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| Course & Section Nos. | EDMI 543 Sec 1 |
| Course Title | Middle Level Mathematics Education |
| Class Roster No. | 40963 |
| Course Days | Days vary, see schedule |
| Time | Time varies |
| Course Location | Woodland Park Middle School, Room 309 |
| Semester / Year | Fall 2016 |
| Professor | Rong-Ji Chen, Ph.D. |
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| Office 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

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

Course Prerequisites

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 of 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 California 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. The course also provides an opportunity for you to reconsider your relationship to mathematics.

The course will also address the five themes in the Middle Level Program: (1) Learning happens in caring communities. (2) Students are the center of our work. (3) Teaching is the negotiation among theory, practice, and students. (4) Empowerment of students is essential to the students' meaningful participation in a democratic society. (5) Education requires political action to achieve a just society.

REQUIRED TEXTS, MATERIALS AND ACCOUNTS

Required Texts

- Boaler, J. (2016). *Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages and innovative teaching*. San Francisco, CA: Jossey-Bass. ISBN 9780470894521.
- California Department of Education (2013). *California common core state standards for mathematics*. Sacramento, CA: Author. <http://www.cde.ca.gov/ci/cc/> (PDF, free download)
- California Department of Education (2016). *Mathematics framework for California public schools: Kindergarten through grade twelve*. Sacramento, CA: Author. <http://www.cde.ca.gov/ma/cf/mathfwchapters.asp> (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 Texts

- Van de Walle, J. A., Karp, K. M., & Bay-Williams, J. M. (2015). *Elementary and middle school mathematics: Teaching developmentally* (9th 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.

- Smith, M. S., & Stein, M. K. (2011). *Five practices for orchestrating productive mathematics discussions*. Reston, VA: 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?jrn=mtms>) and *Teaching Children Mathematics* (<http://www.nctm.org/publications/toc.aspx?jrn=tcm>).

Hansen Curriculum Library: You are encouraged to use the books, manipulatives, and multimedia in the Hansen Curriculum Library, located on the 5th floor of the Kellogg Library on the CSUSM main campus.

Cougar Courses

The course materials and assignments are posted at Cougar Courses, accessible at <https://cc.csusm.edu/>.

COURSE AND PROGRAM LEARNING OUTCOMES

Upon successful completion of this course, teacher candidates will demonstrate the course objectives listed above. 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 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 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).

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>

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).

Expected Dispositions for the Education Profession

Education is a profession that has, at its core, certain dispositional attributes that must be acquired and developed. 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 that must be evident in teacher candidates: social justice and equity, collaboration, critical thinking, professional ethics, reflective teaching and learning, and life-long learning. These dispositions have observable actions that will be assessed throughout the preparation program. 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.

TENTATIVE COURSE SCHEDULE/ COURSE OUTLINE

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 |
|--------------------|---|--|
| 9/1 Thur AM | 1. Building an effective math classroom What are characteristics of an effective math classroom? What is your relationship to math? | Course syllabus Boaler (2016) Intro & ch 1-2 |
| 9/6 Tue 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 (2016) ch 3 Math autobiography Reflection 1 due in class |
| 9/8 Thur AM | 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? | Boaler (2016) ch 5 Explore NCTM Illuminations: http://illuminations.nctm.org/ |
| 9/8 Thur PM | 4. Math discourse 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? | Smith & Stein (2011) intro + ch 1&3 |
| 9/13 Tue AM | 5. Math games and activities How can we look into the mathematical concepts in a few popular games? How do we engage students in problem solving activities? | TBD |
| 9/16 Fri AM | 6. 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? MLA team 1 presentations* | Van de Walle et al. (2013) ch 3 Reflection 2 due in class |
| 9/20 Tue AM | 7. Online session: Unpacking math standards How can we design CCSS-based lessons? What are the benefits and drawbacks of math standards? | Principles to Actions: pp. 1-57 MLA (if presented) |
| 9/23 Fri PM | 8. Lesson design (2): Problem-based lessons What is the Launch-Explore-Summarize model? How do we orchestrate classroom discussion during a problem-based lesson? | Boaler (2016) ch 4 Clinical student interview |
| 9/27 Tue AM | 9. Algebraic thinking How do we help students make connections among math representations? How can we help students make & justify conjectures and generalizations? MLA team 2 presentations* | Driscoll (1999), ch 1-2 Reflection 3 due in class |
| 9/30 Fri PM | 10. Online session: Assessment of students’ thinking in mathematics | Boaler (2016) ch 8 MLA (if presented) |
| 10/4 Tue AM | 11. Geometric thinking How is geometric thinking a viable way for solving programs? How do we provide opportunities for investigations of shapes and relationships? Introduction to Geometer’s Sketchpad. MLA team 3 presentations* | |
| 10/7 Fri AM | 12. 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? | Boaler (2016) ch 9 Reflection 4 due in class |
| 10/11 Tue 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? | |

| Date | Session/Topics/Essential Questions | Reading & Assignments |
|--------------------|--|---|
| 10/14 Fri AM | 14. 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? MLA team 4 presentations* | Selected articles in MTMS Lesson design (temporary due date) |
| 10/18 Tue AM | 15. Equity and social justice 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 (2016) ch 6-7 Reflection 5 due in class MLA (final date 10/21) |

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 9/16, your paper is due on 9/23.

COURSE REQUIREMENTS AND GRADED COURSE COMPONENTS

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.

Course Assignments

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

| Assignment | Points | Due Date |
|---|--------|--------------|
| Mathematics autobiography | - | second class |
| Reflections | 20 | ongoing |
| Clinical student interview | 15 | 9/23 |
| Lesson design | 20 | 10/14 |
| Mathematics learning activity | 10 | varies |
| Online modules | 20 | varies |
| Professional dispositions/participation | 15 | 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 math (i.e., what math 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 the Internet.
- (c) 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—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.

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. You will assess the 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*. 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 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. Your activity should be planned and/or adapted to show evidence of conceptual understanding or other higher-order thinking rather than merely memorization or procedures without understanding. Each individual activity should take about 10 minutes (for your peer teacher candidates). 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.

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.

Final Exam Statement

There will be no final exam.

School of Education/Course 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.

Policy on Late/Missed Work

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

GENERAL CONSIDERATIONS

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

Plagiarism

As an educator, it is expected that each candidate (course participant) 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 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.

Credit Hour Policy Statement

Per the University Credit Hour Policy, students are expected to spend a minimum of 11 hours outside of the classroom each week because this is a 3-unit course in an 8-week timeframe. The course has a few online sessions. The online tasks are designed to reflect an appropriate amount of time needed for the course credit.

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/>).

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/>.

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.