California State University SAN MARCOS | School of Education

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EDMI 543
Middle Level Mathematics Education
CRN #48856
Days Vary, See Schedule
Time Varies
Woodland Park Middle School 1270 Rock Springs Rd. | San Marcos, CA 92069
Fall 2014

Conceptual Framework Theme: Engaging diverse communities through leading and learning for social justice.

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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

This course focuses on developing an understanding of theory, methodology, and assessment of mathematics in self-contained or departmentalized settings.

Course Prerequisite

Admission to the Middle Level 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 at listening to students and asking questions, (b) develop an understanding of students' 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 middle school level, including such topics as rational and real numbers, proportions, statistics, probability, geometry, and algebra, (e) develop an understanding of the current issues and best practices in mathematics education, (f) develop a familiarity with the NCTM standards and 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.

Required Materials

- Boaler, J. (2008). *What's math got to do with it?* New York: Penguin Books.California Department of Education (2010). *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)Several other readings are required and will be available in library databases.

Recommended Materials

- 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.
- 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.
- Small, M., & Lin, A. (2010). *More good questions: Great ways to differentiate secondary mathematics*. New York: Teachers College Press.
- Smith, M. S., & Stein, M. K. (2011). *Five practices for orchestrating productive mathematics discussions*. Reston, CA: National Council of Teachers of Mathematics.
- 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.
- 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
- NCTM's professional journals: *Mathematics Teaching in the Middle School* (http://www.nctm.org/publications/toc.aspx?jrnl=mtms) and *Teaching Children Mathematics* (http://www.nctm.org/publications/toc.aspx?jrnl=tcm).

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

STUDENT LEARNING OUTCOMES

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/education/CalTPA/CalTPA.html.

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.

CSUSM AND SOE POLICIES

School of Education 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).*

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.

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.

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 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.

COURSE REQUIREMENTS AND GRADING STANDARDS

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	-	9/4
Reflections	15	ongoing
Unpacking standards	10	9/19
Clinical student interview	10	9/29
Mathematics learning activity	10	varies
Lesson design	25	10/3 (draft 9/23)
Assessment of problem solving	10	10/17
Online modules	10	9/26 & 10/17
Professional dispositions/participation	10	ongoing

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

(a) 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.
(b) Define a mathematician. Write a one-paragraph definition. USE YOUR OWN WORDS AND DEFINITION. Do not use a dictionary or Wikipedia.
(c) Write a 2-page reflection (double-spaced) on your experience as a mathematics student (you can start at Kindergarten if you wish!). Position yourself concerning how "good" you are in math. 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?

Reflections – You will reflect on the readings, observations, or our class activities. You will submit a reflection on particular dates (see the schedule below). 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 Interview – 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 a clinical interview with a student to assess his or her understanding of mathematics and problem solving skills. Sample interview questions 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 and will ask the student to explain his or her thinking so you may gain insight into his or her mathematical understanding and strategies. You need to submit a 2-page reflective report. Please also include the student's written work (if available). You may 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 on Cougar Courses.

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 middle school curriculum, and each team member will be responsible for conducting an activity within the team's topic (e.g., fractions, 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. 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 8-10 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.

Lesson Design—This assignment has three components: design, implementation, and reflection. First, working in small groups of 3-4 members, your team will design one single lesson (approximately 40 minutes) for a middle school mathematics class. The lesson needs to be aligned with Common Core State Standards for Mathematics and Van de Walle's "teaching through problem solving" framework and require a higher-level cognitive demand.

Second, you will implement the lesson. There are two options. **Option 1**: 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 in our 543 class. Student work samples are usually helpful in your presentation. **Option 2**: If you cannot gain access to a middle school classroom, you can teach your lesson to your fellow teacher candidates, assuming that they are middle school students. In either case, your teaching performance will not affect your grade. You are encouraged to submit a draft of your lesson plan for review before the lesson is taught.

Lastly, your group will do a collective reflection on the implementation of your lesson and student learning outcomes. Again, if you choose Option 1, videotaping and collection of student work are highly recommended as a means for in-depth reflection.

You will submit both your lesson plan (including all supporting materials such as problem statements, visuals, guidelines, rubric, etc.) and a reflection paper. If you teach your lesson to a middle school class, you will present highlights of your lesson in the 543 class and share your reflection. If you teach your lesson in the 543 class, we will all discuss the effectiveness of the lesson and provide feedback.

Assessment of Problem Solving—This assignment is intended for group work. Your group will analyze and sort students' solution strategies to a math problem based on the effectiveness of strategies or levels of understanding.

- Stage 1: Collecting students' problem solving strategies. You will pose a math problem to a whole class of students and collect their solution strategies. Or you can obtain students' problem solving strategies from your cooperating teacher.

- Stage 2: Interpreting students' understanding and problem solving skills. You will analyze and sort students' solution strategies into 3 to 4 categories/levels of understanding and effectiveness of strategies. Choose a student from each category/level whose work represents that category/level.
- Stage 3: Reporting. Your group will write and submit a report containing: (1) the problem; (2) an overall summary of student performance; (3) categories or levels of student work; (4) which 3 or 4 students or groups will you choose to represent the categories/levels; (5) why do you choose these students? (6) implications for instruction; and (7) a concluding remark on the assessment process: what worked and what could be done differently? The report should not exceed 3 pages. Attach copies/scans of the chosen students' work.

This assignment is based on the framework in Smith and Stein's book (2011) entitled *Five Practices for Orchestrating Productive Mathematics Discussions*.

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 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.

Date	Session/Topics/Essential Questions	Reading & Assignments
8/29 Fri AM	**1. Building an effective math classroom** Course introduction; what are characteristics of an effective math classroom?	Course syllabus Boaler (2008) Intro & ch. 1
9/4 Thur AM	**2. Students as young mathematicians in a community of learners** What does it mean to "do mathematics"? How does affect (beliefs, attitudes, etc.) influence learning?	Boaler (2008) ch. 2-3 **Math autobiography** **Reflection 1 due in class**
9/8 Mon PM	**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?	PtA: pp. 1-29 Explore NCTM Illuminations: http://illuminations.nctm.org/
9/12 Fri AM	**4. Unpacking math standards** How can we design CCSS-based lessons? What are the benefits and drawbacks of math standards? **Planning time for math standards activity—bring your laptop or tablet.**	California CCSS-M PtA: pp. 29-57 **Reflection 2 due in class**
9/15 Mon PM	**5. Lesson design (1): Teaching through problem solving** 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. (2013) ch. 3
9/19 Fri AM	**6. Lesson design (2): Problem-based lessons** The Launch-Explore-Summarize model. How do we orchestrate classroom discussion during a problem-based lesson? **MLA team 1 presentations***	Van de Walle et al. (2013) ch. 4 **Unpacking standards**
9/23 Tue PM	**7. Online session: Assessment of students' thinking in mathematics**	Boaler (2008) ch. 4 **Complete online module by 9/26** **Lesson design draft**
9/29 Mon PM	**8. Using tools and technology in math teaching & learning** How do we provide opportunities for hands-on explorations of math? How can manipulatives help or fail to help children construct math ideas? Introduction to Geometer's Sketchpad. **MLA team 2 presentations***	Puchner et al. (2008) **Clinical student interview**
10/3 Fri AM	**9. Algebraic thinking** What factors are involved on the way from arithmetic to algebra? How can we help students make & justify conjectures and generalizations? *Math topic: Algebraic thinking* **MLA team 3 presentations***	Driscoll, ch. 1-2 **Lesson design**
10/6 Mon PM	**10. Lesson implementations/presentations & discussion (1)** 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?	Boaler (2008) ch. 5 Boaler & Humphreys (2005) ch. 1

Date	Session/Topics/Essential Questions	Reading & Assignments
10/7 Tue PM	**11. Lesson implementations/presentations & discussion (2)** The agendas for sessions 11 and 12 will depend on lesson groups' choices of: (1) implementing the lesson in a middle school classroom, or (2) teaching the lesson to peers in the EDMI 543 class.	Boaler (2008) ch. 7-8 **Reflection 3 due in class**
10/10 Fri AM	**12. Assessing problem solving** How can we gauge students' understanding and problem solving skills? How can we use student work to conduct whole-class discussion on important math concepts? **MLA team 4 presentations***	Smith & Stein (2011) ch. 1-2 **Reflection 4 due in class**
10/13 Mon PM	**13. Online session: Differentiation** What can we do in each of the Launch, Explore, and Summarize phases of a problem-based lesson? How do we differentiate instruction?	**Complete online module by 10/17**
10/14 Tue PM	**14. Socio-political issues in math education** How does traditional math education preserve elite groups while denying other children access to powerful math? How is math education related to civil right and social justice? **MLA team 5 presentations***	Boaler (2008) ch. 6 Gutstein (2005a) Gutstein (2005b) **Reflection 5 due in class**
10/17 Fri AM	**15. Reading, writing, & communication in math** 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?	Selected article in MTMS **Assessment of problem solving** **MLA**

Notes: * Presentation of Mathematics Learning Activities (MLA). After the presentation, you should submit this assignment within a week. For example, if you conduct an activity on 9/19, your paper is due on 9/26.