California State University, San Bernardino

CSUSB ScholarWorks

Spring 2020

Syllabus for Semester Bridge Course: Fundamental Concepts of Math for Educators: Fundamental Concepts of Algebra and Geometry & Problem Solving Through Theory and Practice (Math 301A QBR)

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California State University, San Bernardino
College of Natural Sciences/Math Department
Math 301AQBR Section ___ Class Number:_____
Fundamental Concepts of Math for Educators:
Fundamental Concepts of Algebra and Geometry & Problem Solving Through Theory and Practice

<u>Course and Instructor Information</u>

Instructor: _____   Class Days/Time: _____   Classroom: _____

Email: _____   Telephone: _____   Office location: _____

Office hours: _____

<u>Course Description</u>

Welcome! In this course we will develop an understanding of the mathematical concepts underlying K-8 mathematics. In addition, we will develop an appreciation of and facility for mathematical and logical problem solving. During the quarter we will work on Chapters 1-4, 6, & 7 of the Sowder text. This will provide an advanced (teacher's) perspective on some of the fundamental themes of elementary and middle-grade mathematics: topics in geometry and algebraic thinking. Also we will explore heuristic (any approach to problem solving learning, or discovery that employs a practical method not guaranteed to be optimal or perfect, but sufficient for the immediate goals) techniques in solving contextual problems from areas such as algebra, number theory, geometry, logic, probability and statistics. Keep in mind that the expected level of understanding for a teacher should be higher than that for K-8 students.

Here you will:

- Gain expertise reasoning quantitatively (with measurement and units), especially in ways that are appropriate in grades K-8;
- Review and fill in any gaps in knowledge in arithmetic, including fractions, decimals, and negative numbers;
- Learn and analyze alternative ways of doing arithmetic.
- Learn to communicate mathematics verbally and in writing in order to become better teachers of mathematics.

One of our key goals is to learn to communicate mathematics visually, numerically, verbally and in writing in order to become better teachers of mathematics. This course is intended to help you develop the specialized knowledge of mathematics that you will need as a teacher (sometimes called

pedagogical content knowledge or *mathematical knowledge for teaching).* The problem solving portion provides an opportunity to write and verbalize mathematics, which in turn will improve your ability to think logically and abstractly. The topics are based on the Common Core State Standards for Mathematics, which took effect in California in 2014: http://www.corestandards.org/the-standards/mathematics

Textbooks

1. *Reconceptualizing Mathematics*, by Judith Sowder, Larry Sowder and Susan Nickerson, Third Edition (2017).
2. *Powerful Problem Solving: Activities for Sense Making with the Mathematical Practices*, by Max Ray.
3. *Thinking Around the Box: Problem Solving in Mathematics,* by Dr. Davida Fischman and Dr. Shawn McMurran.

Required Materials

You are required to bring the following materials to each class.

- ❏ Composition notebook
- ❏ Ruler (with centimeters and inches), Good scissors
- ❏ Colored pencils or highlighters and 1-2 Whiteboard markers
- ❏ Lined, unlined and graph paper

BlackBoard

The syllabus, the assignments and other class documents may be found on BlackBoard. You should be enrolled into two BlackBoard courses. Login at http://blackboard.csusb.edu using your MyCoyote login credentials

Assignments and other information for your individual section will be located in your section area: **Math 301AQBR (Winter 2020 Section_____).**

The review problems for the requisite skills test can also be found on Blackboard under: **Math 301 Materials.** Review problems from **Math 301A Skills Check.**

Prerequisite and Course Content

The prerequisite for this course is Math 115, Ideas of Math (or equivalent) with a grade of C or better.

Student Learning Outcomes for Math for Educator Series

Students completing the Math for Educators Series will:

- Develop conceptual understanding of mathematical topics.
- Possess knowledge and have an understanding of mathematics that is considerably deeper than that required for the school mathematics that the student will teach.
- Understand their role as a teacher of mathematics including the ability to communicate and explain mathematical ideas with ease and clarity, both verbally and in writing. This includes the ability to construct viable arguments and critique the reasoning of others.
- Make mathematical connections between topics, reason abstractly and quantitatively, and use appropriate and accurate representations involving numbers, symbols, words, and pictures.
- Develop problem-solving skills, make sense of problems, and persevere in solving them. This includes the ability to: organize and analyze information, solve problems readily using multiple solution strategies, construct logical arguments, interpret results, and examine the reasonableness of an answer.
- Demonstrate procedural fluency and mastery of fundamental skill computations and concepts.
- Develop a productive disposition – the habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy (the power to produce a desired result or effect).
- These learning outcomes are consistent with the *Standards for Mathematical Practice* of the *California K-12 Common Core Content Standards for Mathematics.* The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. Please see the following links to the California Department of Education for more details regarding these standards: HYPERLINK "http://www.cde.ca.gov/re/cc/" http://www.cde.ca.gov/re/cc/.

Your Responsibilities

- Attend class and contribute to the class discussion or to the discussion at your table, as appropriate. Take notes as necessary.
- Read the assigned sections of the book in the week they are covered.
- Try the homework as soon as it is assigned. Ask questions during the next class so that you can finish your homework on time.
- Come to an office hour or arrange to see me if you need additional support.

REMEMBER: Since this is a 4.5 unit upper division math class, students who wish to succeed should expect to average 8-10 hours per week outside of class on reading, practice and homework. Keeping up with your out-of-class work is essential for your success in this class!

Course Expectations

Requisite Skills Test (as required by the CSUSB Mathematics Department)

In order to meet the learning goals of the Math for Educators series and gain a deeper, more connected understanding of the mathematics described in California's Common Core State Standards for Mathematics (HYPERLINK "http://www.cde.ca.gov/re/cc/" http://www.cde.ca.gov/re/cc/), you must ensure that you have a solid foundation in the requisite mathematics skills of grades K-Algebra I. A Requisite Skills Test will be given by Week 5 (date). This test will be given in class and you will have 45 minutes to take the test. You must pass this test with 85% correct or better to clear the Requisite Skills requirement. If you do not pass this test on your first attempt, you may retake the entire test, not only the items that were missed. You will need to sign up with me and the test will be administered by (date). Again you will have 45 minutes to take the test. In order to pass the class, you must pass the Requisite Skills Test. Online practice quizzes for requisite skills are available on a dedicated Blackboard site entitled Math 301 Materials, under Math 301A Skills Check.

Please note that some skills described below may not be explicitly covered in class since the skills that you are tested on would have been developed during your K-12 education and GE math course. The purpose of the Math for Educators series is not to reteach these skills, but rather to build a conceptual understanding of school mathematics. However, if you find you need additional support for requisite skills, please feel free to seek my help outside of regular class time.

Exams

We will also have a midterm exam and a cumulative final exam. Calculators will not be allowed on any exam unless stated otherwise.

The (tentative) exams dates are as follows. I reserve the right to postpone any exam date. The final exam date is set by the university and cannot be changed.

Requisite Skills Test

Midterm Exam

Retake of the Requisite Skills Exam   TBA - most likely in Week 8

Final Exam – Cumulative

Exams will have problems that can be solved using methods developed in homework and class discussions. Solutions will be assessed on both technical elements and professional quality.   If you miss an exam you will receive a 0 for that exam. Make-up exams WILL NOT be given without serious and compelling reasons for your absence. You will need to earn a 65% or better on the Final Exam in order to pass the course.

Homework

Homework will be assigned daily, by section. Homework will be posted on Blackboard. It is imperative that you start your homework early so that you will have time to ask questions before it is due.

The following rules apply to your written homework:

- Any written reflections or problem solving explanations need to be typed, double spaced, and in 12 point font.
- All book work problems, unless otherwise specified, will be completed in your notebook. They will NOT be collected and graded for correctness.

Group Project (GP) Instructions:

GPs will be collaborative assignments, which will be completed over a 3-week period.

1. **Part 1: Problem Solving and Connections.** Each group will submit ONE document. Your names, Math 301A *and* the name of the instructor should be written on the first page.
   i. **Solve the problem (independently) in multiple ways**. This will be checked separately for completion.
   ii. **Collaborate with classmates!!** This assignment will be done outside of class. A Google doc will be established for each group, and will be **monitored by the instructor** for collaborative participation and contributions. Decide as a group, who will be responsible for inputting each of the four sections of the document. While everyone cannot type/enter everything into the document, everyone should have a role in **every part** of the document. This means that it is NOT intended to be a divide and conquer assignment. Every group member is responsible for reading through the entire document and ensuring that there are no grammar errors, no mathematical errors, no spelling errors, precise academic language is used, and that the solution is clear, makes sense and is justified.
   iii. Your project should include a visual representation, a verbal representation and either a numeric or algebraic representation. ALL of these representations should match. You will state precisely HOW they match in the fourth section of the document, the Connections section. This section is separate from any written explanation you feel you need for your solution. **Connections between the three representations (visual, verbal and numeric/algebraic) MUST be stated explicitly.** You may also write extensions here and tell why this solution makes sense (stating that both methods "got the same answer" is NOT justification for why the solution makes sense).

2. **Part 2: Reflection.** EACH person will write an individual reflection, which will be turned in separately. In your reflection, respond to the following questions:
    i. What did you **learn** from solving the problem?
    ii. What did you **learn** by collaborating on your problem solving?
    iii. How did you develop Standard for Mathematical Practice _____(to be specified) while working on this group project? Explain your reasoning by referring to the specific behaviors outlined in the SMP, which can be found on the inside cover of your Sowder book, or online at
    https://www.cde.ca.gov/be/st/ss/documents/ccssmathstandardaug2013.pdf

Extra Help: Remember, it is your responsibility to arrange for extra help if you need it. I love talking about math and I want you to be successful. I am more than happy to help you improve your understanding, but it is up to you to make the effort to seek that help! Here are some suggestions for obtaining help:

You are encouraged to visit me during office hours or make an appointment.

Join/form a study group.

Attend another professors' office hours.   A list of the office hours will be posted shortly.

Intellectual Honesty
You are encouraged to discuss assignments with your classmates. However, you are **required to write up your work independently**. (Do not give your homework to a classmate to "look" at because you will share responsibility if your assignment is copied, even if it is copied without your permission. Copied homework will not be tolerated and identical, or nearly identical, assignments will *share* a single homework score.)

Class Participation and Attendance
Your participation is essential in creating a productive classroom environment. Because of the interactive nature of this course, <u>attendance is mandatory</u>. The discussion and activities during the class session cannot be replaced by reading someone's notes. In addition, more than two absences will result in an overall grade reduction of 2 percentage points per class missed. Persistent tardiness will count as absences. If missing a class is unavoidable, it is your responsibility to find out what you missed from another student or from the class Blackboard page and arrange to do the activities on your own.

Grading Policy

Grading for this course is not competitive, nor is it "curved". Working cooperatively with your classmates is encouraged and will more than likely be beneficial to all involved.

If you receive a minimum of 65% on the Final Exam, your course grade will be based according to the following. If you receive less than 65% on the Final Exam, your course grade will be an NC.

Final Exam	30%
Midterm Exam	25%
Homework	25%
Bookwork	10%
Group projects	15%
Class Participation	20%
Attendance	10%
Discussion Board Participation	10%
Total	**100%**

The Math for Educators series is graded ABC/NC. This means that the lowest passing grade is a C (not a C-). Your course grade will be calculated according to the following scale.

A: 93-100%   A-: 90-92%   B+: 87-89%   B: 83-86%   B-: 80-82%

C+: 76-79%   C: 71-75%   NC: 70% and below

Classroom Protocol

Please put away all electronic devices during class. It is inappropriate (and extremely rude) to text message, email, listen to music, web surf and receive or make calls during class.

In the event that class is unexpectedly canceled (e.g., fire, winds), you are still responsible for the day's work. It is your responsibility to check your email and Blackboard for notifications concerning the material, reading, and homework for that day.

> Please plan to be on time for class and to stay for the entire class period. It can be disruptive to the class when students frequently arrive tardy and/or leave early. If you must be tardy for an unavoidable reason, that's OK. (However, it is polite to make a simple apologize after class.) If you must leave early for an unavoidable reason, it is polite to let me know before class starts.

Please turn **off** the ringer on your cell phone during class time – this includes "vibrate". (This is especially imperative during tests and quizzes since the vibration may interfere with another student's concentration.)

Support for Students with Disabilities

If you are in need of an accommodation for a disability in order to participate in this class, it is your responsibility to please contact Services to Students with Disabilities at UH-183 (909) 537-5238. http://enrollment.csusb.edu/~ssd/.

Statement of Commitment to the Values of Inclusion, Diversity, and Equity

We affirm and are committed to the value of all kinds of differences among students, faculty and staff. Inclusivity that is broad and deep makes us a healthier and more productive organization and builds a culture that fosters engagement and diverse perspectives.

We believe in, affirm, and are committed to the equal value and dignity of all people. Fairness and equity are more than equality. We actively seek to eliminate barriers for those who are disadvantaged and disempowered so they may participate fully in university life.

Emergency Management and Safety Guidelines

Please refer to the Office of Emergency Management and Business Continuity for information regarding emergency management and safety guidelines.

Plagiarism and Cheating

Students are expected to be familiar with the University's Policy on cheating and Plagiarism. Please review this policy in the CSUSB Bulletin or at http://senate.csusb.edu/docs/Policies/(FSD%2096-12.R2)%20Academic%20Dishonesty.pdf. "Plagiarism and cheating are violations of the Student Conduct Code and may be dealt with by both the instructor and the Judicial Affairs Officer." Plagiarism is the act of presenting the ideas and writing of another as one's own. Cheating is the act of obtaining or attempting to obtain credit for academic work through the use of any dishonest, deceptive, or fraudulent means. Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified.

Dropping and Adding

You are responsible for understanding the policies and procedures about add/drops, academic renewal, etc., that can be found in the CSUSB Bulletin.

Drops after the census date are permitted only for serious and compelling reasons. If you miss 2 consecutive classes during the census period, Census is _____, and do not contact me, you may be dropped if other students are waiting to enroll. However, if you wish to drop the course it is your responsibility to formally withdraw from class prior to the drop date.

Math 30X Requisite Skills and Concepts Topics

Math 301AQBR Requisite Skills Topics

- Number systems
- Representations of whole numbers and decimals in the base 10 system
- Meaning of fractions and representations of fractions (including improper)
- Locating integers, fractions, decimals on a number line
- Comparing fractions, decimals
- Arithmetic
- Adding, subtracting, multiplying, dividing, whole numbers, integers, rationals, decimals
- Recognizing/using commutative, associative, distributive properties
- Order of operations
- Exponents and order of operations
- Equivalent fractions
- Converting between fractions, decimals
- Solving basic word problems involving fractions, decimals