

<b>Course Number</b>	<b>EDMS 543B</b>
<b>Title</b>	<b>Mathematics Education in Elementary Schools</b>
<b>CRN Number</b>	<b>43079</b>
<b>Days</b>	<b>Mondays</b>
<b>Time</b>	<b>4:00 – 6:45 pm</b>
<b>Course Location</b>	<b>UNIV 444</b>
<b>Semester / Year</b>	<b>Fall 2015</b>
Professor	Rong-Ji Chen, Ph.D.
Phone	760.750.8509
E-Mail	rchen@csusm.edu
Office	UH 418
Hours	By Appointment or before and after class

### **SCHOOL OF EDUCATION MISSION & VISION STATEMENT**

*(Adopted by SOE Governance Community, January 2013)*

#### *Vision*

To serve the educational needs of local, regional, and global communities, the School of Education advances innovative practice and leadership by generating, embracing, and promoting equitable and creative solutions.

#### *Mission*

The mission of the School of Education community is to collaboratively transform education. We:

- Create community through partnerships
- Promote and foster social justice and educational equity
- Advance innovative, student-centered practices
- Inspire reflective teaching and learning
- Conduct purposeful research
- Serve the School, College, University, and Community

### **BASIC TENETS OF OUR CONCEPTUAL FRAMEWORK**

- Student centered education
- Research and theory specific to the program field inform practice
- Connections and links between coursework and application
- Strong engagement between faculty and candidates
- Co-teaching clinical practice
- Culturally responsive pedagogy and socially just outcomes

## COURSE DESCRIPTION

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. *Enrollment restricted to students in the ICP.*

### Course Prerequisites

Admission to the Integrated Credential Program

### Course Objectives

Learning to teach mathematics well is challenging and, therefore, this course is but one stage in your process of becoming a mathematics teacher. We are expected to: (a) increase our skills of listening to students and asking questions, (b) develop an understanding of children's content specific thinking, (c) 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, (d) deepen our understanding of the mathematics taught at the elementary school level, including such topics as place value, base systems, number theory, fractions, proportions, statistics, and algebra, (e) develop an understanding of the current issues and best practices in mathematics education, (f) develop a familiarity with the Common Core State Standards, (g) understand the nature, purposes, and application of mathematics assessment and its relationship with curriculum, teaching, and learning, and (h) learn to teach content specific concepts using effective and appropriate strategies, including the educational use of technology.

### Credit Hour Policy Statement

Per the University Credit Hour Policy, students are expected to spend a minimum of six hours outside of the classroom each week because this is a 3-unit course. The course has a few online sessions. The online tasks are designed to reflect an appropriate amount of time needed for the course credit.

## REQUIRED TEXTS, MATERIALS AND ACCOUNTS

### Required Texts

- Kamii, C. (2000). *Young children reinvent arithmetic: Implications of Piaget's theory* (2nd Ed.). New York: Teachers College Press. ISBN-13: 978-0807739044.
- California Department of Education (2010). *California common core state standards for mathematics*. Sacramento, CA: Author. <http://www.cde.ca.gov/ci/cc/> (PDF, free download)
- National Council of Teachers of Mathematics (NCTM) (2014). *Principles to actions: Ensuring mathematics success for all*. Reston, VA: Author. <http://www.nctm.org/PrinciplestoActions/> (eBook/PDF \$5 or print edition \$29)
- Selected chapters in Van de Walle, J. A., Karp, K. M., & Bay-Williams, J. M. (2013). *Elementary and middle school mathematics: Teaching developmentally* (8th ed.). Boston: Allyn & Bacon.
- Several other readings are required and will be available for download.

### Recommended Texts

- Burns, M. (2007). *About teaching mathematics: A K-8 resource* (3rd Ed.). Sausalito, CA: Math Solutions Publications.
- 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.
- Empson, S. B., & Levi, L. (2011). *Extending children's mathematics: Fractions and decimals*. Portsmouth, NH: Heinemann.

- NCTM's professional journal: *Teaching Children Mathematics*, see <http://www.nctm.org/publications/toc.aspx?jrnl=tcm>
- Smith, M. S., & Stein, M. K. (2011). *Five practices for orchestrating productive mathematics discussions*. Reston, CA: National Council of Teachers of Mathematics.

## **COURSE AND PROGRAM LEARNING OUTCOMES**

Upon successful completion of this course, teacher candidates will demonstrate the course objectives listed above, plus the two focused TPEs below.

### **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:

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

Teacher candidates will also complete other courses, clinical practice, and additional requirements for the credential program. Upon successful completion of the program, teacher candidates will demonstrate the following competencies and dispositions:

### **Authorization to Teach English Learners**

This 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. Candidates successfully completing this program receive a credential with authorization to teach English learners. (*Approved by CCTC in SB 2042 Program Standards, August 02*)

### **Teacher Performance Assessment**

Beginning July 1, 2008 all California credential candidates must successfully complete a state-approved Teacher Performance Assessment (TPA), as part of the credential program of preparation. During the 2015-16 academic year the CSUSM credential programs will use either the CalTPA (California Teacher Performance Assessment) or the edTPA (Educative Teacher Performance Assessment).

Check with your program coordinator to determine which assessment is used for your credential program.

#### **CalTPA**

To assist with your successful completion of the CalTPA, 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. The CalTPA Candidate Handbook, TPA seminar schedule, and other TPA support materials may be found on the SOE website:

<http://www.csusm.edu/education/CalTPA/ProgramMaterialsTPA.html>

#### **edTPA**

Beginning in fall 2015, for newly entering initial candidates, the CSUSM assessment system is the edTPA. To assist with your successful completion of the edTPA, a capstone class is part of your curriculum. In this class edTPA related questions and logistical concerns are addressed. Additional support materials are available on the edTPA website:

[http://www.edtpa.com/PageView.aspx?f=GEN\\_Candidates.html](http://www.edtpa.com/PageView.aspx?f=GEN_Candidates.html)

Additionally, to support your success in your credential program and with TPA, SOE classes use common pedagogical language, lesson plans (lesson designs), and unit plans (unit designs).

### **Assessment of Professional Dispositions**

Assessing a candidate's dispositions within a professional preparation program is recognition that teaching and working with learners of all ages requires not only specific content knowledge and pedagogical skills, but positive attitudes about multiple dimensions of the profession. The School of Education has identified six dispositions – social justice and equity, collaboration, critical thinking, professional ethics, reflective teaching and learning, and life-long learning—and developed an assessment rubric. For each dispositional element, there are three levels of performance - *unacceptable*, *initial target*, and *advanced target*. The description and rubric for the three levels of performance offer measurable behaviors and examples.

The assessment is designed to provide candidates with ongoing feedback for their growth in professional dispositions and includes a self-assessment by the candidate. The dispositions and rubric are presented, explained and assessed in one or more designated courses in each program as well as in clinical practice. Based upon assessment feedback candidates will compose a reflection that becomes part of the candidate's Teaching Performance Expectation portfolio. Candidates are expected to meet the level of *initial target* during the program.

## **GENERAL CONSIDERATIONS**

### **School of Education Attendance Policy**

Due to the dynamic and interactive nature of courses in the School of Education, all candidates are expected to attend all classes and participate actively. At a minimum, candidates 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 candidate have extenuating circumstances, s/he should contact the instructor as soon as possible. (*Adopted by the COE Governance Community, December, 1997.*)

**This course:** Teacher education is a professional preparation program. Therefore, candidates missing more than one class session cannot earn an A or A-. Candidates missing more than two class sessions cannot earn a B or B+. Candidates 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.

### **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 Disabled 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.

### **All University 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/>).

### **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 assignments must be original work, clear and error-free. All ideas/material 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 accordingly.

Academic Honesty and Integrity: Students are responsible for honest completion and representation of their work. Your course catalog details the ethical standards and penalties for infractions. There will be zero 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.

Refer to the full Academic Honesty Policy at:

[http://www.csusm.edu/policies/active/documents/Academic\\_Honesty\\_Policy.html](http://www.csusm.edu/policies/active/documents/Academic_Honesty_Policy.html)

### **Plagiarism**

As an educator, it is expected that each candidate 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.

### **Necessary Technical Competency Required of Students**

This course has a few online sessions. To successfully complete online activities, you need to use Cougar Courses (download course documents, watch presentations and videos, upload your assignments, post discussion responses and reply to peers' posts, join online chats, etc.). You need to use e-mail effectively and know how to attach files. It is best that you know how to make minor configuration changes in a Web browser (change font sizes, open and close tabs, allow or disable pop-ups and plug-ins, enable Cookies and JavaScript, etc.). In addition, you are expected to use office applications (such as a word processor, a presentation tool, a spreadsheet tool, an image viewer, a PDF reader, etc.), engage in collaboration and file sharing (such as Dropbox and/or Google Drive & Apps), and apply Web literacy skills (conduct an effective search with a search engine, evaluate trustworthiness of web content, understand copyrights). Lastly, you may need to troubleshoot basic hardware and software problems.

### **Contact Information for Technical Support Assistance**

If you need any technical support, contact IITS Student Help Desk: <http://www.csusm.edu/sth/>.

### **Use of Technology**

Candidates are expected to demonstrate competency in the use of various forms of technology (i.e. word processing, electronic mail, Moodle, 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. All 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 School 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.

## COURSE REQUIREMENTS

Teaching and learning require engaged and reflective participants. It is essential that you 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	Due Date
Mathematics autobiography	-	9/14
Reflections	20	ongoing
Unpacking standards	5	10/10
Clinical student interviews	20	10/19 & 12/7
Lesson design	20	draft 10/26, revision 11/9
Mathematics learning activity	10	varies
Online modules	15	varies
Professional dispositions/participation	10	ongoing

### Assignments

**Mathematics Autobiography**—This assignment will not be graded but will count as part of your participation grade. This assignment has three components:

- Make a drawing of what comes to mind when you think about mathematics (i.e., what mathematics is to you?). Provide a brief explanation of your drawing.
- Define a mathematician. Write a one-paragraph definition. **USE YOUR OWN WORDS AND DEFINITION.** Do not use a dictionary or the Internet.
- Write a 2-to-3-page reflection (double-spaced) on your experience in math. How would you describe your relationship to math? What is math to you? How did you feel when you did mathematics? Discuss your feelings about math and your perception of yourself as a math learner. Did you feel you were an active participant in your math classes, or you felt that you were mostly an outsider? Did you see personal meanings/purposes in math or just to get a grade and move on? If there has been a change in your view of math, please describe your old and new perspectives.

**Reflections**—Each week you will reflect on the readings, observations, or our class activities. You will submit a reflection *during class*. The focus will be on how you make sense of the information rather than a summary. The purpose of the reflections is to prepare you for class discussion and to reflect on your own experiences, beliefs, and theories about mathematics education. There will be time for discussion of the readings so it is imperative that you do the readings each week. The way in which you are asked to reflect may change week to week.

**Unpacking Standards**—You will work with peers and unpack selected California *Common Core State Standards for Mathematics* (CCSS-M). You will explore how the math concepts and skills progress through grade levels in a domain. You will also identify an example (activity, task, problem, or scenario) that addresses particular standards and explain how the example addresses some of the eight standards for mathematical practice.

**Clinical Student Interviews** – The purpose is to gain insight into students' mathematical thinking and 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. You will conduct two clinical interviews. In each interview, you will assess a student's understanding of mathematics and problem solving skills. Interview protocols with sample problems are provided, but you are encouraged to use your own invention with instructor approval. You will pose mathematical problems/tasks for the student to solve. You will ask the student to explain his or her thinking, so you may gain insight into his or her mathematical understanding and strategies. For each interview, you need to submit a 2-to-3-page reflective report. Please also include the student's written work (if available). In addition, you may need to share/present your interview findings in class. See the Student Interview Guidelines and a sample interview report on Cougar Courses.

**Lesson Design**—You will design a *problem-based* math lesson. The lesson needs to focus on *student thinking* and *interaction* (Kamii, 2000). It needs to be aligned with Van de Walle's "teaching through problem solving" framework and requires a higher-level cognitive demand. You are strongly encouraged but not required to (1) implement the lesson in your practicum/clinical teaching classroom; (2) videotape the lesson implementation as it is a powerful means for an in-depth analysis of the effectiveness of the lesson and student learning.

**Mathematics Learning Activity (MLA)**. 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.

We will get into MLA teams. Each team will select a math topic in K-8 curriculum, and each team member will be responsible for conducting an activity within the team's topic (e.g., number sense, algebraic thinking, geometry). That is, each member will teach the math concepts/skills in the activity to your peers that are not on the team in a learning center type format. For example, if your team has 5 members, there will be 5 math activities. Your team will set up 5 learning centers in our class. Each of you will conduct your activity at a learning center. The rest of the class will form into 5 groups, and they will rotate through the 5 learning centers/activities. It means that you have the opportunity to do your activity 5 times, and chances are you will modify the activity to meet the participants' needs. See the course schedule for presentation dates.

Suggested math learning activities will be provided in class and/or on Cougar Courses. You may choose an activity from the course texts or other resources, but you will need to communicate with the instructor before you implement your MLA. You are welcome to design your own activity. Choose/design an activity that helps the class understand the "big ideas" in math education and that demonstrates various instructional strategies. Your goal is to engage your peer teacher candidates in advancing their understanding of the key ideas, frameworks, effective teaching strategies, and so on. At any rate, your activity should be planned and/or adapted to show evidence of higher-order thinking (no bingo games!). Each individual activity should take about 10 minutes. Therefore, if the activity as the way it is described is too short or too long, you need to adapt it to fit the time frame.

After you have conducted your MLA, you need to submit a reflection.

**Online Modules**—There will be a few online sessions. You need to complete a learning module for each online session. The modules will be posted on Cougar Courses.

**Professional Dispositions & Participation**—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).

### **Assignment Policy**

All assignments, requirements, due dates, and scoring rubrics will be available through Cougar Courses. You are responsible to track your grades and progress in the course. In order to successfully complete this course, all assignments must be completed at an acceptable level noted on assignment directions and rubrics. 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. All assignments are due by 11 p.m. on the due date, unless specified otherwise. Reading reflections are typically due in class.

### **Late Assignment Policy**

10% deduction for being one day late, 20% deduction two days late, 30% deduction three days late, and so on. After a week, no assignments will be accepted. If extraordinary circumstances occur, please contact the instructor BEFORE the deadline.

### **Grading Standards**

Final grades are calculated on the standard of:

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		

Failure to complete this course with a grade of C+ or higher will prohibit a teacher candidate from continuing the teaching credential program.



## TENTATIVE COURSE SCHEDULE

The dynamic nature of teaching and learning makes it hard to establish a set schedule. Please note that modifications will likely to occur at the discretion of the instructor.

<b>Date</b>	<b>Session, Topics, &amp; Essential Questions</b>	<b>Reading &amp; Assignments</b>
8/31	1. Building a math learning community - What are characteristics of an effective math classroom? - What is your relationship to math?	Course syllabus
9/7	Labor Day. No class.	
9/14	2. Students as young mathematicians in a community of learners - What does it mean to “do mathematics”? - Affective factors in learning - Understanding students’ thinking in math: Clinical interviews	Kamii, ch 8-9 <b>Math autobiography</b> <b>Reflection 1</b>
9/21	3. Challenging students with rich math tasks - Different levels of cognitive demand of math tasks - MLA & learning centers - Logico-mathematical knowledge (Piaget); student interactions	Kamii, ch 1-3 <b>Reflection 2</b>
9/28	4. Lesson design: Teaching through problem solving - The art of listening to students and asking good questions - Designing problem-based lessons	Van de Walle et al. ch 3&4 <b>Reflection 3</b>
10/5	5. Online session: Unpacking California Common Core State Standards	PtA: pp. 1-57 <b>Reflection 4</b> <b>Unpacking stdr by 10/10</b>
10/12	6. Children’s number sense: Intro 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? <b>MLA team 1 presentation</b>	Carpenter et al. (1996) <b>Reflection 5</b>
10/19	7. Using tools/technology for developing number sense and place-value concepts How do we provide opportunities for hands-on explorations of mathematics? How can manipulatives help or fail to help children construct math ideas? <b>MLA team 2 presentation</b>	Kamii, ch 12, 13 Puchner et al. (2008) <b>Reflection 6</b> <b>Student Interview 1</b> <b>MLA (team 1 members)</b>
10/26	8. Developing understanding in computation How do we help students develop a conceptual understanding of operations on numbers? <b>MLA team 3 presentation</b>	Kamii, ch 4-7 <b>Lesson draft for peer review</b> <b>Reflection 7</b> <b>MLA (team 2 members)</b>
11/2	9. Online session: Children’s computation strategies	<b>MLA (team 3 members)</b>
11/9	10. Developing children’s understanding of fractions How do we help students understand operations on fractions? What are the strengths and limitations of manipulatives for fraction concepts? <b>MLA team 4 presentation</b>	Empson (2011) ch 1-2 <b>Reflection 8</b> <b>Lesson design</b>
11/16	11. Assessment of students’ thinking in mathematics - Assessment strategies and their purposes - Rubrics and scoring	Boaler (2015) <b>MLA (team 4 members)</b>
11/23	12. Online session: Differentiation	
11/30	13. Teaching for conceptual understanding: The case of algebraic thinking Children’s understanding and misunderstanding of the equal sign. How can we improve children’s relational understanding of math? <b>MLA team 5 presentation</b>	Carpenter et al. (2003) ch2-3 <b>Reflection 9: equal sign survey</b>
12/7	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 social justice?	Peterson (2006) Gutstein (2005) <b>Reflection 10</b> <b>Student interview 2</b> <b>MLA (team 5 members)</b>