

## CALIFORNIA STATE UNIVERSITY SAN MARCOS COLLEGE OF EDUCATION

### EDMI 543 - Middle Level Mathematics Education

CRN 41486, Fall 2007

Meeting time varies (see course schedule)

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 Prerequisites**

- Admission to the Middle Level Credential Program
- Commitment to help children understand and do mathematics

#### **Required Materials**

- Van de Walle, J. A. (2007). *Elementary and middle school mathematics: Teaching developmentally* (6<sup>th</sup> Ed.). Boston: Pearson Education, Inc.
- 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>.
- Several other readings are required and will be available for download.

### **Recommended Materials**

- Lampert, M. (2001). *Teaching problems and the problems of teaching*. New Haven, CT: Yale University Press.
- 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/> (NCTM members have full access)
- 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. You will be required to formally address the following TPEs in this course:

Primary Emphasis:

- TPE 1a-Subject Specific Pedagogical Skills for MS Teaching (Mathematics)
- TPE 2-Monitoring Student Learning During Instruction

### **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.

### **Requirements**

*Participation and Disposition (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).

*Reflections (18 points)* – You need to write six reflections. The first reflection consists of questions about your prior experience with mathematics. The questions will be given on the first day of class. For each of weeks #3, #4, #6, #7, and #8, you will need to write a "meaningful" one-page reflection on the chapters/articles assigned to be read for that week. These reflections must clearly articulate your thoughts on the articles. You are encouraged to make some 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.

*Student Interviews (30 points)* – You need to conduct three student interviews based on questions provided in class and/or your own invention. You need to choose three mathematical topics from the following five areas: (1) fractions, (2) rational numbers, (3) measurement & geometry, (4) data analysis & probability, and (6) 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 to 3-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 need to share/present your interview findings in class.

*Designing Mathematics Lessons (30 points total)* – The purpose of this assignment is to help you learn how to design effective mathematical activities and lessons and to provide an opportunity for you to practice teaching mathematics (if access to classrooms can be obtained). The assignment has two parts.

*Part I. Mathematics learning activities (10 points).* The class will form groups of 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 10-minute learning activity in the assigned area and to conduct the activity in a small group setting in the EDMI 543 class. In addition, you need to write a description of the learning activity and provide teaching tips on both the class WebCT and the class Wiki site, where a collection of 25 learning activities will be available for your future teaching.

*Part II. Mathematics lesson (20 points).* Working in small groups of 3-4 members, your team will design one single lesson (approximately 30 minutes) that you will present in a middle school mathematics class. A draft of the lesson should be submitted for review before the lesson is taught to students. The draft of the lesson is worth 10 points, and the final version is worth 10 points.

*Class Wiki and Internet Resources for Mathematics Education (6 points)* -- You will contribute three Internet resources for mathematics education to the class Wiki site at <http://edmi543fa07.wikispaces.com/>. This assignment allows you to begin compiling mathematical resources for your future teaching careers and to experience the educational use of Web 2.

*Teacher Performance Expectation (TPE) Competencies (6 points)* – You need to demonstrate that you have met TPE 1a and TPE 2 by submitting your reflection statements and providing artifacts as evidence. They should be posted on Taskstream.

Detailed information about the assignments will be given in class. You need to submit the assignments (except TPE reflections and children's work) at the course WebCT (access from <https://webct6.csusm.edu>). You are responsible for ensuring that assignments are submitted correctly and on time. Late assignments will receive a reduction in points unless *prior arrangements* have been made with the instructor.

The grade on a late assignment will be deducted 1 point per day unless *prior arrangements* have been made with the instructor.

### **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		

### **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.*)

If you miss two class sessions or are late (or leave early) more than four sessions, you will not receive a grade of "A". If you miss four class sessions, your highest possible grade is a "C+". 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.

### **Students with Disabilities Requiring Reasonable Accommodations**

Students must be approved for services by providing appropriate and recent documentation to the Office of Disabled 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.

### **Use of Technology**

Students are expected to demonstrate competency in the use of various forms of technology (i.e. word processing, electronic mail, WebCT6, use of the Internet, and/or multimedia presentations). Specific requirements for course assignments with regard to technology are at the discretion of the instructor. Keep a digital copy of all assignments for use in your teaching portfolio. Most assignments will be submitted online, and some will be submitted in hard copy as well. Details will be given in class.

### **Electronic Communication Protocol**

Electronic correspondence is a part of your professional interactions. If you need to contact the instructor, e-mail is often the easiest way to do so. It is my intention to respond to all received e-mails in a timely manner. Please be reminded that e-mail and on-line discussions are a very specific form of communication, with their own nuances and etiquette. For instance, electronic messages sent in all upper case (or lower case) letters, major typos, or slang, often communicate more than the sender originally intended. With that said, please be mindful of all e-mail and on-line discussion messages you send to your colleagues, to faculty members in the College of Education, or to persons within the greater educational community. All electronic messages should be crafted with professionalism and care.

Things to consider:

- Would I say in person what this electronic message specifically says?
- How could this message be misconstrued?
- Does this message represent my highest self?
- Am I sending this electronic message to avoid a face-to-face conversation?

In addition, if there is ever a concern with an electronic message sent to you, please talk with the author in person in order to correct any confusion.

### Tentative Schedule

Please note that modifications may occur at the discretion of the instructor. Student's cooperation and flexibility in response to changes will be noted as part of the participation assessment.

Date	Session/Topics	Assignment to be completed BEFORE Class Session
8/31/07 PM	1 Course introduction Teaching mathematics equitably to all children Building a mathematics learning community	
9/5/07 AM	2 Problem solving Developing understanding in mathematics	Van de Walle ch 3, 4 Article 1: <i>Relational understanding</i> <b>Reflection #1 (math experience) Due</b>
9/11/07 AM	3 Fractions (math activities: group 1 presentation**)	Van de Walle ch 16, 17 <b>Fractions Interview Due*</b>
9/12/07 AM	4 Rational numbers: Decimals, percents Designing math lessons	Van de Walle ch 18 <b>Reflection #2 (ch 17-18) Due</b>
9/18/07 PM	5 Proportional reasoning (math activities: group 2 presentation**)	Van de Walle ch 19 <b>Rational Numbers Interview Due*</b>
9/19/07 AM	6 Measurement and Geometry	Van de Walle ch 20 <b>Mea/Geo Interview Due*</b> <b>Internet Resources (Wiki) Due</b>
9/28/07 PM	7 Measurement and Geometry (con't) (math activities: group 3 presentation**)	Van de Walle ch 21 <b>Reflection #3 (ch 20-21) Due</b>
10/2/07 AM	8 Technology in mathematic classrooms: Geometer's Sketchpad (GSP)	Article 2: <i>Interactive geometry software</i>
10/3/07 AM	9 Data analysis	Van de Walle ch 22 <b>Reflection #4 (ch 22) Due</b>
10/5/07 PM	10 Probability (math activities: group 4 presentation**)	Van de Walle ch 23 <b>Data Analysis/prob Interview Due*</b>
10/9/07 PM	11Technology in mathematic classrooms: spreadsheets	Van de Walle ch 8 Article 3: <i>Spreadsheets</i>
10/10/07 AM	12 Algebraic thinking (1) TPE workshop	Van de Walle 15 <b>Algebra Interview Due*</b> <b>Reflection #5 (ch 15) Due</b>
10/12/07 AM	13 Algebraic thinking (2) (math activities: group 5 presentation**)	<b>Lesson Plan Draft Due</b>
10/16/07 AM	14 Team teaching	<b>TPE due</b>
10/17/07 AM	15 Socio-political issues in mathematics education Wrap-up	Article 4: <i>Culture, race, power, and mathematics education</i> <b>Lesson Plan Due</b> <b>Reflection #6 (Culture article) Due</b>

\* You just need to choose three 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 9/11. If you want to do an interview on algebra, then your paper is due on 10/10.

\*\* After the presentation of your *mathematics learning activity*, you should submit this assignment within a week. For example, if you present an activity in fractions on 9/11, the description and teaching tips are due on 9/18.

## **STUDENT INTERVIEW GUIDELINES**

Student interviews are designed to provide you with opportunities to focus on a single child's thinking about mathematics. It will also help you to improve your use of inquiry for assessment purposes and to better understand students with different understandings.

### **Prior to the interview**

- You should arrange with a teacher (or parent of a child you know) to interview one child for 20-30 minutes in a quiet place outside the classroom, if possible.
- Provide the teacher with some understanding of what the interview will involve and see if he/she has any thoughts about how this child will do on the assessment.
- Develop a list of "probing" questions you may want to use if the child is not forthcoming with a response. For example, if the child says "I just knew it", you might respond with "What did you think about first?" or "If you were helping a friend, how would you explain what you did?"

### **During the interview**

Work with the child individually. Begin the interview by informing the child that you will be giving him/her a series of math problems to solve and that you are interested in his/her thinking process and in the strategies s/he uses to solve these problems. Inform the child that s/he can solve the problems in any way s/he wants. Please remind the child that the interview is voluntary and that s/he can end the interview at any time (if a student does end early then please find another willing student). Do everything you can to help make the child comfortable.

Pose problems one at a time. Orally provide the child with each problem and provide him/her with sufficient time to complete each problem. You may also want to provide the child with a written copy of each problem.

After the child answers each problem you should ask a variety of questions that will help you to better understand the child's thinking and to assess his/her mathematical understanding. *You will want to note the questions you ask and the child's responses* and it may be necessary to ask the child to wait while you are writing -- it is OK to ask the child to wait. *You should not tape-record/video-tape the interview without parental permission.*

During the interview, be sure to consider the following:

- The best thing you can be is genuinely curious. Remember the point of the interview is to discover how the child thinks -- *NOT* to guide the child to the correct answer (try to fight the urge to be "teacher").
- Be careful to respond similarly to correct and incorrect answers. Be curious about all solution strategies -- not just the ones leading to incorrect solutions.
- Your primary role is to listen. Make sure you allow enough "wait time" -- children need time to think before answering.
- Make sure the child feels comfortable during the entire interview. If the child clearly cannot answer a problem, move on to the next problem. If you feel that the child is really struggling and frustrated, you may want to end the interview or give the child a problem you are fairly certain s/he can solve and then end the interview. If you cut an interview short because of student difficulty, be sure to discuss your reasoning in your write-up.

### **After the interview**

You should write a two to three-page report that includes a brief discussion on each of the following three points:

- What *specifically* did you learn about this child's mathematical understanding? Here you will want to make some claims about the mathematics your student understands or doesn't understand.
- What do your findings *mean*? What are their *implications* for math teaching and learning? I am looking for more of an explanation than just your student could or couldn't solve a particular problem.

- What *specifically* might you do for this child if you were his/her teacher? Here you might want to include discussions about such issues as curriculum, instructional strategies, etc.

### **Grading**

I will be looking for nicely written papers that clearly and specifically express what you learned about: (1) the child's mathematical understanding, (2) the implications of your findings for teaching, learning, and even curriculum, and (3) what you would do next for this child if you were his/her teacher (again be specific here). For example, you might recognize that this student lacks a conceptual understanding of variables – so as this child's teacher you might want to pose meaningful problems related to variables and functions, etc.

\*NOTE: When you turn in your write-up, you should also include the child's written work (if it exists) and without the student's "actual" name listed. You can use a pseudonym in your report.

## **DESIGNING & TEACHING A LESSON IN MATHEMATICS**

You will participate in small groups (approximately three to four members) to design, construct, and teach a single lesson on an assigned mathematical topic. The lesson will be designed for use with students at a specific grade level (based on the grade level of the cooperating teacher). The purpose of this activity is to help you learn how to design effective mathematical lessons for a specific group of students, provide you with an opportunity to practice teaching mathematics and to receive feedback, and to learn how to effectively collaborate with colleagues in order to improve your teaching.

### **Plan of Action**

When planning your lesson, each group should:

- Clearly identify the objective(s) of your lesson within the context of the overall goals and objectives of the unit.
- Identify students' prior knowledge before making decisions about curriculum and instructional practices.
- Consider whether your curriculum clearly brings forward your mathematical objective(s) and what, if any, alterations are necessary. Furthermore, your lesson must be consistent with the Mathematics Framework for California Public Schools (e.g., Content Standards).
- Make sure that each member of the group participates fully in the design and implementation of the lesson and that the workload is shared equitably.
- Your team will teach the lesson in a classroom. Other teams might observe your teaching and provide feedback. Before the day of your teaching, you need to submit a draft version of the lesson plan.
- After the lesson, you will need to revise the lesson plan based on students' responses and the feedback you receive from the instructor and/or other teams. Submit the revised lesson plan for grading.

**Lesson Plan Grading Rubric**College of Education  
Cal State San MarcosEDMS 543, EDMI 543

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Name(s):

<b>BASIC COMPONENTS (3)</b>		Absent 0	Present 1			
Title, Grade Level, Time, Materials		<input type="checkbox"/>	<input type="checkbox"/>			
Curriculum Standard(s)		<input type="checkbox"/>	<input type="checkbox"/>			
Management/discipline considerations		<input type="checkbox"/>	<input type="checkbox"/>			
<b>GUIDING COMPONENTS (6)</b>		Absent 0	Poor 1	Good 2		
Goals/Objectives		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Learner Analysis		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Assessment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<b>INSTRUCTIONAL COMPONENTS (16)</b>		Absent 0	Poor 1	Fair 2	Good 3	Excellent 4
Opening/Intro		<input type="checkbox"/>				
Steps of instruction/Through ( <i>double points</i> )		<input type="checkbox"/>				
After/Beyond		<input type="checkbox"/>				

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Points (raw): \_\_\_\_\_ of 25

Earned Points (raw \* 10/25) = \_\_\_\_\_

Comments:

**SB 2042 - AUTHORIZATION TO TEACH ENGLISH LEARNERS COMPETENCIES**

<b>PART 1: LANGUAGE STRUCTURE AND FIRST- AND SECOND-LANGUAGE DEVELOPMENT</b>	<b>PART 2: METHODOLOGY OF BILINGUAL, ENGLISH LANGUAGE DEVELOPMENT, AND CONTENT INSTRUCTION</b>	<b>PART 3: CULTURE AND CULTURAL DIVERSITY</b>
<b>I. Language Structure and Use: Universals and Differences (including the structure of English)</b>	<b>I. Theories and Methods of Bilingual Education</b>	<b>I. The Nature of Culture</b>
A. The sound systems of language (phonology)	A. Foundations	A. Definitions of culture
B. Word formation (morphology)	B. Organizational models: What works for whom?	B. Perceptions of culture
C. Syntax	C. Instructional strategies	C. Intra-group differences (e.g., ethnicity, race, generations, and micro-cultures)
D. Word meaning (semantics)	<b>II. Theories and Methods for Instruction In and Through English</b>	D. Physical geography and its effects on culture
E. Language in context	A. Teacher delivery for both English language development and content instruction	E. Cultural congruence
F. Written discourse	B. Approaches with a focus on English language development	<b>II. Manifestations of Culture: Learning About Students</b>
G. Oral discourse	C. Approaches with a focus on content area instruction (specially designed academic instruction delivered in English)	A. What teachers should learn about their students
H. Nonverbal communication	D. Working with paraprofessionals	B. How teachers can learn about their students
I. Language Change		C. How teachers can use what they learn about their students (culturally responsive pedagogy)
<b>II. Theories and Factors in First- and Second-Language Development</b>	<b>III. Language and Content Area Assessment</b>	<b>III. Cultural Contact</b>
A. Historical and current theories and models of language analysis that have implications for second-language development and pedagogy	A. Purpose	A. Concepts of cultural contact
B. Psychological factors affecting first- and second-language development	B. Methods	B. Stages of individual cultural contact
C. Socio-cultural factors affecting first- and second-language development	C. State mandates	C. The dynamics of prejudice
D. Pedagogical factors affecting first- and second-language development	D. Limitations of assessment	D. Strategies for conflict resolution
E. Political factors affecting first- and second-language development	E. Technical concepts	<b>IV. Cultural Diversity in U.S. and CA</b>
		A. Historical perspectives
		B. Demography
		C. Migration and immigration