

**CALIFORNIA STATE UNIVERSITY SAN MARCOS
SCHOOL OF EDUCATION (Fall 2012)**

**EDMS 543 (02) –Elementary Mathematics Education (3 Units)
Monday: 8:30 AM – 3:00 PM (Bonsall Elementary School)**

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Office Hours: Monday 3:00 PM -3:30 PM or by appt.

School of Education Mission Statement

The mission of the School 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 on-going service. Our practices demonstrate a commitment to student-centered education, diversity, collaboration, professionalism, and shared governance. (*Adopted by COE Governance Community, October, 1997*).

COURSE DESCRIPTION

EDMS 543 focuses on curriculum development, methods, techniques, materials, planning, organization and assessment in various elementary school curricula, and curriculum integration. Methods of cross-cultural language and academic development will be integrated into the course. The course requires participation/observation in the public schools.

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, and (g) develop strategies to create a classroom environment that promotes the investigation and growth of mathematical ideas and to ensure the success of all students in multi-cultural settings.

Course Prerequisites

Admission to the Multiple Subject/CLAD Teacher Credential Program is a prerequisite.

Course Objectives

1. Using reflective writings, teacher candidates will provide ongoing evidence of good depth of understanding as well as application to the classroom, of chosen ideas from weekly assigned readings and/or responses to prompts provided by the instructor related to assigned readings and/or current issues in mathematics.
2. Using the interview process to apply the pedagogical content knowledge that is being learned in the course, teacher candidates will improve their use of inquiry for assessment purposes by focusing on students' thinking about mathematics to better understand elementary level students with different understandings.
3. By merging theory and practice in order to enable their future students to understand a mathematical topic and make connections among ideas related to this topic, teacher candidates will participate in the design, construction, and presentation of an engaging mathematical lesson plan activity that is: reform-minded, hands-on, cognitively challenging, contains differentiated instruction, and focuses on students' mathematical

thinking.

4. By engaging in problem-solving contexts and assessing student problem solving, candidates will learn about, identify, and select quality learning experiences for children that promote mathematical inquiry and conceptual development.
5. Candidates will demonstrate understanding and application of the Common Core Content Standards for Mathematics and the varieties of expertise that mathematics educators at all levels should seek to develop in their students.
6. Teacher candidates will engage in coursework that leads to preparation for engaging in Teaching Performance Assessment (TPA) tasks.

Unique Course Requirements

Students will be required to have access to children in a grade K-6 for the purpose of conducting a series of math interviews to learn about how children think and problem solve and for implementing and videotaping a math learning activity.

Required Texts

- Van De Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2013). *Elementary and middle school mathematics: Teaching developmentally* (8th ed.). Boston: Pearson. ISBN: 978-0-13-261226-5

Web site for Blackline Masters suggested in the course text:

http://wps.ablongman.com/ab_vandewalle_math_6/54/13858/3547876.cw/index.html

- California Department of Education (2006). *Mathematics framework for California public schools, kindergarten through grade twelve* (2006 Revised Ed.). Sacramento, CA: Author. This document can be found on the WWW at:
<http://www.cde.ca.gov/ci/ma/cf/documents/mathfrwkcomplete.pdf>. The Web site contains a downloadable PDF file. There are also copies in the library for checkout.
- California Department of Education (2010). *Common core state standards for mathematics*. Sacramento, CA: Author.
http://www.scoe.net/caststandards/agenda/2010/math_ccs_recommendations.pdf
- Turnbull, A., Turnbull, R., & Wehmeyer, M. (2010). *Exceptional lives: Special education in today's schools*. (6th ed). Upper Saddle River, NJ: Pearson/Merrill. ISBN: 978-0-13-502696-0

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. This document can be found at: <http://www.nctm.org/standards/content.aspx?id=16909>
- Standardized Testing and Reporting (STAR) CST Mathematics Blueprint: Standards Items (grades 2-7)
<http://www.cde.ca.gov/ta/tg/sr/documents/math1105.doc>

INFUSED COMPETENCIES

Special Education

Consistent with the intent to offer a seamless teaching credential in the School of Education, this course will demonstrate the collaborative infusion of special education competencies that reflect inclusive educational practices.

Authorization to Teach English 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 SB 2042 Program Standards, August 02)

Technology

This course infuses technology competencies to prepare candidates to use technologies, emphasizing their use in both teaching practice and student learning. Students 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. Please keep a digital copy of all assignments.

You must use your Moodle and campus email accounts for this class. The best way to contact me is by e-mail.

COURSE POLICIES

School of Education 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. Absences and late arrivals/early departures will affect the final grade. 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).*

For this class, if you miss one class session or are late (or leave early) more than two sessions, you cannot receive a grade of "A" and your highest possible grade is a "B". If you miss two class sessions, your highest possible grade is a "C+". **Attendance will be taken at each class session.**

If possible, please discuss with the instructor any extenuating circumstances that will cause you to miss class prior to your absence. Absence is no excuse for not turning in assignments, as they may be sent electronically (e-mail) to the instructor if an absence arises or is anticipated. Please ensure that e-mailed assignments are sent by the start of the class session that the assignment is due. **NOTE: With few exceptions, late assignments will not be accepted.**

All University Writing Requirement

In keeping with the All-University Writing Requirement, all 3-unit courses must have a writing component of at least 2,500 words (approximately 10 pages), which can be administered in a variety of ways. Writing requirements for this course will be met as described in the assignments.

Computer Use During Class Sessions

You are welcome to use a laptop computer in class when working on class assignments, for example. However, you will need to save checking email or other personal computer use for time outside of class. Most students find it disruptive when they are focusing on class activities or listening to presentations and can hear keyboarding in the classroom. When the instructor or your cohorts are speaking or when class activities are in proceeding, your computer will not be in use. Your kind consideration is greatly appreciated by all!

Cell Phones

Please turn off your cell phone before the start of each class. In addition, there will be no texting during class. It is unprofessional for teachers to use their cell phone during meetings with peers or during professional development activities (our class is considered professional development!).

Person-First Language

Use "person-first" language in all written and oral assignments and discussions (e.g., "student with autism" rather

than “autistic student”). Disabilities are not persons and they do not define persons, so do not replace person-nouns with disability-nouns. Further, emphasize the person, not the disability, by putting the person-noun first.

Students With Disabilities Requiring Reasonable Accommodations

Students must be approved for services by providing appropriate and recent documentation to the Office of Disabled Student Services (DSS). This office is located in Craven Hall 4300, and can be contacted by phone at (760) 750-4905, or TTY (760) 750-4300. 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.

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.

STUDENT LEARNING OUTCOMES

Teacher Performance Expectation (TPE) Competencies

The course objectives, assignments, and assessments have been aligned with the CTC standards for the 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.

Teacher Performance Expectation (TPE) Competencies:

Primary Emphases:

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

Secondary Emphases:

- TPE 3-Interpretation and Use of Assessments
- TPE 4-Making Content Accessible
- TPE 5-Student Engagement
- TPE 6a-Developmentally Appropriate Practices in Grades K-3
- TPE 6b-Developmentally Appropriate Practices in Grades 4-8
- TPE 6d- Developmentally Appropriate Teaching Practices for Special Education: Teaching the Special Education Population in the General Education Environment

- TPE 7-Teaching English Learners
- TPE 8-Learning About Students
- TPE 9-Instructional Planning
- TPE 10-Instructional Time
- TPE 11-Social Environment
- TPE 13-Professional Growth

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, 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: <http://www.csusm.edu/education/CalTPA/ProgramMaterialsTPA.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.

COURSE REQUIREMENTS/ASSIGNMENTS

Each written assignment is expected to have a clear organizational presentation and be free of grammar, punctuation and spelling errors. There will be a reduction in points for the above mentioned errors. Late assignments will not be accepted. Prepare carefully for class, be ready to discuss readings and assignments thoughtfully and actively participate in all class activities. Note the Description of Exemplary Students in this syllabus (p. 8).

	<u>Total % of Course</u>
1. Active Participation and Collaboration (all or nothing credit given)	10%
2. Reading Accountability & Classroom Activities (Forums, Reflections, Responses, and other activities)	30%
3. Student Math Interview and Assessing Problem-Solving	20%
4. Mathematical Lesson Design	20%
5. Mathematics Learning Activity, Implementation & Videotape	20%

DESCRIPTIONS OF ASSIGNMENTS

The relative weight for each assignment is indicated as a percentage of the total course grade.

Detailed assignment guidelines and scoring rubrics will be provided. The course calendar/topics schedule is attached to this syllabus.

Active Participation and Collaboration (10%) - Individual

Defined as actively engaging and contributing in all class discussions and activities, students will be evaluated daily. You are expected to actively participate in discussions, group work, presentations, and hands-on activities throughout the course. A positive professional disposition includes a willingness to consider and discuss new ideas objectively and to exhibit curiosity, perseverance and seriousness about improving oneself as a teacher. All students are expected to exhibit professional behavior and demeanor at all times. All or nothing credit is given for this course component.

Reading Accountability/Book Club: Demonstrating Evidence of Understanding (30%) – Individual

Each week students will :

1. Choose one chapter each week from the assigned readings and provide evidence of having read and understood the content of the chosen chapter. You may choose to demonstrate your knowledge of the Big Ideas contained in the reading by preparing a graphic organizer, a concept map, a bulleted list, drawings, or another method of your choice. The complete list of choices is located in a Moodle course folder.

Reflection papers will also be related to self-assessment and course-related activities and assignments per the instructor's guidelines.

- 2) Engage in classroom activities that are designed for students to demonstrate their understanding of the text and other readings.

Each paper should clearly articulate your thoughts **on the assigned reading or prompts** and how you might **specifically apply** what you learned to the mathematics classroom. Please do not repeat verbatim or quote from the readings. **Other written assignments may be given that will substitute the written reflection but not the reading assignment.**

Student Math Interviews (20%) - Individual Write-ups

You will conduct two different student interviews based on questions provided in class. Each interview is worth 10 points. For each interview, you will pose mathematical problems to any one student at a predetermined grade level. The purpose is to get you to begin thinking about students' mathematical understanding, to learn how to effectively pose questions, interpret the meaning of students' responses, and to provide you with an opportunity to interact with students. For each interview, you need to submit a report of no more than two pages (11" font, line spacing of 1.5). Please include the child's written work. You may work with a peer in the interviewing process, but each needs to write his/her own report. The following two documents can be found in the *Course Documents and Resources* folder in Moodle: *Interviewing Guidelines* and *Student Math Interviews*.

Mathematical Lesson Design: Teaching Through Problem Solving (20%) – Partner or Small Group

The purpose of this assignment is to help you learn how to design effective problem-based mathematical activities and lessons and to provide an opportunity for you to practice teaching mathematics. Working in small groups of 2-3 members, your team will design one standards-based lesson (approximately 35-40 minutes in length) that you will present in your cohort class.

In your lesson, you must use focus on problem-based activities, and the lesson must be differentiated. Your lesson activity must be reform-minded, hands-on, cognitively challenging, contain differentiated instruction, focus on students' mathematical thinking, AND provide the opportunity for you to gather evidence of student learning (i.e., student work that you can assess) if you were to implement the lesson in a practicum classroom. **No Bingo games for your lesson activity! You will present your lesson to the cohort with full participation from your peers.** More specific details and guidelines will be given in class. The lesson design template is attached to this syllabus.

Mathematics Learning Activity/Learning Centers- small collaborative groups: (10%)

The purpose of this assignment is to provide you with opportunities to (1) experience teaching a math activity in a small group setting, (2) practice questioning skills and strategies to engage all students, (3) reflect on student learning and adjust teaching accordingly.

You will be assigned to a group of 3-4 class members, and the group will choose a specific chapter in the course text as well decide which grade level each member will concentrate on. Each member will select an activity from the chapters to teach to small groups in class in the form of learning centers. Choose activities that help the class understand the big ideas in the chapter and that demonstrate various instructional strategies.

On the day of presentation, each individual activity should take about 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 and conceptual understanding. Your goal is to engage your peer teacher candidates in advancing their understanding of the key ideas, frameworks, and effective teaching strategies in the chapters.

A write-up of the activity should include your name, an activity title, grade level, grade-level state content standards, learning objective(s), materials, a description of the activity, teaching tips for your activity, and instructional differentiation one EL, one SPED, and one accelerated learner (10 pts). Post your write-up to the appropriate forum link on Moodle (TBA) where all of your cohorts' MLA will be available for your future teaching.

This assignment has 3 additional components and will be completed with your group members:

1. Chapter Presentation: Your group will put together a *10-minute* PPT presentation about the chapter, highlighting its instructional strategies, models, types of problems, and the features that you will be demonstrating in your learning center activities.
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. To what extent were all of your learners able to complete the activity (making content accessible) and how did you

know? What worked and what didn't (student engagement)? In what ways did you modify the activity and why? 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? *Please submit a hard copy of your reflection to the course instructor. (5 %).*

3. Each group member will implement his/her MLA in an elementary classroom (preferably in your CP classroom) and videotape the implementation. Ask your cooperating teacher if permission is needed from parents. If any of the MLAs has been videotaped by the date of class presentation, one video may be presented to your cohort peers (choose who will present their video) **(5 %)**

GRADING SCALE: Grades for this course 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

Exemplary “A” Students:

- Demonstrate serious commitment to their learning, making full use of the learning opportunities available and searching out the implications of their learning for future use.
- Complete all assignments thoroughly and thoughtfully toward the goal of developing in-depth math projects.
- Make insightful connections between all assignments and their developing overall understanding of mathematical concepts; they continually question and examine concepts in a genuine spirit of inquiry.
- Show a high level of achievement of course goals.

“B” Students:

- Simply comply with the course requirements and expectations.
- Complete all assignments, usually thoroughly and thoughtfully.
- Usually connect assignments to their developing overall understanding of mathematical concepts; may be satisfied with accepting their learning as it is received without deeply examining concepts or seeking a higher level of understanding.
- Show reasonable achievement of course goals.

Remember! You are required to maintain a B average (3.0 GPA) in your teacher education courses to receive a teaching credential in the State of California.

Lesson Design Elements

Elements of the learning experience

Lesson Title: What is the title of your lesson?

Grade Level:

Content Area: Mathematics

Subject Matter: Number Sense, Measurement and Geometry, Algebra and Functions, Statistics, Data Analysis and Probability, Mathematical Reasoning

Time period for the learning experience:

California Mathematics Content Standards: State-adopted content standards

Lesson objective(s) based on the content standards: What do you want students to be able to do as a result of active engagement and learning in your lesson? What do you want students to know when the lesson investigation is finished? Write in complete sentences. Use an action verb and explain how students will demonstrate their new knowledge and understanding.

Example: "The student will demonstrate understanding of _____." Or, "The student will be able to _____."

Mathematical Concept(s): What are you trying to teach? What big idea(s) is/are the focus of your lesson? Do not say, "The students will _____. (That is an objective, not a concept.)

Example: In the set model for fractions, the whole is understood to be a set of objects and subsets of the whole make up fractional parts.

Class Description - For the purpose of this assignment, the class description must include English Learners, Special Education students, and GATE students. Individualize this section based on your own assigned classroom.

Type of class (self contained, subject specific), time of year, general background of students learning in relationship to new learning (challenges and prior learning)

English Learners:

Special education:

GATE student:

Regular education:

Developmental needs of the students at this age

Learning needs and developmental, age-appropriate skills needed by your students based on grade level.

Student Groupings: How will you group students for instruction?

Materials/Resources/Technology: What does the teacher need? What do the students need? Materials should include lists of supplies that will be needed to present this lesson.

Assessment Plan

Note: Goals/objectives that will be assessed are based on the content standards and are tied to the Big Idea(s) (concepts) in your lesson.

Types of assessment: Prior knowledge (pre assessment), Formative (progress monitoring), Summative (final product)

Description and Purpose of each Assessment Type listed above

Feedback strategies: How students will be informed of specific successes and challenges?

*Description & Purpose of Differentiated/Adapted Assessment Methods for **ONE** of the following students:*

- English Learner
- Learner with Special Needs
 - Learning Disability
 - Physical Disability
- GATE Student/Advanced Learners/Accelerated Learner

How general assessment results will be used to inform instruction:

Criteria for Assessment

What benchmark criteria will you use to grade the assessment? How will you know if a student has successfully completed the assessment and accomplished the learning goals? What will they do to show you they have succeeded?

NOTE: Criteria are based on the science content standards and the learning goals/objectives in your lesson.

Lesson Activities: Address the subject matter lesson objectives (tied to math content standards and developmental needs of the students described).

Instructional Strategies- <i>What the teacher does during the instruction.</i>	Student Activities – <i>What the students do during the lesson and independent practice.</i>
Opening the Lesson/ INTO = Before the Lesson Anticipatory Set - How will you motivate and focus students? What prior knowledge do students need?	What will the students do?
Process/Steps of Instruction/ THROUGH = During the Lesson Please ensure that the following GUIDING QUESTIONS are addressed in this area of your lesson design. 1. How will you describe and model skills/tasks? 2. How will you explain the mathematical concept(s)? 3. How will teach to the objective(s)? 4. How will you actively involve <u>all</u> students? 5. How will you structure opportunities for the students to practice in class with support? 6. How will you check for students' understanding? 7. How will you structure opportunities for the students to practice independently? 8. How will you ensure that the independent practice is at the appropriate level of difficulty for the various students? 9. Closure: How will you have students summarize their learning? 10. How will you assess that students have met the learning objectives?	For each of the steps of instruction (what the teacher does), describe what the <u>students</u> will do

11. What will your interventions consist of if the learning objectives are not being met?	
BEYOND = After the Lesson = Extending Learning Transfer: How will you structure opportunities for students to continue learning/practice and transfer learning after the lesson?	What will the students do?

Description & Purpose of Differentiated/Adapted Instructional Methods for ONE of the following students:

- *English Learner*
- *Learner with Special Needs*
 - *Learning Disability*
 - *Physical Disability*
- *GATE Student/Advanced Learners/Accelerated Learner*

Rationale for Instructional Strategies:

Why are the instructional strategies, student activities and resources appropriate for this class, (based on content and student development)?

TentativeCourse Schedule: Fall 2012**

DATE	EDMS 543 COURSE TOPICS & ASSIGNMENTS (M)	READINGS (Text and Other Sources)
8/27/12	Introduction to Mathematics Education What does it mean to “do mathematics”? (Big picture) Characteristics of Effective Classrooms: Overview of Instructional Practices Developing understanding—How do kids learn? Problem solving in the mathematics classroom Unpacking the standards : Common Core Content Standards (CCCS) for Mathematics Mathematics Content Standards for CA Public Schools	1. Teaching Mathematics in the 21 st Century 2 - Exploring What It Means to Know and Do Mathematics 3 -Teaching Through Problem Solving
9/10/12	Building a Math Learning Community Lesson Planning - Conceptual vs. procedural knowledge - Introduction to Cognitively Guided Instruction (CGI) - Assessment – Connecting instruction to assessment Student Math Interviews Group presentations of assigned CCCS for Mathematics	4 - Planning in the Problem- Based Classroom 5 - Building Assessment into Instruction
9/17/12	Special Populations: Creating Inclusive Mathematics Classrooms Math and Special Populations activity Number Sense I: What it means and how we can help children develop it.	6 - Teaching Mathematics Equitably to All Children Math & special needs presentations 8 - Developing Early Number Concepts and Number Sense
9/24/11	PRACTICE INTERVIEW DUE (Everyone) Number Sense II: Classification of word problems for addition, subtraction, multiplication, and division. Constructing efficient mental tools for fact mastery. Number Sense III: How do we promote understanding of place value? Place Value Interview due (option 2) Math Learning Activities: Chapters 9, 10, & 12	9 - Developing Meanings for the Operations 10 - Helping Children Master the Basic Facts 11 – Developing Whole-Number Place-Value Concepts
10/01/12	Number Sense IV: Developing flexible methods of computation/mental strategies/estimation. Error Patterns in Computation Number and Operations Lesson Classroom Presentation Addition/Subtraction OR Multiplication/Division interview due (turn in only one interview) (option 2) Algebraic Reasoning and Functions – Exploring patterns, variables, and equations.	12 – Developing Strategies for Addition and Subtraction Computation 13 - Developing Strategies for Multiplication and Division Computation 14 - Algebraic Thinking: Generalizations, Patterns, and Functions
***1		
***2	Operations and Algebraic Reasoning Lesson Classroom Presentation Algebra interview due (option 2) Math Learning Activities: Chapters 14 & 16	23 – Developing Concepts of Exponents, Integers, and Real Numbers
10/08/12 ****3	Algebra Lesson Classroom Presentation Fractions I: Constructing understanding of fractions; fraction computation Fraction Lesson Classroom Presentation	15 - Developing Fraction Concepts 16 – Developing Strategies for Fraction Computation
****4		

	Fractions interview due (option 2) Math Learning Activities: Chapters 19, & 20	17 – Developing Concepts of Decimals and Percents 18 – Proportional Reasoning
10/15/12 ****5 ****6	Measurement - Customary and metric system Measurement Lesson Classroom Presentation Measurement interview due (option 2) Geometry – Developing geometric reasoning and spatial sense Geometry Lesson Classroom Presentation Geometry interview due (option 2)	19 - Developing Measurement Concepts 20 - Geometric Thinking and Geometric Concepts
10/22/12 ****7	Probability & Data Analysis – Developing meaningful experiences in gathering and displaying statistical data. Exploring concepts of chance, simple and independent events. Statistics and Data Analysis Lesson Classroom Presentation Probability & Data Analysis interview due (option 2)	21 – Developing Concepts of Data Analysis 22 – Exploring Concepts of Probability
	Assessment - This competency will be infused throughout the course. Use this chapter as one reference for planning instruction. Technology – This competency will be infused throughout the course. Use this chapter as an ongoing reference.	5 - Building Assessment into Instruction 7 – Using Technological Tools to Teach Mathematics

*** * NOTE: While this syllabus is carefully planned, it may be modified or adjusted at any time in response to the learning needs of the class.**

PROBLEM-BASED THREE-PART LESSON INSTRUCTIONAL MODEL

Problem-centered teaching opens the mathematics classroom to exploring, conjecturing, reasoning, and communication. This model is very different from the “transmission” model in which teachers tell students facts and demonstrate procedures and then students memorize the facts and practice the procedures. This model looks at instruction in three phases: launching, explore, and summary.

Launch (Before)

In the first phase, the teacher launches the problem with the whole class. This involves helping students understand the problem setting, the mathematical context, and the challenge. The following questions can help the teacher prepare for the launch:

- What are students expected to do?
- What do the students need to know to understand the context of story and the challenge of the problem?
- What difficulties can I foresee for students?
- How can I keep from giving away too much of the problem?

The launch phase is also the time when the teacher introduces new ideas, clarifies definitions, reviews old concepts, and connects the problem to past experiences of the student. It is critical that, while giving students a clear picture of what is expected, the teacher leaves the potential of the task intact. He or she must be careful not to tell too much and lower the challenge of the task to something routine or to cut off the rich array of strategies that may evolve from an open launch of the problem.

Explore (During)

In the explore phase, students work individually, in pairs, in small groups, or occasionally as a whole class to solve the problem. As they work, they gather data, share ideas, look for patterns, make conjectures, and develop

problem-solving strategies. It is inevitable that students will exhibit variation in their progress. The teacher's role during this phase is to move about the classroom, to observe individual performance, and to select specific student work samples to be shared during the summary phase. The teacher helps students persevere in their work and differentiate their work by asking appropriate questions and providing confirmation and redirection where needed. For students who are interested in and capable of deeper investigation, the teacher may provide additional challenges related to the problem. Although it is imperative that all students be given enough time and opportunity to thoroughly work on the problem, it is not always necessary for every student to finish the problem at this time.

The following questions can help the teacher prepare for the explore phase:

- How will I organize the students to explore this problem? (Individuals? Pairs? Groups? Whole class?)
- What materials will students need?
- How should students record and report their work?
- What different strategies can I anticipate they might use?
- What questions can I ask to encourage student conversations, thinking, and learning?
- What questions can I ask to focus their thinking if they become frustrated?
- What questions can I ask to challenge students if the initial question is "answered"?

Summary (After)

The summary phase of instruction begins when students have gathered sufficient data or made sufficient progress toward solving the problem. In this phase, students discuss their solutions as well as the strategies they used to approach the problem, organize the data, and find the solution. During the discussion, the teacher helps students enhance their understanding of the mathematics in the problem and guide them in refining their strategies into efficient, effective problem-solving techniques.

Although the summary discussion is led by the teacher who has collected specific student work samples he or she would like shared, students play a significant role. Ideally, they should pose conjectures, question each other, offer alternatives, provide reasons, refine their strategies and conjectures and make connections. As a result of the discussion, students should become more skillful at using the ideas and techniques that come out of the experience with the problem.

During the summary phase, content goals of the problem, investigation, and unit can be addressed, allowing the teacher to assess the degree to which students are developing their mathematical knowledge. At this time, teachers can make additional instructional decisions that will enable all students to reach the mathematical goals of the activities.

The following questions can help the teacher prepare for the summary:

- How can I help the students make sense of and appreciate the variety of methods that may be used?
- How can I orchestrate the discussion by choosing specific student work samples that will help students summarize their thinking about the problems?
- What concepts or strategies need to be emphasized?
- What ideas do *not* need closure at this time?
- What definitions or strategies do we need to generalize?
- What connections and extensions can be made?
- What new questions might arise and how do I handle them?
- What will I do to follow-up, practice, or apply the ideas after the summary?

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