Math 313 Topics in Elementary Mathematics - Algebra
Course Syllabus

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Fall 2014
M 12:55 – 3:35 PM
Calexico Campus

Required Textbooks
Reconceptualizing Mathematics by J. Sowder, L. Sowder, and S. Nickerson

Introduction
Welcome! What an opportunity for us to explore together the big ideas of mathematics, how people think when learning mathematical ideas, and how they use this knowledge to solve mathematical problems. This is a capstone course to help you develop a reinforced and sophisticated understanding of mathematics so that you may help your future students make sense of the mathematics that they are learning from you. Keep in mind, however, that making mathematics accessible to our students is difficult and is a journey that does not, or should not, end as one gains experience in the classroom. It is my underlying belief, that no teaching strategy is effective unless we ask the questions that will incorporate their way of thinking, experiences, and knowledge into their learning experience. After all, education involves both content (mathematics) and process (strategies to engage students). Welcome to this course and I look forward learning with you about how to improve the teaching of mathematics to our students.

Course Objectives
1. Develop a deeper understanding of the content of mathematics, specifically in the areas of Number Theory and Functions.
2. Reflect on your own learning as a venue to better understand how people learn mathematics.
3. Analyze and reflect on student solution strategies as a way to improve your understanding of how students think when solving mathematical problems.
4. Recognize and apply different representations of mathematical ideas to solve problems.

Course Requirements
1. Study the required readings (chapters 11 to 15).
2. Reflect and write about our class discussions and activities.
3. Participate in class activities and discussions.
4. Complete the semester examination successfully.
Evaluation

Your final grade will depend on how well you complete the course requirements and how well you show that you have met the course objectives. Clarity of thought and expression, both in writing and in speaking, are very important for your success in this course. Using higher order thinking skills is the key to your earning a high grade in this course.

In order to maximize the opportunities we will have to understand better the big ideas of mathematics, we will always need to present ourselves, and our ideas, in a professional manner. Specifically,

- The work (content, presentation, timeliness) must be of the highest quality. Keep in mind that I may ask you to redo assignments to meet this requirement.
- Attendance is not optional and arriving on time, prepared to work together, is essential for the success of our academic community.
- Your grade will be reduced by 5% for each absence after the first one.
- I do not accept late work, so please send it with someone, email it, or drop it off at my office at a time prior to the start of class.
- Please keep in mind that excessive absences, tardiness and/or poor workmanship will impact your final grade in a negative manner for this course.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Points</th>
<th>Activity</th>
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<th>Activity</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Notes</td>
<td>80</td>
<td>Classwork Problems</td>
<td>80</td>
<td>Reflections</td>
<td>40</td>
</tr>
<tr>
<td>Final Examination</td>
<td>300</td>
<td>500 Total Possible Points</td>
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Extra Credit: Homework Problems [50 points]

Grading Standards

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A, A-: Outstanding Achievement</td>
<td>100%-90%</td>
</tr>
<tr>
<td>B+, B, B-: Demonstrable Achievement</td>
<td>89%-80%</td>
</tr>
<tr>
<td>C+, C, C-: Partial Achievement</td>
<td>79%-70%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Letter Grade</th>
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</thead>
<tbody>
<tr>
<td>D+, D, D-: Minimal Achievement</td>
<td>69%-60%</td>
</tr>
<tr>
<td>F: Lacking Achievement</td>
<td>59%-00%</td>
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Course Catalog Description

(Prerequisite: Mathematics 311 or 312)

Capstone course for prospective K-8 teachers. Advanced topics in mathematics selected from algebra, number systems, transformational geometry, and problem solving. Enrollment limited to future teachers in grades K-8.
# Course Outline

## 8/25 Day One

### Areas of Focus: Patterns and Functions
- Getting to know one another
- Syllabus overview
- Introduction to Functions

## 9/8 Day

### Areas of Focus: Patterns and Functions
- Numerical Patterns and Algebra, 12.3
- Functions and Algebra, 12.4

## 9/15 Day Three

### Areas of Focus: A Quantitative Approach to Algebra and Graphing
- Algebraic Reasoning About Quantities, 12.5
- Using Graphs and Algebra to Show Quantitative Relationships, 13.1

## 9/22 Day Four – Ch. 12 Homework Problems Due

### Areas of Focus: Quantitative Approach to Algebra and Graphing
- Understanding Slope: Making Connections across Quantitative Situations, Graphs, and Algebraic Equations, 13.2

## 9/29 Day Five

### Areas of Focus: Quantitative Approach to Algebra and Graphing
- Linear Functions and Proportional Relationships, 13.3
- Nonlinear Functions, 13.4

## 10/6 Day Six – Ch. 13 Homework Problems Due

### Areas of Focus: Understanding Change—Relationships among Time, Distance, and Rate
- Distance-Time and Position-Time Graphs, 14.1

## 10/13 Day Seven

### Areas of Focus: Understanding Change—Relationships among Time, Distance, and Rate
- Using Motion Detectors, 14.2
- Graphs of Speed against Time, 14.3

## 10/20 Day Eight

### Areas of Focus: Understanding Change—Relationships among Time, Distance, and Rate
- Interpreting Graphs, 14.4

## 10/27 Day Nine – Ch. 14 Homework Problems Due

### Areas of Focus: Algebra as a Language and as Generalized Arithmetic
- Algebra as Symbolic Language, 12.1
- Algebra as Generalized Arithmetic, 12.2
Course Outline [Continued]

11/3 Day Ten – Ch. 12 Homework Problems Due

Areas of Focus: Algebra as a Language and as Generalized Arithmetic

- Finding Linear Equations, 15.1
- Solving Two Linear Equations in Two Variables, 15.2

11/10 Day Eleven

Areas of Focus: Algebra as a Language and as Generalized Arithmetic

- Different Approaches to Problems, 15.3
- Average Speed and Weighted Averages, 15.4

11/17 Day Twelve – Ch. 15 Homework Problems Due

Areas of Focus: Number Theory

- Factors and Multiples, Primes and Composites, 11.1
- Prime Factorization, 11.2

11/24 Day Thirteen

Areas of Focus: Number Theory

- Divisibility Tests to Determine Whether a Number is Prime, 11.3

12/1 Day Fourteen

Areas of Focus: Number Theory

- Greatest Common Factor, Least Common Multiple, 11.4

12/8 Day Fifteen – Ch. 11 Homework Problems Due

Areas of Focus: Issues for Learning

- Issues for Learning: Understanding the Unique Factorization Theorem, 11.5
- Issues for Learning: The National Assessment of Educational Progress and Achievement in Algebra, 12.7
- Issues for Learning: Algebra for the Elementary Grades, 13.5
- Issues for Learning: Topics in Algebra, 15.6

12/15 Day Sixteen – Final Exam

This examination will consist of several questions that will ask you to integrate and synthesize your learning from this course. The questions will be based on the syllabus of this course. The exam will ask you to use higher order thinking skills (analysis, evaluation, synthesis, integration) to answer the questions. Simply reciting of memorized material from the course will count against you in the evaluation of your examination. Specifically, the exam will have questions that will assess your content knowledge of mathematics in the areas of number theory and functions. It will also assess your insights about student thinking when solving mathematical problems.