math concepts in the lesson ...	& details the steps that build students' conceptual understanding (cognitively demanding tasks instead of merely rule-oriented drill); provides hints/assists and questions you might give as students work ...	& provides script for teacher and times for each activity; predicts what might happen, provides accommodations and modifications for students who may struggle.
The Summarize Phase 5 points	Describes how you will wrap up the lesson ...	& clearly describes how you will format the discussion of the learning task, what questions will you ask to encourage students to draw conclusions and to extend their thinking, etc. ...	& provides strategies for increase students' reflection and meta-cognition.
Part IV. Differentiation Strategies (5 points)-- Choose ONE group of students who present a different instructional challenge such as ELL, GATE, Special education, etc.)			
Differentiation 5 points	Describes the differentiation strategy for the chosen group of students...	& articulates how the strategy addresses the students identity and developmental needs	& provides how the strategy will be assessed for effectiveness and altered if needed.

		(readiness, interest or learning profile)...	
Part V. Rationale & Reflection (6 points)			
Rationale 3 points	Describes the rationale for teaching this lesson (big ideas, enduring understandings, essential questions) ...	& addresses how the instructional strategies and the student activities are suited to meet the standard(s) and objective(s) of the lesson...	& explains how the assessment is a valid and reliable way to assess student learning.
Reflection 3 points	Reflects on what works and what does not work...	& includes an in-depth analysis of students' learning outcomes...	& provides specific and effective strategies for improving the lesson.

Total: 35 points.

CSUSM Furloughs

Due to the devastating effects of current budget crisis in California, I have been furloughed nine days each semester of this academic year, representing a 9.23% reduction in both workload and compensation. A furlough is an unpaid day off on a faculty member's regularly-scheduled workday. In order to satisfy legal and ethical requirements of the California Labor Code, I am required to submit formal certification that I will not work on my furlough days. I am prohibited from teaching, conducting scholarly research, consulting with students, responding to email or voicemail, providing assignment feedback, or participating in any CSU work-related activities on my furlough days. Furlough dates vary by professor; my Fall Semester furlough dates are 9/3, 9/8, 10/8, 10/15, 11/20, 11/23, 11/24, 11/25, and 12/1. Furlough plans may be altered after the beginning of the semester as a result of administrative actions or other emergencies, thus subsequent revisions to this syllabus may occur.

The CSU faculty agreed to take furlough days in order to preserve jobs for as many CSU employees as possible, and to serve as many students as possible, in the current budget crisis. The agreement that governs faculty furloughs acknowledges that "cuts of this magnitude will naturally have consequences for the quality of education that we can provide." Within the furlough context, I will make every effort to support your educational experience at CSUSM. Visit CSUSM Budget Central [<http://www.csusm.edu/budgetcentral/>] to learn about the state budget crisis and how it impacts your educational opportunities. To avoid the continued loss of higher education availability in California, exercise your right to voice an opinion. Contact information for state legislators and the governor are provided at Budget Central.

Tentative Schedule

Please note that modifications may occur at the discretion of the instructor.

Date	Session/Topics	Reading & Assignments
9/4 AM & PM	1. Building a math learning community Course introduction 2. Levels of cognitive demand of math tasks What does "understanding" mean in math? What does a "balanced" curriculum look like? How can we challenge students using appropriate math tasks? How do we differentiate instruction?	
9/11 AM	3. Lesson Design How do we make decisions about what to teach and how we teach it? How do we sequence the learning activities so that students can learn the intended themes?	Van de Walle et al. ch 3, 4 Reflection 1 due
9/17 AM	4. Math Assessment How do we know whether or not students achieve learning objectives? What are the purposes of different types of assessment strategies? How do we respond when students do not learn?	Van de Walle et al. ch 5, 6
9/18 PM	5. Using models for math teaching & learning How do we provide opportunities for hands-on explorations of math? How can manipulatives help or fail to help children construct math ideas?	Van de Walle et al. ch 15, 16 Fractions interview due*

	<i>Math topics: (a) Integers, (b) Fractions</i> Learning Center Activities- Group 1 presentation**	
9/21 PM	6. Making connections among math concepts Why are fractions, decimals, & percents different representations of the same quantity? What are some models for them? Learning Center Activities- Group 2 presentation**	Van de Walle et al. ch 17 Rational #s interview due* Reflection 2 due
9/25 PM	7. Connecting math with daily life experience What is an anthropological aspect of math? How can we help students make sense of the world around us through math? <i>Math topics: Proportional reasoning</i> Learning Center Activities- Group 3 presentation**	Van de Walle et al. ch 18
9/28 PM	8. Project-based math teaching & learning How can open-ended math tasks allow students to engage in higher-order thinking? <i>Math topics: Geometry</i> Reflection 3 activity Learning Center Activities- Group 4 presentation**	Van de Walle et al. ch 20 Mea/Geo interview due*
10/5 PM	9. Technology in math education I What are some affordances and limitations of technology in math teaching and learning? <i>Introduction to Geometer's Sketchpad (GSP)</i>	Article: Battista (2002) Data ana/prob interview due*
10/7 AM	10. Math patterns and generalization What factors are involved on the way from arithmetic to algebra? How can we help students make & justify conjectures and generalizations? Reflection 4 activity <i>Math topic" Algebraic thinking</i> Learning Center Activities- Group 5 presentation**	Van de Walle et al. ch 14 Algebra interview due* Lesson design draft due
10/16 AM & PM	11. Technology in math education II What is the appropriate role of technology in math teaching and learning? How may technology (not) mediate learning? <i>Using graphing calculators for higher-order thinking</i> 12. Lesson plan presentations I	Article: McGraw and Grant (2005)
10/19 AM & PM	13. Literacy in math learning How can we help students develop math vocabulary and read math? How do we encourage students to write about math? How can we help students communicate mathematically? 14. Socio-political issues in math education How does traditional math education preserve elite groups while denying other children access to powerful math? How is math education related to civil right and social justice? Lesson plan presentations II	Van de Walle et al. ch 2 Article: Gutstein (2005a) Article: Gutstein (2005b) Reflection 5 due Lesson design final due

* You just need to choose two of these five topics for student interviews. The due dates vary. For example, if you choose to do an interview on fractions, then your paper is due on 9/18. If you want to do an interview on algebra, then your paper is due on 10/7.

** Presentation of *mathematics learning activities*. After the presentation, you should submit this assignment within a week. For example, if you present an activity on fractions on 9/18, the description and teaching tips are due on 9/25.