Introduction to Mathematics for Elementary Teachers

Course Description
Elementary concepts of sets, numeration systems, number theory, and properties of the natural numbers, integers, rational, and real number systems with an emphasis on problem solving and critical thinking. http://www2.sfasu.edu/math/courses/syllabi/MTH127Syllabus.pdf

Course Prerequisites
Two years of high school algebra and one year of high school geometry.

Course Time and Meeting Place
- MTH 127 Section 004 meets in Math 205 at 11:00am - 12:15pm TR

Instructor
- Jane H. Long, Ph.D., Associate Professor, Department of Mathematics and Statistics
- Office: Math 318
- TEL: (936) 468-1804
- Email: longjh@sfasu.edu
- Office Hours: Anytime my door is open, by appointment or
  Monday, Wednesday, Friday 11:00am – 12:00pm
  Tuesday, Thursday 10:00am – 11:00am

Current Text and Materials
The textbook for this course is
  A bound copy, loose-leaf copy, or electronic (eBook/online) copy of the textbook are acceptable. Please see D2L (more on that system below) for eBook registration instructions. The eBook course ID is long36433. Students must bring paper copies of class activities to class meetings each day, so students using the eBook should plan to print these pages to bring to class.
  Students are advised to keep this text for use in future courses (MTH 128, MTH 129) and as a reference for classroom teaching.

- Calculators will not be used in this course.

Course Goals
- To understand the mathematics essential to successful teaching in the elementary school classroom.
- To acquire a foundation in numeration systems, number theory and properties of the natural numbers, integers, rational, and the real number system.
- To gain skill in problem solving and critical thinking.

Student Learning Outcomes (SLO):
At the end of MTH 127, a student who has studied and learned the material should be able to:
1. Solve a variety of problems using multiple problem-solving techniques. [CO 1,3]
2. Demonstrate understanding of core concepts underlying standard and non-standard algorithmic procedures for performing operations on subsets of real numbers. [CO 1,3]
3. Communicate his/her knowledge effectively in multiple formats – verbally, concretely, and in writing. [CO 2]
4. Define, identify, and use the fundamental properties of real number operations. [CO 3]
5. Provide logical justification of mathematical thinking. [CO 1]
6. Use mathematical language and notation appropriately to communicate ideas. [CO 2]

Program Learning Outcomes
This is a general education core curriculum course and no specific program learning outcomes for this major are addressed in this course.

Calculators
Calculators will not be used in this course.

Homework
Online homework is required using WeBWorK.

Homework will also be assigned from our textbook and turned in at the beginning of the class. Your daily average is based on your grades from WeBWorK homework, homework from the textbook, and any other daily work that is assigned for a grade.

Grading and Exams
There will be three 75 minute exams during the semester and a 2-hour comprehensive final exam. Your course grade will be determined as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Date</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Homework/TEKS Writing Assignments</td>
<td>WeBWorK assignments</td>
<td>5%</td>
</tr>
<tr>
<td>Textbook Homework</td>
<td>Class assignment due according to dates on calendar</td>
<td>15%</td>
</tr>
<tr>
<td>Exam I</td>
<td>Monday/Tuesday, September 17/18 2018</td>
<td>20%</td>
</tr>
<tr>
<td>Exam II</td>
<td>Monday/Tuesday, October 15/16 2018</td>
<td>20%</td>
</tr>
<tr>
<td>Exam III</td>
<td>Wednesday/Thursday, November 7/8, 2018</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td><strong>Tuesday, December 11, 2018, at 6:45-8:45 PM in Kennedy Auditorium</strong></td>
<td>20%</td>
</tr>
</tbody>
</table>

Semester numerical scores will be converted into letter grades according to the following method.

<table>
<thead>
<tr>
<th>Range of numerical values</th>
<th>Corresponding Letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-100</td>
<td>A</td>
</tr>
<tr>
<td>80-89</td>
<td>B</td>
</tr>
<tr>
<td>70-79</td>
<td>C</td>
</tr>
<tr>
<td>60-69</td>
<td>D</td>
</tr>
<tr>
<td>0-59</td>
<td>F</td>
</tr>
</tbody>
</table>

When we calculate your final grade at the end of the course, we will calculate a score on a 0-100 point scale using the scores that you have obtained during the course, and the grade breakdown given above. Your course grade will then be obtained using this table.
Resurrection Policy. If you score a 70 or better on the final exam, we will replace your lowest midterm grade with your final exam grade if the midterm grade is lower. The resurrection policy does not apply to your homework or WeBWorK grade.

Important Information about the Math 127 Final Exam
The final exam for all MTH 127 classes is on Tuesday, December 11, 2018, at 6:45-8:45 PM in Kennedy Auditorium. Students having another exam at this time will schedule an earlier time to take the MTH 127 final.

Cell phone use is not permitted in or out of the classroom during all exams. If you bring your cell phone to the exam venue, please remember to turn it off. Violation of this policy will be considered as academic dishonesty and dealt with accordingly. You will not be permitted to use your cell phone as a calculator, so plan ahead.

Exam Policy
Exams are scheduled far in advance, and it is impossible to move the time or date. However, in rare cases where it is impossible for an individual to take the exam at the scheduled time, we will work with you to make other arrangements. Exceptions for taking the exam out of sequence are the following:

1. A medical excuse. Please provide proper documentation according to university rules.
2. A University sponsored event such as an athletic tournament, a play, or a musical performance. Your coach or director must contact us in advance. Athletic practices and rehearsals do not fall into this category.
3. A religious holiday. Please send a short email explaining the situation.
4. Extreme hardship such as a family emergency. Please have the proper university office notify us.

The above are the only allowable excuses for taking the exam before the scheduled time. Under no circumstances do we give late exams. Since we can only accommodate a limited number of students taking the exam at an earlier time, please make sure that you fall into one of the above categories before you contact us. If you miss an exam due to illness or a family emergency, you will not be penalized. The missed exam will be replaced with the final exam grade. If you have a conflict with the final exam (other than another exam at the same time), you must contact the Registrar. Only the Registrar can schedule an out-of-sequence final exam.

Making Your Homework Easy to Read and Easy to Grade
• Make sure your handwriting is legible.
• Homework with multiple pages should be stapled in the upper left-hand corner.
• In the upper right-hand corner you should write (in this order)
  o Your name
  o MTH 127.004
  o The due date of the homework
• Problems should be clearly labeled and numbered on the left side of the page. There should also be a visible separation between problems. Don't forget to staple your homework together if you are submitting several pages.
• You should leave the entire left margin blank so that the grader can use this space for scoring and comments.
• To ensure that each problem is graded, problems and solutions should be written in the order that they are assigned.
• It is good practice to first work out the solutions to homework problems on scratch paper, and then to neatly write up your solutions. This will help you turn in a clean finished product.
• You should write up your solutions by yourself. You should always acknowledge any help received at the top of the assignment or in the right-hand margin.

The Classroom
Any questions you ask in class will likely be ones that other students will want answered as well, so get over any hesitation you might have and ask questions as the material is presented. You will not be penalized for doing this, no matter how trivial or simple you think your questions might seem. Remember, the class is being held for you to learn the material, not just to give you a time to copy notes off of a blackboard, so be sure to get help when you
need it and stay involved in your class. Please be respectful of your fellow students and your instructor. Cell phone use and texting are not allowed in class. Remember to turn your cell phone off or place it in quiet mode before entering the classroom. You will be required to put your cell phone in a basket for the duration of the class period if I see you use it during class. Research shows that human brains cannot multitask complex, abstract information with cell phone usage, so this policy is designed for your benefit.

Getting Help with Math 127

• Individual and group help is available at the Academic Assistance and Resource Center, which is located on the first floor of the Steen Library.
• Take advantage of office hours.
• AARC

Attendance Policy
Regular attendance is expected in Math 127. Attendance and Excused Absences Policy can be found at http://www.sfasu.edu/policies/class_attendance_excused_abs.asp

Course Outline:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Approximate time spent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Techniques of problem solving and estimation skills</td>
<td>15%</td>
</tr>
<tr>
<td>Explicit instruction in Critical Thinking, Communication and Empirical and Quantitative Reasoning is in addition to implicit instruction, modeling and practice that occur daily in the discussion of numbers and operations. This explicit instruction includes explanation of solving mathematical problems by thinking critically, communicating logically ordered solutions with complete and correct notation, and applying empirical or quantitative skills as appropriate to the problem. The following topics will be threaded throughout the course in order to develop the habits of mind necessary to be successful in mathematics:</td>
<td>15%</td>
</tr>
<tr>
<td>• Introduce Polya’s Problem Solving Process: Understand the Problem, Devise a Plan, Carry Out Plan, Look Back</td>
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</tr>
<tr>
<td>• Explore Basic Problem Solving Strategies</td>
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<tr>
<td>• Explore Patterns in Language, Figures, Numbers, Sequences and Geometry</td>
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<tr>
<td>• Develop Estimation Skills with Mental Arithmetic</td>
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<tr>
<td>• Investigate temperature as a form of measurement</td>
<td></td>
</tr>
<tr>
<td>• Whole Numbers and Numeration: Concepts and Algorithms</td>
<td>25%</td>
</tr>
<tr>
<td>• Define the Set of Whole Numbers</td>
<td></td>
</tr>
<tr>
<td>• Model Whole Number Operations using a Variety of Methods</td>
<td></td>
</tr>
<tr>
<td>• Verify Properties of Operations: Binary Operation; Closed, Commutative, Associative, Distributive Property of Multiplication over Addition, Identities, Multiplication by Zero; Division Algorithm</td>
<td></td>
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<tr>
<td>• Explore Place Value Systems in Base-10 System</td>
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<tr>
<td>• Develop and Apply Algorithms for Whole Number Operations</td>
<td></td>
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<tr>
<td>• Develop Definition and Properties for Whole Number Exponents</td>
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</tr>
<tr>
<td>• Number Theory: An Introduction</td>
<td>10%</td>
</tr>
<tr>
<td>• Define and Explore Primes and Composites</td>
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</tr>
<tr>
<td>• Explore Basic Divisibility Properties of Sums and Products</td>
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<tr>
<td>• Define the GCD and LCM and Use Algorithms for Finding Each</td>
<td></td>
</tr>
<tr>
<td>• Integers: Concepts and Algorithms</td>
<td>25%</td>
</tr>
<tr>
<td>• Model Integer Operations Using a Variety of Methods</td>
<td></td>
</tr>
<tr>
<td>• Investigate Extensions of Whole Number Operations and their Properties: Closed, Commutative, Associative, Distributive Property of Multiplication over Addition, Identities, Additive Inverse, Multiplication by Zero</td>
<td></td>
</tr>
<tr>
<td>• Real Numbers: Concepts and Algorithms</td>
<td>25%</td>
</tr>
<tr>
<td>• Investigate Practical Uses for Fractions</td>
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<tr>
<td>• Explore Connections between Fractions, Rational Numbers, Decimals, and Percents</td>
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<tr>
<td>• Investigate Order of Numbers in Decimal Form</td>
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<tr>
<td>• Illustrate the Pythagorean Theorem</td>
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</tr>
<tr>
<td>• Develop Proportional Thinking to Include Ratio and Proportion, Properties of Proportions, Fundamental Law of Fractions</td>
<td></td>
</tr>
</tbody>
</table>
Explicit instruction in Critical Thinking, Communication and Empirical and Quantitative Reasoning is in addition to implicit instruction, modeling and practice that occur daily in the discussion of numbers and operations. This explicit instruction includes explanation of solving mathematical problems by thinking critically, communicating logically ordered solutions with complete and correct notation, and applying empirical or quantitative skills as appropriate to the problem.

**Course Calendar**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Activity</th>
</tr>
</thead>
</table>
| 1    | Course Orientation,  
1. The Counting Numbers  
1.2. Decimals  
1.3. Reasoning to Compare Numbers in Base Ten | 1C, 1E, 1F, 1I |
| 2    | 1.4. Reasoning about Rounding  
2.1. Solving Problems and Explaining Solutions  
2.2. Defining and Reasoning about Fractions | 1N, 1O, 2A, 2B, 2C, 2D, 2G |
| 3    | 2.3. Reasoning about Equivalent Fractions  
2.4. Reasoning to Comparing Fractions | 2I, 2K, 2L, 2O, 2P, 2Q |
| 4    | Exam I - Chapters 1 and 2  
3.1. Interpretations of Addition and Subtraction | Strip Diag. |
| 5    | 3.2. The Commutative and Associative Properties of Addition, Mental Math, and Single-Digit Facts  
| 6    | 3.4. Reasoning About Fraction Addition and Subtraction  
4.1. Interpretations of Multiplication  
4.2. Why Multiplying by 10 is Special in Base Ten | 3O, 3P, (3Q, 3R), 4A, 4B, 4C |
| 7    | 4.3. The Commutative and Associative Properties of Multiplication, Areas of Rectangles and Volumes of Boxes  
4.4. The Distributive Property  
4.5. Properties of Arithmetic, Mental Math, and Single-Digit Multiplication Facts | 4D, 4E, 4F, 4G, 4H, 4J, 4M |
| 8    | Exam II - Chapters 3 and 4  
4.6. Why the Standard Algorithm for Multiplying Whole Numbers Works | 4N |
| 9    | 5.1. Making Sense of Fraction Multiplication  
5.1. Making Sense of Fraction Multiplication (con’t)  
6.1. Interpretations of Division | 5A, 5C(only CA-89), 5D, 5E, 6A, 6B |
| 10   | 6.2. Division and Fractions and Division with Remainder | 6D, 6F, 6G |
| 11   | 6.3. Why Division Algorithms Work  
6i, 6J  
Exam III – Chapter Sections 4.6, 5.1, 6.1, 6.2 and 6.3 | 6i, 6J |
| 12   | 6.4. Fraction Division from the How-Many-Groups Perspective | 6M |
| 13   | Thanksgiving Holiday | |
| 14   | 6.5. Fraction Division from "How-Many-Units-in-1-Group Perspective | 6M (con’t), 6P, 6Q |
|      | 8.1. Factors and Multiples  
8.2. and Odd | 8A, 8B, 8C, 8D, 8E |
| 15   | 8.3. Divisibility Tests  
8.4. Prime Numbers  
8.5. Greatest Common Factor and Least Common Multiple | 8G, 8H, 8I, 8J, 8M |
| 16   | Final Exam | |
Per SFA policy 5.4, your schedule should reflect that there is (1) an amount of student work per credit hour that reasonably approximates not less than one hour of class or direct faculty instruction and two hours of out-of-class student work per week for fifteen weeks over a long semester, or the equivalent amount of work over a different amount of time; or (2) at least an equivalent amount of work as outlined in item 1 above for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

General Education Core Curriculum
The Texas Higher Education Coordinating Board has identified six core learning objectives: Critical Thinking Skills, Communication Skills, Empirical and Quantitative Skills, Teamwork, Personal Responsibility, and Social Responsibility. SFA is committed to the improvement of its general education core curriculum by regular assessment of student performance on these six objectives.

By enrolling in Introduction to MTH 127: Mathematics for Elementary Teachers you are also enrolling in a Core Curriculum Course that fulfills the Communication Skills requirement. You will see this course on your D2L list.

At one point during the semester, you will receive an assignment that fulfills both the requirements of this course and the needs of Stephen F. Austin State University's Core Curriculum Assessment Plan with the Texas Higher Education Coordinating Board. When you complete this one assignment, you need to upload the assignment to both your standard course dropbox determined by your Instructor and the “Core Curriculum” dropbox. The Core Curriculum dropbox will be identified by the Objective for which work is being collected. (Examples: Critical Thinking, Teamwork, Social Responsibility Empirical & Quantitative Skills, Personal Responsibility, Communication Skills-Written, Communication Skills-Written & Visual, and Communication Skills- Oral & Visual.) Please note that this only applies to the approved assignment. All other assignments should be submitted according to regular class operations. If you have any questions, please see your Instructor or the Office of Student Learning and Institutional Assessment.

When you complete the assignment mentioned above, you will upload the assignment to both the MTH 127: Mathematics for Elementary Teachers dropbox and the Communication Skills dropbox.

Please note that this only applies to the specific assignment listed in the matrix below. All other assignments should be submitted according to regular class operations.

If you have any questions, please see your instructor or contact the Institutional Effectiveness Office at (936) 468-1130.

The chart below indicates the core objectives addressed by this course, the assignment(s) that will be used to assess the objectives in this course and uploaded to the D2L Communication Skills dropbox this semester, and the date the assignment(s) should be uploaded to the D2L Communication Skills dropbox. Not every assignment will be submitted for core assessment every semester. Your instructor will notify you which assignment(s) must be submitted for assessment in the Communication Skills dropbox.

<table>
<thead>
<tr>
<th>Core Objective</th>
<th>Definition</th>
<th>Course Assignment Title</th>
<th>Date Due in D2L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Thinking Skills</td>
<td>To include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Communication Skills</td>
<td>To include effective development, interpretation and expression of ideas though written, oral, and visual communication.</td>
<td>Core Curriculum Assignment: Fraction Addition</td>
<td>December 3, 2018</td>
</tr>
<tr>
<td>Empirical and Quantitative Skills</td>
<td>To include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Add/Drop Policy
The Add/Drop Policy can be found at http://www.sfasu.edu/policies/add_drop.asp

Academic Integrity (Policy A-9.1)
Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

The penalty for a student found cheating on any part of an assignment, quiz, or exam in this class will range from a grade of zero on the work to a grade of F in the course, and may result in additional, more severe disciplinary measures. A student who allows another to copy his work and the student copying the work are both guilty of cheating. Do your own work. Do not show your completed work to others. Do not allow others to copy your work.

Definition of Academic Dishonesty
Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit. Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp.

Withheld Grades Semester Grades Policy (A-54)
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average. The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

Students with Disabilities
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices.

Acceptable Student Behavior
Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1 http://www.sfasu.edu/policies/student_conduct_code.asp). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.