

**CALIFORNIA STATE UNIVERSITY SAN MARCOS
SCHOOL OF EDUCATION**

EDMS 543B – Mathematics Education in Elementary Schools

3 Units, CRN 41139, Fall 2011
Wednesday 13:00-15:45, UNIV 441

Instructor: Rong-Ji Chen, Ph.D.
Phone: (760)750-8509
Email: rchen@csusm.edu
Office: UH 309
Office Hours: before & after class or by appointment

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

EDMS 543B focuses on how children develop mathematical understanding; children's mathematical thinking, curriculum development; methods, materials, planning, organization and assessment in various elementary school curricula; and curriculum integration. Methods of cross-cultural language and academic development are 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 your process of becoming a mathematics teacher. We are expected to: (a) deepen our understanding of the mathematics taught at the elementary level, including such topics as place value, base systems, number theory, fractions, proportions, statistics, and algebra, (b) develop an understanding of the current issues and best 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, (g) understand the nature, purposes, and application of mathematics assessment and its relationship with teaching and learning, 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 Integrated Credential Program (ICP)

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 (2010). *Common core state standards for Mathematics*. Sacramento, CA: Author. <http://www.cde.ca.gov/ci/cc/>
- 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 may be required and will be available for download.

You are required to access the following Web sites and materials for this course:

- 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://www.nctm.org/standards/content.aspx?id=16909>
- Star Test Blueprints for Standards Items (grades 2-7) <http://www.cde.ca.gov/ta/tg/sr/documents/math1105.doc>

Recommended Materials

- Carpenter, T. P., Fennema, E., Franke, M. L., Levi, L., & Empson, S. B. (1999). *Children's mathematics: Cognitively guided instruction*. Portsmouth, NH: Heinemann.
- Carpenter, T. P., Franke, M. L., & Levi, L. (2003). *Thinking mathematically: Integrating arithmetic & algebra in elementary school*. Portsmouth, NH: Heinemann.
- Lampert, M. (2001). *Teaching problems and the problems of teaching*. New Haven, CT: Yale University Press.
- Burns, M. (2007). *About teaching mathematics: A K-8 resource* (3rd Ed.). Sausalito, CA: Math Solutions Publications.

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.

Primary Emphases:

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

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, School of Education (SoE) 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 SoE 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. For this class please use APA Manual, 6th edition (see a guide at <http://owl.english.purdue.edu/owl/section/2/10/>).

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 4300, 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 School 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).*

Teacher education is a professional preparation program. Therefore, for this course: Students missing more than one class session cannot earn an A or A-. Students missing more than two class sessions cannot earn a B or B+. Students missing more than three classes cannot earn a C+. Arriving late or leaving early by more than 20 minutes counts as an absence. Notifying the instructor does not constitute an excuse. All assignments must be turned in on due date even in case of an absence.

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	25
Math activity	10	Reflection on math lesson implementation	10
Student interviews	20	Participation & professionalism	10

Detailed information about the assignments will be given in class and/or on the course Moodle (Cougar Courses). You need to submit the assignments (except drawings and children's work) at the course Moodle. You are responsible for ensuring that assignments are submitted correctly and on time. Late assignments may receive a reduction in points unless *prior arrangements* have been made with the instructor.

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

Mathematics 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.

This assignment will be completed with a small group of 4-5 members. Each group will select a math topic in K-8 curriculum and be responsible for presenting activities from the correspondent chapters in the textbook. Your goal is to engage your peer teacher candidates in advancing their understanding of the key ideas, frameworks, effective teaching strategies, and so on in the chapters.

This assignment has 2 components:

1. **Learning Center:** You will put theory to practice. Each member will select an activity from the chapters to teach to a small group in class. Choose the activities that help the class understand the big ideas in the chapters and that demonstrate various instructional strategies. Each individual activity should take about 7-10 minutes. If the activity in the text is too short or too long, you need to adapt it to fit the time frame. The activity should be planned and/or adapted to **show evidence of higher-order thinking** (no bingo games!)
2. After the presentation, each member will write a **one-page reflection** (due 1 week after you have taught your activity). The reflection should describe the effectiveness of your individual math activity. How were your learners able to complete the activity (making content accessible)? What worked and what didn't (student engagement)? In what ways did you modify the activity? What was the level of thinking in the activity? How were you able to assess their understanding? How would you modify the activity the next time?

Mathematics Activity Assignment Grading Rubric

	Approaching	Meets (includes the criteria for Approaching)	Exceeds (includes the criteria for Approaching & Meets)
Learning Center	Activity is engaging...	& requires higher-order thinking...	& provides opportunity for student interaction.
Reflection	Describes what works and what does not work...	& provides an in-depth analysis of (1) the strengths of your teaching/presentation strategies and (2) the aspects of the math activity that work well...	& provides an in-depth analysis of (1) the weaknesses of your teaching/presentation strategies and (2) the aspects of the math activity that do not work. What can be done differently to improve the effectiveness of the math activity?

Student Interviews (20 points) – Conduct two sets of interviews to assess students' understanding of mathematics. In each set of interviews, you will interview one high performing student and one low performing student. The purpose is to gain insight into students' mathematical thinking and

understanding, to evaluate the similarities and differences between the mathematical thinking of students, 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. Sample interview questions will be provided, but you are encouraged to use your own invention. For each set of interviews, you will choose a grade-appropriate mathematical topic from the following six areas: (1) number concepts, (2) addition/subtraction, (3) multiplication/division, (4) fraction, (5) measurement/geometry, and (6) algebraic thinking and will submit a reflective report, including 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 will share/present your interview findings in class. See the Student Interview Guidelines and a sample interview report at the course Moodle. Reports should not exceed 3 pages, double-spaced.

Mathematics Lesson Design (25 points) – You are required to design a lesson (30 to 40 minutes) and teach it in an elementary school classroom. You can work with classmates in lesson planning or do it individually. In case of group work, each of you will implement the lesson separately. Once you have taught the lesson, you will share your teaching experience in the 543 class by means of an oral presentation.

There are 2 assignment format options to choose from:

1. You will videotape your teaching of the lesson, reflect on the effectiveness of the lesson (see below for details), and present selected video clips in class. You should include student work samples in your presentation.

-OR-

2. You will work with other students, ideally at your observation school site, as a study team (groups of 2 or 3 only). The role of the group members will be to observe each others' lessons and take observation notes (template will be provided). Together, you will all reflect and discuss the effectiveness of each lesson in detail (see below for discussion ideas).

During the presentation of your lesson in class, student work samples should be presented and you may call your teammates up to help you discuss your findings (option 2). Study team observation forms (option 2) and student work samples must be submitted with your lesson design plan. Your teaching performance will not affect your grade; it is more the lesson design and your reflection that will be assessed. A lesson design template and the grading rubric will be provided. *Note that they are different than the generic TPA lesson template and rubric.* You will sign up to present your lesson design in class and it will be due on the day of your presentation. Note: you are encouraged to submit a draft of your lesson plan for review before the lesson is taught to students.

Reflection on Mathematics Lesson Implementation (10 points) – You will reflect on the implementation of your mathematics lesson. 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 (0-5 points)	Meets (6-8 points)	Exceeds (9-10 points)
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	(includes the criteria for Approaching)	(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).

Grading Scale

Final course 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		

Tentative Schedule

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

Date	Session, Topics, & Essential Questions	Reading & Assignments
8/31	1. Building a math learning community Course introduction; Overview of math standards. What are characteristics of an effective math classroom?	Syllabus
9/7	2. 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 & drawbacks of math standards? Common core standards Math standards presentations	Van de Walle et al. ch 1 Reflection 1 due
9/14	3. 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 2 due
9/21	4. Lesson Design How do we make decisions about what to teach and how we teach it? How do we provide opportunities for student thinking and interaction? Lesson plan workshop: Bring ideas & materials	Van de Walle et al. ch 3, 4
9/28	5. 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? Lesson plan workshop: Bring ideas & materials	Van de Walle et al. ch 5 Student interview 1 due
10/5	6. Introduction to Cognitively Guided Instruction (CGI). What are some types and structures of math problems? How do students solve problems? How do we help children develop number sense? Math activities- Group 1 presentation*	Van de Walle et al. ch. 8, 9
10/12	7. Using models for math teaching & learning (1) How do we provide opportunities for hands-on explorations of	Van de Walle et al. ch. 10, 11

	<p>mathematics? How can manipulatives help or fail to help children construct math ideas? Math activities- Group 2 presentation*</p>	Reflection 3 due
10/19	<p>8. Using models for math teaching & learning (2) Making sense of operations on whole numbers Lesson design presentations & discussion (1-3)</p>	<p>Van de Walle et al. ch. 12 Lesson Design and Reflection are due on the day of presentation</p>
10/26	<p>9. Making connections among math concepts Why are fractions, decimals, & percents different representations of the same quantity? What are some models for fractions? Math activities- Group 3 presentation* Lesson design presentations & discussion (4-6)</p>	Van de Walle et al. ch. 15
11/2	<p>10. Making sense of operations on fractions Do we need common denominators in order to add or subtract fractions? How do we help students understand operations on fractions? Lesson design presentations & discussion (7-10)</p>	<p>Van de Walle et al. ch. 16 Reflection 4 due</p>
11/9	<p>11. Project-based teaching & learning How can open-ended math tasks allow students to engage in higher-order thinking? Math activities- Group 4 presentation* Lesson design presentations & discussion (11-12)</p>	Van de Walle et al. ch. 19, 20 (levels 0 & 1 only)
11/16	<p>12. Differentiation in math instruction How is mathematics education related to equity and social justice? What are some strategies for differentiating math tasks for all students? Lesson design presentations & discussion (13-16)</p>	Van de Walle et al. ch 6 AND Small (2009) ch 1
11/23	13. Online session; no class meeting	Complete Reflection 5 by 11/30.
11/30	<p>14. The meaning of the equal sign: Pathway to algebra What are children's understanding and misunderstanding of the equal sign? How can we improve children's understanding of the equal sign? Lesson design presentations & discussion (17-20)</p>	<p>Van de Walle et al. ch. 14 Reflection 5 due.</p>
12/7	<p>15. Relational understanding of equality How do children develop understanding of equality? How do we promote a relational understanding of equality? Math activities- Group 5 presentation* Lesson design presentations & discussion (21-22)</p>	Student interview 2 due

Notes: * Presentation of *Mathematics Activities*. After the presentation, you should submit this assignment within a week. For example, if you conduct an activity on number concepts on 10/5, your paper is due on 10/12.