

CALIFORNIA STATE UNIVERSITY SAN MARCOS COLLEGE OF EDUCATION

EDMI 543 - Middle Level Mathematics Education

CRN 41522, 3 Units, Fall 2010

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, (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

- Boaler, J., & Humphreys, C. (2005). *Connecting mathematical ideas: Middle school video cases to support teaching and learning*. Portsmouth, NH: Heinemann.
- 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.
- 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.

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 at <http://www.csusm.edu/coe/CalTPA/CalTPA.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).

You are expected to practice professionalism in this course. Attendance, participation, and in-class presentations and interactions are essential. 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 more than three 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

Each written assignment is expected to have a clear organizational presentation and be free of grammar, punctuation, or spelling errors. There will be a reduction in points for the above mentioned errors. Late assignments may not be accepted. Prepare carefully for class, be ready to discuss readings and assignments thoughtfully and actively participate in all class activities.

Here is a list of the assignments and requirements, followed by descriptions of each of them.

Assignment	Points	Assignment	Points
Reflection papers/activities	25	Mathematics lesson design	30
Math learning center activity	10	Reflection on math lesson implementation	5
Student interviews	20	Participation & professionalism	10

Reflection Papers/Activities (25 points) – There are four reflection papers or activities. Detailed information will be given in class and on the Moodle site.

Mathematics Learning Center Activity (10 points). The purpose of this assignment is to provide you with opportunities to (1) experience teaching a math activity in a small group setting, (2) reflect on student learning, (3) set up learning centers in a classroom and rotate students through various activities.

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) measurement & geometry, (b) fractions, (c) ratios & proportions, (d) algebra, and (e) statistics and probability. 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 EDMI 543 class. You will have 10 minutes for the presentation. 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.

In addition, you need to write a description of the learning activity. Sufficient details need to be provided so that, for example, a sub teacher can follow. Include all worksheets and materials. You can also include teaching tips that will help others successfully implement the activity.

You need to post your activity in the appropriate forum at the class Moodle site, where a collection of approximately 25 learning activities will be available for your future teaching.

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 a 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 student'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. See the Student Interview Guidelines and a sample interview report at the course Moodle.

Mathematics Lesson Design (30 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. If access to a middle school class can be obtained, then you will implement your lesson in that classroom. Videotaping the lesson implementation is highly recommended. You need to share your lesson and teaching experience by means of a group presentation. Student work samples are usually helpful in your presentation. You are encouraged to submit a draft of your lesson plan for review before the lesson is taught to students. Your teaching performance will not affect your grade. A lesson template is provided below. *Note that it is different than the generic TPA lesson template.* The grading rubric is also shown below. Ensure you check the other guidelines at the course Moodle.

Reflection on Mathematics Lesson Implementation (5 points) – You will videotape the implementation of your mathematics lesson and reflect on your teaching. A few prompts for this 2-page paper are:

- What went well and what could be done differently? Did students learn what they were supposed to learn? What evidence of learning do you have? What does the evidence tell you?
- How did your teaching strategies enhance student learning? What were the strengths and weaknesses of your teaching strategies? What difficulties in learning did you observe? What did you do to overcome such difficulties? If manipulatives were used, were they effective? Why or why not? If you put students in groups, how did group members interact? If a worksheet was given, how did it help or fail to facilitate learning? If you allowed student presentations, how did students share their ideas? How did other students respond to the presentations?
- Why did you make particular moment-to-moment decisions in your teaching moves? What were the effects of these moves? For example, you planned to encourage Jason to talk, but Cassidy raised a question in the middle of the lesson. You decided at that moment to pursue Cassidy's question instead of asking Jason to share his ideas. Why did you change your mind and take a detour? It is not sufficient to just say that Cassidy's question was important. You need to explain why the question was important and how the class responded to it.

Reflection paper grading rubric:

Approaching (0-2 points)	Meets (3-4 points) (includes the criteria for Approaching)	Exceeds (5 points) (includes the criteria for Approaching & Meets)
Reflects on what works and what does not work...	& includes an in-depth analysis of students' learning outcomes; evaluates the effectiveness of major teaching strategies and instructional moves...	& provides specific and effective strategies for improving the lesson.

Participation and Professionalism (10 points) – You are expected to actively participate in in-class and online 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).

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 Template

Group Members:

Part I. ELEMENTS OF THE LEARNING EXPERIENCE

Lesson Title:

Grade Level:

Time Period for the Learning Experience:

Mathematical Concept(s): What are you trying to teach? What big idea(s) is/are the focus of your lesson?

Example 1: 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.

Example 2: Ratios and proportions involve multiplicative rather than additive comparisons. Equal ratios result from multiplication of division, not from addition or subtraction.

California Mathematics Content Standards: State-adopted content standards

Learning Objective(s) Based on the Content Standards:

Class Description

- General background information of the class: Type of class, time of year, and general characteristics of students’ learning in relationship to new learning (challenges, prior learning/experience, and misconceptions):
- English learners: number of such students, their learning needs, etc.
- GATE student: number of such students, their learning needs, etc.
- Learners with other special needs: number of such students, their learning needs, etc.
- “Regular” students: number of such students, their learning needs, etc.

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

Part II. ASSESSMENT

Assessment Strategies: Assessment strategies need to be aligned with the lesson goals/objectives and content standards. The above-stated mathematical concept(s), or big idea(s), should be assessed.

- Describe the purpose and method of each of the assessment strategies.
- Describe feedback strategies: How will you inform students of specific successes and challenges?
- Describe how you will use assessment results to inform instruction.

Criteria for Assessment: How can you tell a good job from a poor one? What benchmark criteria will you use for the assessment? How will you know to what degree a student has learned the intended material? What SPECIFICALLY will they say or do to show you that they have accomplished the learning objectives?

PART III. INSTRUCTIONAL STRATEGIES AND PEDAGOGICAL CONSIDERATIONS

You should clearly address the lesson objectives and developmental needs of the students.

Student Activities – What the students think and do during the lesson.	Teacher Actions-- What the teacher does during the instruction.	Pedagogical Considerations— Rationale for instructional moves & decisions.
<p>LAUNCH What do you expect students to think? How do they connect the current task to their prior knowledge and experience? How do they show that they understand the task and the expectations?</p>	<p>LAUNCH What do you need to do to ensure that the student activities on the left will happen? How will you set up the problems or mathematical tasks? How will you motivate and focus students? What can you do to guide students' thinking? What will you establish expectations? <i>Estimate the amount of time for each activity.</i></p>	<p>LAUNCH For "major" instructional strategies on the left, why specifically do you decide to do so? What is the purpose of the activity/strategy? For example: Why do you choose a particular problem for students? Why do you put the problem on the board/overhead instead of giving each student a copy (or the other way around)? Why do you present examples in a particular way? Are there alternative ways to present a problem or to ask a question?</p>
<p>EXPLORE How do students explore the math concepts? If this is a group activity, how does each student contribute to the group task? What do they do to show that they are engaged in the task? What opportunities are provided for student thinking (analyzing, conjecturing, & drawing conclusions) and interaction (explanation, justification, & communication)?</p>	<p>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? How will you encourage student thinking and interaction? What are the accommodations and modifications for students who may struggle?</p>	<p>EXPLORE Same above—justify your strategies in detail. For example, why do you provide a solution strategy instead of allowing students to come up with their own? Why do you use a worksheet? Why do you use a technological tool? Why do you choose particular words? Why do you think your accommodation or modification strategies will work?</p>

<p>SUMMARIZE/SHARE How do students draw conclusions? How do they share their learning? How do they provide comments to other students' findings? How do they reflect on the learning experience in the lesson?</p>	<p>SUMMARIZE/SHARE 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>	<p>SUMMARIZE/SHARE Same above—justify your strategies in detail.</p>
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Differentiation: Describe your differentiated/adapted instructional methods for ONE group of students who present a different instructional challenge such as ELL, GATE, Special education, etc.). Justify your strategies.

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 (3 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.
Math Concept(s) 0.5 points	Provides a description of the math concepts in the lesson...	& the description is correct and is distinct from a lesson objective...	& the description contains essential math concepts ("big ideas").
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.
Class Description & Development Needs 1 point	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.
List of materials 0.2 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.

Part II. Assessment (5 points)			
Assessment Strategies 3 points	Provides assessment strategies for each objective ...	& articulates if each strategy is <i>entry-level</i> , <i>progress monitoring</i> , or <i>summative</i> assessment; clearly describes types of assessment, purpose, and implementation ...	& provides multiple opportunities for the instructor to check for understanding.
Criteria or Rubrics 2 points	Provides a set of criteria OR rubrics for assessing student learning ...	& clearly communicates to students about the expectations ...	& provides evidence of addressing all learning objectives.
Part III. Instructional Strategies and Rationale (18 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 and engage all learners ...	& 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.
Rationale 3 points	Justifies the instructional strategies for each of the <i>Launch</i> , <i>Explore</i> , and <i>Summarize</i> phases.	& addresses how the instructional strategies and the student activities are suited to meet the standard(s) and objective(s) of the lesson...	& describes how the instructional strategies help students learn the math concept(s) or big ideas of the lesson.
Differentiation 4 points	Describes the differentiation strategy for the chosen group of students...	& articulates how the strategy addresses the students' identity and developmental needs (readiness, interest or learning profile)...	& provides how the strategy will be assessed for effectiveness and altered if needed.

Total: 30 points.

Tentative Schedule

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

Date	Session/Topics/Essential Questions	Reading & Assignments
ML theme 1: Learning happens in caring communities.		
9/3 Fri PM	1. Building a math learning community Course introduction; What are characteristics of an effective math classroom?	
ML theme 2: Students are the center of our work		
9/10 Fri AM	2. Challenging students with rich math tasks What are different levels of cognitive demand of math tasks? How can we challenge students using appropriate math tasks?	Van de Walle et al. ch 2 Reflection 1 due
9/13 Mon PM	3. Lesson Design (1) How do we make decisions about what to teach and how we teach it? How do we provide opportunities for student thinking and interaction?	Van de Walle et al. ch 3, 4
9/15 Wed AM	4. Assessment of students' thinking in mathematics How do we assess students' understanding and misunderstanding of mathematics? 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 Reflection 2 due
9/20 Mon AM	5. Using models for math teaching & learning (1) How do we provide opportunities for hands-on explorations of math? How can manipulatives help or fail to help children construct math ideas? <i>Math topic: Algebra</i> Learning Center Activities- Group 1 presentation*	Van de Walle et al. ch 16 Student interview 1 due
9/20 Mon PM	6. Using models for math teaching & learning (2) <i>Math topics: (a) Integers, (b) Fractions</i> Learning Center Activities- Group 2 presentation*	
ML theme 3: Teaching is the negotiation among theory, practice and students.		
9/23 Thu AM	7. Unpacking math standards What are some similarities and differences between NCTM <i>Principles and Standards for School Mathematics</i> and CA math framework and standards? What are the benefits and drawbacks of math standards?	Van de Walle et al. ch 1
9/27 Mon PM	8. Lesson Design (2) What can we do in each of the Launch, Explore, and Summarize phases of a problem-based lesson? How do we differentiate instruction?	Van de Walle et al. ch 6 Lesson design draft due
9/29 Wed AM	9. Making connections among math concepts How can we promote students' development of proportional thinking across the math curriculum? What are some models for ratios and proportions? Learning Center Activities- Group 3 presentation*	Van de Walle et al. ch 18 Reflection 3 due
10/6 Wed AM	10. Lesson implementation & reflection How can we maintain the intended cognitive level of a math task? How do we collect evidence of learning as a means for in-depth reflection on the effectiveness of instructional strategies?	
10/8 Fri AM	11. 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? <i>Math topic: Algebraic thinking</i> Learning Center Activities- Group 4 presentation*	Van de Walle et al. ch 14 "Reflection on math lesson implementation" due
ML theme 4: Empowerment of students is essential to the students' meaningful participation in a democratic society.		

10/13 Wed AM	12. Technology in math education (1) What are some affordances and limitations of technology in math teaching and learning? How does technology influence <i>what</i> and <i>how</i> math is taught and learned? <i>Introduction to Geometer's Sketchpad (GSP)</i>	Article: Battista (2002) Lesson design final due
10/15 Fri AM	13. Technology in math education (2) 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> Learning Center Activities- Group 5 presentation*	Article: McGraw and Grant (2005)
10/18 Mon AM	14. Literacy in math learning How can we help students develop math vocabulary? How do we encourage students to read and write about math? How can we help students communicate mathematically?	
ML theme 5: Education requires political action to achieve a just society.		
10/18 Mon PM	15. 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?	Article: Gutstein (2005a) Article: Gutstein (2005b) Student interview 2 due Reflection 4 due on Oct 22

Notes: * Presentation of *Mathematics Learning Center Activities*. After the presentation, you should submit this assignment within a week. For example, if you conduct an activity on 9/20, your paper is due on 9/27.