SED 413/613: Methods and Curriculum in Teaching Mathematics  
Spring 2011

Instructor:  Prof. Joanna O. Masingila  
203A Carnegie Hall  
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E-mail: jomasing@svr.edu  
Office hours: by appointment

Time:  Mondays, Wednesdays, Fridays  8:25-10:25 a.m. (except for Candidacy Student Teaching days)

Place:  222 Carnegie Hall (with some meetings in 110 Link)

Course Description:  This course is designed for students in the mathematics education certification program and mathematics education doctoral students wanting to learn about teaching a secondary mathematics methods course. Mathematical communication is a cross-cutting theme in this course that seeks to prepare teachers to learn from their own planning and teaching in grades 7-12 mathematics.

Learning Outcome Goals:  The learning outcome goals for this course are for students to:

1.  Progress toward becoming “mathematically proficient” (NRC, 2001) and know and articulate what it means for one to understand the mathematics in grades 7-12.

2.  Understand a framework for analyzing mathematical tasks and be able to select tasks, critique these tasks using the framework, and make appropriate modifications.

3.  Understand a framework for analyzing teaching and use this framework to analyze specific lessons from your teaching.

Primary References:
Reader articles posted on Blackboard

Order for Yourself As a Member After Joining NCTM

Assignments:
1.  Join the National Council of Teachers of Mathematics and subscribe to the Mathematics Teacher. You may also subscribe to Teaching Mathematics in the Middle School if you like.
2. Complete all readings and assignments and be prepared to discuss them in class.

3. Find, select, critique and modify a task from an article in the *Mathematics Teacher* or *Mathematics Teaching in the Middle School*. [Due January 26, February 4]

4. Construct learning goals for a lesson that you anticipate that you will teach during your Candidacy student teaching experience. [Due February 7]

5. Create an Inside-Out Circle structure activity for a class that you anticipate that you will teach during your Candidacy student teaching experience. Discuss your learning goals for this activity and what evidence you would collect to see if the learning goals are met. [Due February 11]

6. Create a Teller-Doer structure activity for a class that you anticipate that you will teach during your Candidacy student teaching experience. Discuss your learning goals for this activity and what evidence you would collect to see if the learning goals are met. [Due February 16]

7. Develop and revise a unit plan and five lesson plans for a topic you will teach in your Candidacy Student Teaching experience. [One lesson due on February 18; unit and five lessons due February 23; revised plans due April 25]

8. Teach a 15-minute lesson from one of the five lesson plans you developed. [February 18, 21, 23 or 25]

9. Write an analysis of teaching paper using the multimedia case study and considering (a) the strands of mathematical proficiency, (b) the mathematics task framework, and (c) the analysis of teaching framework. [May 2]

**Graduate Students:** In addition to the above assignment requirements, graduate students enrolled in this course will be expected to (a) use the readings on research on teaching and learning as the framing for their self-assessment of their peer teaching lesson, (b) draw on research-based readings in this course and from their other graduate courses to articulate the development of their teaching practice that will accompany their final unit and lesson plan, and (c) draw on research-based readings in this course and other graduate courses to complete an extended analysis for the analysis of teaching paper.

**Point Distribution:**
1. Class participation (including assignments that are to be brought to class) 10%

2. Critique and modification of two tasks from the *Mathematics Teacher* or *Mathematics Teaching in the Middle School* 10%

3. Learning goals 5%

4. Two structure activities (Inside-Out Circle; Teller-Doer) 10%
5. Peer Teaching 15%

6. Unit plan and five lesson plans 30%

7. Analysis of teaching paper 20%

Information on Assignments:

Task Critique and Modification. Select a mathematical task from an article published in the last four years (2007-present) in the Mathematics Teacher or Mathematics Teaching in the Middle School to review. Critique the task using the Mathematics Task Framework, then modify the task in ways that make it a better task. Classify the modified task using the Mathematics Task Framework. Send me an electronic copy of the article from which you took the task.

Learning Goals. Construct learning goals for a lesson that you anticipate that you may teach during your Candidacy student teaching experience. Give the content of the lesson, the goals that you would have for student learning for the lesson in terms of the required content and required skills (written using the language of Understanding by Design), and discuss how these relate to the strands of mathematical proficiency.

Activity Structures. Create an Inside-Outside Circle structure activity and a Teller-Doer structure activity for a class that you anticipate that you will teach during your Candidacy student teaching experience. Discuss your learning goals for each activity and what evidence you would collect to see if the learning goals are met.

Unit Plan and Lesson Plans. The first part of this course is designed to enable you to design a unit plan with accompanying lessons and to practice teaching part of one of these lessons. Each of the lessons should include ideas for making adaptations for learners with different needs. You will also have a chance to test the effectiveness of your lessons during your student teaching. Consequently, the revised unit (submitted at the end of the course) should include changes based on the feedback and reflections you receive from me, your host teachers, your classmates, and your students.

Peer Teaching. Each student will teach a 15-minute lesson from her or his developed lessons. Each student will be required to participate as a student in those lessons taught by her or his peers. Upon completion of these lessons, the student will complete a brief anonymous comment sheet that will be given to the instructor at the conclusion of the lesson. Each peer teaching session will be videotaped. Following your peer teaching session you will view your lesson on tape and write a 2-3 page self-analysis/reflection paper using feedback from the instructor and students in the class. This paper should not be a summary of the feedback; you should use the feedback to aid you in your own analysis. For the paper, choose one immediate decision and one planned decision that you made and analyze the reasons why you made these decisions and their effectiveness in improving student learning. Additionally, discuss at least two strategies you used to extend student thinking (e.g., wait time, follow-up questions, withholding judgment,
asking for summary, playing devil's advocate, encouraging thinking aloud). Finally, analyze your teaching using analysis of teaching framework. These reflections and comments should help you improve the lesson for use in your student teaching. The reflection paper is due one week after you completed your peer teaching in class.

**Analysis of Teaching Paper.** Using the three frameworks that have framed our work in this course (strands of mathematical proficiency, mathematics task framework, analysis of teaching framework), analyze the teaching on the *Weighty Decisions* multimedia case study in a 5-6 page paper. You can also draw on other courses readings (e.g., on questioning) in your analysis.

**Other Information:**

**Students with Disabilities.** Students who may need academic accommodations due to a disability are encouraged to discuss their needs with the instructor at the beginning of the semester. In order to obtain authorized accommodations, students should be registered with the Office of Disability Services (ODS), 804 University Avenue, Room 308, 315-443-4498 and have an updated accommodation letter for the instructor. Accommodations and related support services, such as exam administration, are not provided retroactively and must be requested in advance.

**Academic Integrity Policy.** The following material comes from the Syracuse University Student Handbook (an online version of the Handbook with additional explanations of academic integrity and examples of how it may be violated can be found at http://students.syr.edu/handbook/):

At Syracuse University, academic integrity is expected of every community member in all endeavors. Academic integrity includes a commitment to the values of honesty, trustworthiness, fairness, and respect. These values are essential to the overall success of an academic society. In addition, each member of the university community has a right to expect the highest standards of academic integrity from all other community members. Academic integrity is violated by any dishonest act which is committed in an academic context including, but not limited to, the following:

**Use of Sources** Plagiarism is the use of someone else's language, ideas, information, or original material without acknowledging the source. Examples of plagiarism: (1) Paper is downloaded from an Internet source and/or obtained from a paper mill; (2) paper contains part or all of the writings of another person (including another student), copied without citation; (3) paper contains passages that were cut and pasted from an Internet source, without citation.

**Course Work and Research** (1) The use or attempted use of unauthorized aids in examinations or other academic exercises submitted for evaluation; (2) fabrication, falsification, or misrepresentation of data, results, sources for papers or reports; in clinical practice, as in reporting experiments, measurements, statistical analyses, tests, or other studies never performed; manipulating or altering data or other manifestations of research to achieve a desired result; selective reporting, including the deliberate suppression of conflicting or unwanted data; (3) copying from another student's work; (4) actions that destroy or alter the work of another student; (5) unauthorized cooperation in completing
assignments or examinations; (6) submission of the same written work in more than one course without prior written approval from both instructors.

The culture of K-12 education in the United States encourages teachers to share materials with each other and to adopt and adapt commercially published materials for their particular teaching contexts. It may be quite appropriate, therefore, for you to use in your coursework or field placements activities, handouts, and/or lesson plans that you obtained from a mentor teacher, found on the Internet, or developed with another student teacher. At the same time, units, lesson plans, and curriculum materials are products used in many School of Education courses, including this one, to gauge your individual mastery of concepts and skills central to your success in the profession. Consequently, you are expected to cite sources, including personal communication or professional development workshops, for any material in those assignments that you did not create on your own. Please see me if you have questions about how to do this accurately.

**Semester Schedule**

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<thead>
<tr>
<th>Date</th>
<th>Topics and Reading Assignments</th>
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<tbody>
<tr>
<td>Jan 19—W</td>
<td>Overview of course; Introduction to the <em>Standards</em></td>
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| Jan 21—F | *Principles and Standards for School Mathematics*  
Assignment: read pp. 11-27 in NCTM (2000); read “The Strands of Mathematical Proficiency” |
| Jan 24—M | *Principles and Standards for School Mathematics*  
Assignment: read pp. 29-71 in NCTM (2000); read “Mathematical Tasks as a Framework for Reflection” |
| Jan 25—T | *Principles and Standards for School Mathematics*  
Assignment: read pp. 211-213 in NCTM (2000); prepare a brief presentation on one of the Standards 6-8; read “Selecting and Creating Mathematical Tasks” |
| Jan 26—W | *Principles and Standards for School Mathematics*  
Assignment: read pp. 287-289 in NCTM (2000); prepare a brief presentation on one of the Standards 9-12; **task critique and modification due** |
| Jan 31—M | Understanding by Design  
Assignment: read “The Case of Ron Castleman”; read “Backward Design” |
| Feb 2—W | Understanding by Design; Questioning  
Assignment: read “Alternative Patterns of Communication in Mathematics Classes: Funneling or Focusing?”; bring “Understanding by Design” activity |
Feb 4—F  Questioning; Analyze video clips
Assignment: read “Questioning our Patterns of Questioning”; task critique and modification due

Feb 7—M  Instructional Approaches and Lesson Analysis; Inside-Outside Circle Structure
Assignment: read through "Lesson Analysis 1”; be prepared to work on some of the activities in class and analyze the lesson; learning goals due

Feb 9—W  Instructional Approaches and Lesson Analysis; Teller-Doer Structure
Assignment: read through “Lesson Analysis 2”; be prepared to work on some of the activities in class and analyze the lesson

Feb 11—F  Instructional Approaches and Lesson Analysis
Assignment: read through “Lesson Analysis 3”; be prepared to work on some of the activities in class and analyze the lesson; Inside-Outside Circle structure activity due

Feb 14—M  Instructional Approaches and Lesson Analysis
Assignment: read through “Lesson Analysis 4”; be prepared to work on some of the activities in class and analyze the lesson

Feb 16—W  Planning and Instruction
Assignment: bring unit and lesson plans to class for sharing and discussion in small groups; Teller-Doer structure activity due

Feb 18—F  Peer Teaching
Assignment: one lesson due

Feb 21—M  Peer Teaching
Assignment: work on unit and lesson plans

Feb 23—W  Peer Teaching
Assignment: work on unit and lesson plans

Feb 25—F  Peer Teaching; New York State Standards, Common Core State Standards and the NCTM Standards
Assignment: unit plan and five lesson plans due

Apr 18—M  Analyzing our Candidacy student teaching experiences; Analyzing and Revising lesson plans

Apr 20—W  Using Case Studies to Reflect on Teaching
Assignment: look at “Video Overview,” “Lesson Plans” (Prior Activities, Day 1), “Video” (Journal Day 0, Class Day 1, Journal Day 1), and “Seating Chart,” on the CD; be prepared to discuss the task in terms of the Mathematics Task framework and analyze the teaching using the Analysis of Teaching framework
Apr 22—F  No classes—Good Friday

Apr 25—M  Using Case Studies to Reflect on Teaching
Assignment: look at “Lesson Plans” (Day 2), and “Video” (Class Day 2, Journal Day 2) on the CD; be prepared to discuss the task in terms of the Mathematics Task framework and analyze the teaching using the Analysis of Teaching framework

Apr 27—W  Using Case Studies to Reflect on Teaching
Assignment: look at “Lesson Plans” (Day 3), and “Video” (Class Day 3, Journal Day 3) on the CD; be prepared to discuss the task in terms of the Mathematics Task framework and analyze the teaching using the Analysis of Teaching framework; revised unit and lesson plans due

Apr 29—F  Using Case Studies to Reflect on Teaching
Assignment: look at “Lesson Plans” (Day 4), and “Video” (Class Day 4, Journal Day 4) on the CD; be prepared to discuss the task in terms of the Mathematics Task framework and analyze the teaching using the Analysis of Teaching framework

May 2—M  Reflecting on the Three Frameworks (Breakfast at my house!)
Assignment: analysis of teaching paper due

Lab Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Lab Activities</th>
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<tbody>
<tr>
<td>Jan 19—W</td>
<td>Tangram activity</td>
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<tr>
<td>Jan 21—F</td>
<td>Number Theory activity (Locker Problem and Factorization Activity)</td>
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<td>Jan 24—M</td>
<td>Perimeter and Area activity</td>
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<td>Jan 25—T</td>
<td>Hiker Lab  Parts I and II</td>
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<td>Jan 26—W</td>
<td>Hiker Lab  Parts III and IV</td>
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<td>Jan 31—M</td>
<td>Hiker Lab  Part V</td>
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<tr>
<td>Feb 2—W</td>
<td>Hiker Lab  Parts VI and VII</td>
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<tr>
<td>Feb 4—F</td>
<td>Adding and Subtracting Integers</td>
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<td>Feb 7—M</td>
<td>Multiplying and Dividing Integers</td>
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Feb 9—W Comparing Ratios, Percents and Fractions
Feb 11—F Making Sense of Proportions
Feb 14—M Symmetry Transformations
Feb 16—W Exploring Congruence
Feb 18—F Sneaker Problem
Feb 21—M Camp Problem
Feb 23—W Crime Problem
Feb 25—F Examining NYS Standards and Common Core State Standards via Internet

9:30-10:25 a.m. in 110 Link

Apr 18—M Geometer’s Sketchpad™ activities

9:30-10:25 a.m. in 110 Link

Apr 20—W Geometer’s Sketchpad™ activities

9:30-10:25 a.m. in 110 Link

Apr 25—M Geometer’s Sketchpad™ activities

9:30-10:25 a.m. in 110 Link

Apr 27—W Geometer’s Sketchpad™ activities

9:30-10:25 a.m. in 110 Link

Apr 29—F Geometer’s Sketchpad™ activities

9:30-10:25 a.m. in 110 Link