George Mason University
FASTTRAIN Programs

EDUC 513/601 S’ 06: TEACHING ELEMENTARY MATHEMATICS IN INTERNATIONAL SCHOOLS
(3 credits)
Spring 2006

Instructor: Dr. Lynnea C. Salvo
Telephone: (703) 448-8655 (10 AM – 2 PM)
Email: mathtree@mac.com
Class Meets: Wed., 4:30 PM – 7:10 PM
Arlington campus, Room 301
Office Hours: By appointment, before or after class

I. Course Description
This course is an introduction to methods for teaching all children, including those from non-mainstreamed populations, developmentally appropriate topics in arithmetic, algebra, geometry, measurement, and data analysis and probability. This is a hands-on, activity, workshop-oriented experience. Students work with manipulatives and technologies to explore mathematics, solve problems, and learn ways to teach mathematics content to children. Field experience is required.
Corequisite: EDUC 511

II. Student Outcomes
This course will enable students to:
A. Know what constitutes the essential topics in K – 6 mathematics in international schools.
B. Identify and use selected manipulatives and technology such as Linking Cubes, Attribute Blocks, Geoboards, Base-10 Blocks, Fraction Circles, Tangrams, calculators, and computers to teach appropriate mathematics content topics in K - 6.
C. Identify and use various instructional strategies and techniques (cooperative and peer group learning, activity centers, laboratories and workshops, teacher-directed presentations, etc.) to teach mathematical content topics appropriate for K - 6 to all children, including those from non-mainstreamed populations.
D. Identify and use alternative methods for assessing students’ work in mathematics in K - 6.
E. Solve problems in the mathematical content areas of number and number theory, geometry, algebra, probability, and statistics appropriate for adaptation to K - 6.
F. Know and explain what is a standards-based mathematics curriculum, what are the key elements of the National Council of Teachers of Mathematics Principles and Standards for School Mathematics, and what are the key elements of the Virginia Standards of Learning for Mathematics.

III. Relationship to Program Goals and Professional Organizations
Student Outcomes Referenced to Selected National Standards

<table>
<thead>
<tr>
<th>Course Student Outcomes (above)</th>
<th>NCTM Principles and Standards</th>
<th>ISTE NETS</th>
<th>INTASC</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>S1, S2, S3, S4, S5</td>
<td>SI</td>
<td>P1, P7</td>
</tr>
<tr>
<td>B</td>
<td>S10</td>
<td>SII</td>
<td>P1, P2, P6</td>
</tr>
<tr>
<td>C</td>
<td>P1, P2, P3, P4, P6</td>
<td>SII</td>
<td>P1, P2, P3, P4</td>
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<tr>
<td>D</td>
<td>P5</td>
<td>SIV</td>
<td>P3, P8</td>
</tr>
<tr>
<td>E</td>
<td>S1, S2, S3, S5, S6</td>
<td>SI</td>
<td>P4, P6</td>
</tr>
<tr>
<td>F</td>
<td>S1-10, P1-6</td>
<td>SI</td>
<td>P1, P7, P9</td>
</tr>
</tbody>
</table>

Key:
ISTE NETS = International Society for Technology in Education National Education Technology Standards 2000, where S = standard number
INTASC = Standards for Licensing Beginning Teachers, where P = principles
IV. Nature of Course Delivery

In this course we will begin an inquiry into mathematics teaching and learning that will guide you in your first teaching job and give you the tools that will enable you to continue to inquire and learn as part of your work as a teacher. Class sessions will be interactive and will include a variety of hands-on experiences with concrete and virtual manipulatives appropriate for elementary school mathematics. We will explore the teaching of mathematics, investigating both what to teach and how to teach it. We will explore what it means to do mathematics and what it means to understand mathematics through individual, small group, and large group mathematical problem solving. We will investigate ways to represent understandings of mathematical concepts, communicate reasoning about mathematical ideas, and construct mathematical arguments. We will investigate and read about ways children might represent mathematical concepts, looking at ways to help children build connections and see relationships among mathematical ideas. We will explore characteristics of a classroom environment conducive to mathematical learning by reading and discussing the importance of mathematical tasks, mathematical tools, the roles of teachers and students, and the assessment of mathematical understanding.

V. Text


Optional: NCTM Student Membership. Provides access to (1) Online subscription to Teaching Children Mathematics (for the elementary grades), and online NCTM 2000 Principals and Standards for School Mathematics; available from the National Council of Teachers of Mathematics, 1906 Association Drive, Reston, VA 22091; 703-620-9840; www.nctm.org website.

VI. Course Requirements and Assignments

The assignments across the semester are intended to further your understandings of what it means to teach, learn, and assess mathematics in light of current reforms in mathematics education. All assignments are to be turned in to your instructor on time. LATE ASSIGNMENTS: Late work will not be accepted for full credit. If you make prior arrangements with the instructor, assignments turned in late will receive a 10% deduction from the grade per late day or any fraction thereof (including weekends and holidays).

<table>
<thead>
<tr>
<th>Content</th>
<th>50%</th>
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</thead>
<tbody>
<tr>
<td>Mathematics Content Exam I</td>
<td>20%</td>
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<tr>
<td>Mathematics Content Exam II</td>
<td>20%</td>
</tr>
<tr>
<td>Problem-Solving Journal</td>
<td>10%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Pedagogy</th>
<th>50%</th>
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<tbody>
<tr>
<td>Field Experience</td>
<td>10%</td>
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<tr>
<td>Student Assessment Interview</td>
<td>10%</td>
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<tr>
<td>Lesson Plans</td>
<td>10%</td>
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<tr>
<td>Reflection Journal</td>
<td>10%</td>
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<tr>
<td>Presentations and Participation</td>
<td>10%</td>
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</tbody>
</table>

A. Mathematics Content Exams (40%)

The Mathematics Content Exams (Feb. 8 and April 19) in this course will consist primarily of multiple choice and short response questions that focus on mathematics content in K - 6, with some questions focusing on methodological content. Throughout the semester, brief content-specific homework assignments will assist you in reviewing important mathematics appropriate for the elementary grades. If you must be absent from the scheduled exams (with instructor approval), you must contact the instructor personally, prior to the exam, to make alternative arrangements to take the exam.

B. Problem-Solving Journal (10%)

You will maintain a problem-solving journal. You will receive both physical and written problems to try to solve. You will try to solve the problems using a variety of problem-solving techniques, individually and/or in small groups. You will peer-edit at least three problems. Your journal will be collected three times during the course (Jan. 18, Feb. 8, April 5).

C. Field Experience (10%)

You will arrange to visit classes in a particular school, arrive on time, check in with the office, meet the appropriate teacher, record observations in their journal, ask the teacher to sign the journal or other record of observation. You will observe and take notes in a variety of mathematics classes at different levels, K – 6. You will take notes on teachers’ lessons and instructional practices using the Field Experience Recording Sheet as a guide for the items to be observed during field experience. You may peruse curriculum guides, textbooks, instructional materials, and other teaching materials, if available. Your Formal Field Experience Report is due April 12.
D. Student Assessment Interview (10%)
This is the performance-based assessment (PBA) for this course. In order to plan effective instruction, you will need to know how to assess children’s knowledge of mathematical concepts. One way to assess children’s thinking is a diagnostic interview. This assignment has two parts: (1) Design a plan for the interview, assessing a specific mathematics topic using concrete, pictorial and abstract representations, (2) Conduct the interview with a child and write a report describing the outcome of the interview. (PLAN 5% due Feb. 1; REPORT 5% due Mar. 22)

E. Lesson Plans (10%)
Lesson Plans:
You are required to design and write up three lesson plans. You will present one of the lesson plans to your fellow students. The format for designing your mathematics lessons will be provided. Avoid the overuse of worksheets. Integrate the use of mathematics tools (manipulatives, calculators, computers) and representations (concrete, pictorial, symbolic) to provide children with an interactive, conceptually-based mathematics experience. Your three lesson plans are due Feb. 15, Mar. 1, and March 29.

F. Reflection Journal (10%)
You will keep a reflection journal on Blackboard (http://blackboard.gmu.edu).
1. You are required to write a reflection on each chapter, 1 – 17, in the order presented in the class schedule. The reflection will be no longer than one page and will express what impact the content of the particular chapter will have on your own teaching. These entries will be checked periodically unannounced so it is imperative that you keep your entries up to date.
2. You will also include a reflection on an interview (in person or by e-mail) with a practicing mathematician. It is due Jan. 11.
3. You will include reflections on three mathematics education websites. Choose from NCTM, Math Forum, PBS, Utah State University virtual manipulatives, IBO (PYP, MYP), or another website with prior approval of the instructor. Provide APA style reference to website. Describe what resources and services are available at this site. State how you might use this site. Explain why you would recommend this site to other educators. This is due Jan. 25.

G. Presentations and Participation (10%)
A variety of presentation, field experience, and participation activities will be integrated into our class sessions this semester. You will discuss and receive feedback on your mathematics teaching using a Lesson Reflection Procedure in class. You will share ideas on student error patterns and technology in brief presentations during class sessions. You will participate in class activities during class time. These assignments require your active engagement in class sessions; therefore, there is no opportunity to “make-up” these assignments.

Attendance. It is your responsibility to attend all class sessions. You are held accountable for all information from each class session whether you are present or not. Please report your reasons for any absences to the instructor in writing. Tardiness. It is your responsibility to be on time for each class session. Please report your reasons for any tardiness to the instructor in writing.

VII. Evaluation Schema
Determination of the Final Grade:
Graduate Grading Scale
<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93%-100%</td>
</tr>
<tr>
<td>A-</td>
<td>90%-92%</td>
</tr>
<tr>
<td>B+</td>
<td>87%-89%</td>
</tr>
<tr>
<td>B</td>
<td>80%-86%</td>
</tr>
<tr>
<td>C</td>
<td>70%-79%</td>
</tr>
<tr>
<td>F</td>
<td>Below 70%</td>
</tr>
</tbody>
</table>

The mathematics education courses in FASTTRAIN’s Elementary Education Program integrate pedagogy and mathematics content appropriate for the elementary school grades. To earn a grade of A in the course, you must demonstrate excellence in both the pedagogical knowledge and the content knowledge of the mathematics appropriate at your level of teaching. Thus, the grading in the course is structured to help fairly evaluate student excellence in both areas. Exam work focuses primarily on ascertaining student excellence in handling mathematics content appropriate for the elementary grades, and represents 50% of your grade. Pedagogical knowledge is ascertained primarily through readings, assignments and participation in the course, and represents 50% of your grade. Therefore, if you demonstrate excellence in both pedagogical knowledge and content knowledge, you will receive a grade of A.
### VIII. Course Schedule
This course schedule is subject to change at the discretion of the instructor. Any changes will be announced in class.

#### SPRING 2006 CALENDAR

**CLASS SCHEDULE**

<table>
<thead>
<tr>
<th>Session No.</th>
<th>Session Date</th>
<th>Topic/Learning Experiences</th>
<th>Assignment(s) due at next session</th>
</tr>
</thead>
</table>
| 1           | Wednesday, Jan. 4     | • What is Mathematics?  
• Mathematics Topics: NCTM’s Principles & Standards 2000  
• Problem Solving  
• Assignment: Problem-Solving Journal  
• Assignment: Blackboard Journal  
• Assignment: Field Experience | Reys: Chapters 1, 6  
Reys: 2, 3, 8  
Interview with Mathematician Journal Entry |
| 2           | Wednesday, Jan. 11    | • Number Sense: Place Value  
• How Do Children Learn Mathematics?  
• Planning for Mathematics Instruction  
• Assignment: Lesson Plans | Reys: Chapters 4, 5  
Problem-Solving Journal (1st look) |
| 3           | Wednesday, Jan. 18    | • Number Sense: Elementary Numbers  
• Geometry: Plane (triangles)  
• Mathematical Processes  
• Assessment  
• Assignment: Student Assessment Interview | Reys: Chapters 3, 9  
Math Ed Website Journal Entry |
| 4           | Wednesday, Jan. 25    | • Basic Facts (diss, Game: Product Parfait)  
• Patterns: Perfect Squares  
• Geometry: Plane (quadrilaterals)  
• Designing Mathematics Lessons | Reys: Chapters 10, 11  
Student Assessment Interview Plan |
| 5           | Wednesday, Feb. 1     | • Tools: Computers (esp. Virtual Manipulatives), Calculators, Mental Math, and Estimation  
• Whole Number Operations  
• Patterns: Divisibility | Problem-Solving Journal (2nd look)  
Content Exam #1 |
| 6           | Wednesday, Feb. 8     | • Number Theory: Perfect Numbers  
**CONTENT EXAM #1** | Reys: Chapters 12, 13  
Lesson Plan Summary #1 |
| 7           | Wednesday, Feb. 15    | • Fractions, Decimals, & Percent | Reys: Chapter 15 |
| 8           | Wednesday, Feb. 22    | • Geometry: Solid (cubes) | Lesson Plan Summary #2 |
| 9           | Wednesday, March 1    | • Number Theory: Patterns in 9s | Reys: Chapter 7 |
| 10          | Wednesday, March 8    | Guest speakers  
• Tentative: Number Sense: Counting & Patterns  
• TBA | Reys: Chapter 17  
Student Assessment Interview Report |
|             | Wednesday, March 15   | Spring Break | |
| 11          | Wednesday, March 22   | • Data Analysis, Statistics, & Probability | Reys: Chapter 16  
Lesson Plan Summary #3 |
| 12          | Wednesday, March 29   | • Measurement | Problem-Solving Journal (3rd look) |
| 13          | Wednesday, April 5    | • Geometry: Plane (circles) | Reys: Chapter 14  
Formal Field Experience Report |
| 14          | Wednesday, April 12   | Last day of class before exam.  
• Algebraic Thinking | Content Exam #2 |
| 15          | Wednesday, April 19   | **CONTENT EXAM #2** | |

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IX. UNIVERSITY POLICIES

The university has a policy that requests students to turn off pagers and cell phones before class begins.

The College of Education and Human Development (CEHD) expects that all students abide by the following:

**HONOR CODE**

To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of George Mason University and with the desire for greater academic and personal achievement, George Mason University has set forth a code of honor that includes policies on cheating and attempted cheating, plagiarism, lying and stealing. Students must follow the guidelines of the University Honor Code. See [http://www.gmu.edu/catalog/apolicies/#TOC_H12](http://www.gmu.edu/catalog/apolicies/#TOC_H12) for the full honor code.

**INDIVIDUALS WITH DISABILITIES POLICY**

The university is committed to complying with the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 by providing reasonable accommodations for applicants for admission, students, applicants for employment, employees, and visitors who are disabled. Students with disabilities who seek accommodations in a course must be registered with the GMU Disability Resource Center (DRC) and inform the instructor, in writing, at the beginning of the semester. See [www.gmu.edu/student/drc](http://www.gmu.edu/student/drc) or call 703-993-2474 to access the DRC.

**ATTENDANCE POLICY**

Students are expected to attend the class periods of the courses for which they register. Although absence alone is not a reason for lowering a grade, students are not relieved of the obligation to fulfill course assignments, including those that can only be fulfilled in class. Students who fail to participate (because of absences) in a course in which participation is a factor in evaluation, or students who miss an exam without an excuse, may be penalized according to the weighted value of the missed work as stated in the course syllabus (GMU University Catalog, pg. 32).

**PROFESSIONAL BEHAVIOR & DISPOSITIONS**

Students are expected to exhibit professional behavior and dispositions. See [www.gse.gmu.edu](http://www.gse.gmu.edu) for a listing of these dispositions.

Students must agree to abide by the university policy for Responsible Use of Computing. See [http://mail.gmu.edu](http://mail.gmu.edu) and click on Responsible Use of Computing at the bottom of the screen.

X. ACKNOWLEDGMENTS

This syllabus, content, and course materials have been designed in collaboration with FASTTRAIN and Dr. Patricia Moyer-Packenham at George Mason University.

Approved December 2005